AMERICAN RAILROAD JOURNAL

NEW YORK [ETC.]

V. 5, 1836

Water vs. Liquor.

BY CORPORAL JOHN JONES.

Verein the comparison is decidedly in favor of the former.

Did you ever know the virtue, Ben,
That's in a drink of water?
I think as, being used to sprees,
By this time you should oughter;
Yet, fearin' you may not yet know
To use of this rare bev'rage
I'll tell you vot I think of it,
Ven taken at an av'rage.

Vater is werry excellent
Ven, travellin' a hot day,
You find a chrystial bubblin spring
A bilin' by the vay;
It thrills throughout a body's frame,
Worn out by travel's rigor,
And we résume our walk again,
With a re-doubled vigor.

Water's exhileratin'
Ven in a desert found;
How the whole caravan will crowd
The well to get around!
It is revivin' ven you've spent
Whole nights vithout a vink
'Cause you vas dry, to git as much
Vater as you can drink.

But there is a sitivation
As a person sometimes gits in,
Ven diff'rent kinds of bad liquors
A-nights you have been mixin',
And have been kindly put to bed,
Vith your boots and jacket on,
And vake up, with a hard headache
Ere half the night is gone;

Then—as you careful grope your vay
To the wash water stand,
And tumble o'er a dozen chairs,—
The pitcher greets your hand—
Culph!—and with greedy thirst a quart
Goes down your burnin' swallow!
It's just then that cold water beats
The spirit'us all hollow!

From the Examiner.

Loafer's Lament.

BY PILGARLICK.

"I vould not live alvays—I ax not to stay'
Vare there's plenty of vork, but no chance to play;
A straw to suck 'lasses, a mug of old beer,
Am enough for the life I vish to live here!

I vould not live alvays—no, darn'd if I would,
Vare loafers can't loaf as they used to could!
Vare Tuney Wan Wachten, our mortals foe,
Has shut up the rum-holes vare ve used to go!

I vould not live alvays avay from the bowl,
The only companion to cheer my lone soul;—
I vould not roam on through life's weary vay,
Vidout that old friend to "moisten my clay!"

I vould not live alvays—no, I'll be blow'd,
But in the dark grave I'd rayther be throw'd —
Vare ended vill be all my sorrows and sin—
Than thus be chok'd off from my good old raw gin!

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, JANUARY 9, 1836. [VOLUME V.—No. 1.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 9, 1836.

☞ The Title page and Index will be forwarded with the next number.

☞ Subscribers to the Journal who desire to obtain missing numbers, will please let us know as early as possible, that we may supply such as we may be able, from the *few saved from the fire*. A statement of the missing numbers should accompany the subscription for the fifth volume, in advance.

In commencing a new volume of the Journal, we do not deem it necessary, after what has been said in the last three numbers issued since the conflagration, to make any apology for its delay. We feel sensibly, and regret deeply, the cause, and look confidently to our patrons for forbearance, on account of its delay; while we, at the same time, upon our assurance that the Journal will be continued, in an improved style, and, we trust, with increased usefulness—and with equal confidence, look to them for prompt remittances for the current year, but *more especially* for *balances due* They need not, we are sure, be again reminded of the losses we have sustained, and the difficulties under which we labor, in consequence of them, to insure a ready compliance, not only with the previous, but also with the following request, viz. that each friend of the Journal will, as far as it is in his power, exert himself to *extend its circulation*. And in doing so, they may rest assured that its publisher will not be the only one benefitted.

If a few friends interested in Railroads would do as the writer of the following letter, with whom we are not even personally acquainted, the Journal would soon present a far more attractive appearance. He will please accept our grateful thanks for his very important aid in sustaining the work.

"New-Orleans, Jan. 7, 1836.

"To the Editor of the Railroad Journal:

"Sir,—I transmitted to you, a few weeks since, fifteen dollars for my own, and the subscription of others to the Railroad Journal for the ensuing year. On my way to this city, I obtained you ten subscribers, whose names are annexed—and inclosed I send you twenty-five dollars."

Thus we have received from one friend of the Journal, since the fire, *fourteen* new subscribers and $40. The Journal has many such friends, we trust.

CANAL NAVIGATION IN WINTER.—The following notice from the Baltimore Gazette of the 20th inst., states a fact which must be of interest to the friends of Internal Improvement everywhere. It affords us real pleasure to learn that any part of the country is in the enjoyment of such advantages—as it must, we think, induce others to use greater exertion to secure similar facilities, or their equivalent, in Railroads.

The information contained in the following paragraph is of deep importance to our city, and ought to be known, as it may stimulate the exertions of such, if any, of our citizens who may have had doubts on the subject—they will be convinced by this proof, that the benefit of the western trade to Baltimore is not merely in danger—to an alarming extent, as they will see, *it is lost*.

CHESAPEAKE AND OHIO CANAL.—The Williamsport Banner of Saturday, states that the Canal has been open and in active use for the last week, and that a great amount of business has been done upon it. Quantities of flour and other produce were daily arriving at that place to be forwarded on it to market.

A list of the boats and cargoes that cleared from Williamsport to Georgetown, for the week ending on Friday last—makes 3364 barrels flour, 315 barrels whiskey—45 barrels cloverseed, besides other articles of produce.

We find the following notice of the wonderful increase of travel to and from this city, in the Newark, N. J., Sentinel, of the 19th inst.

NEW-JERSEY RAILROAD.—In December, 1834, there were 6927 passengers carried on this Road, between Newark and New-York, while in December, 1835, (last month) the number was 16,081, exclusive of Elizabethtown and Rahway passengers. The accession from these towns is already considerable, and is increasing. We are told also, that notwithstanding the reduction of tolls on the old Post Road and Bridges, that the ordinary revenue has been fully sustained; a practical proof that the former policy of high rates was in no respect advantageous to the stockholders. In view of facts like these, who need be surprised at the great prosperity and growth of Newark?

INTERNAL IMPROVEMENT STATE CONVENTION.—This Convention met at the Assembly Chamber yesterday. Joshua A. Spencer, Esq., of Utica, called to order, and moved the appointment of Samuel Cheever, Esq., of Albany, as a temporary chairman. A. J. Parker, Esq., of Delhi, and C. P. Kirkland, of Utica, were appointed Secretaries.

Mr. J. A. Spencer suggested, that as the heavy snow storm had prevented a number of Delegates from reaching the city, an adjournment till to-day.

A. Stewart, Esq., spoke at length in explaining the objects and importance of the Convention.

On motion of Mr. A. L. Jordan, Esq., the following gentlemen were appointed a Committee to report the names of suitable officers for the Convention:—Messrs. J. A. Spencer, A. L. Jordan, R. P. Hart, T. W. Olcott, L. Bradish, J. E. Bloomfield, and A. J. Parker

And then the Convention adjourned till 3 o'clock this afternoon.—

TUESDAY, Jan. 12,—4 o'clock.

The Convention met pursuant to adjournment, in the Assembly Chamber.

Mr. Joshua A. Spencer, from the Committee appointed yesterday to select officers for the Convention, reported the names of the following gentlemen, which report was unanimously agreed to:—

Hon. SAMUEL CHEEVER, President.

Sumner Ely, Charles Borland, } Vice Presidents.

David C. Colden, Fletcher M. Haight, } Secretaries.

The Roll of the members was called and perfected.

Among others Hon. Mr. Maison of the Senate was invited to take a seat in the Convention. He remarked that the despatch with which the business was disposed of in this Convention was commendable. It savors a little of Jacksonism, although he saw a great many good men in attendance, who belonged to the other party. He was aware that the delegation from Dutchess county were authorised to fill vacancies, yet he would beg leave to decline the honor now offered him of a seat.

Mr. Loockwood, of the Assembly, upon a similar invitation, declined serving in the Convention, for the reason that he had had no *instructions* from his constituents to serve.

The minutes of the Convention held in Utica in November last, were then read,

When an interesting report from the Committee denominated "the Committee on Roads and Bridges," was read by the Secretary; Mr. Blunt, of New-York, the Chairman of that Committee, being unavoidably detained from the Convention.

We gather the following statistics from the report:—

Number of miles of common roads in the State, 71,204.

Number of days works assessed for the repair of these roads 1,378,748.

Number of miles of turnpike roads in the State 4124, supported at an annual cost of $112,840.

Number of bridges in the State 1031, supported at an annual expense of $21,210.

The annual amount expended in the repair of common roads is about $1,110,605.

The report upon Mr. Jordan's motion, was laid upon the table for the present.

Mr. Gordon then moved that a Committee be appointed to report subjects for the consideration of the Convention, which motion was agreed to.

Mr. Alvin Stewart moved a re-consideration of the vote by which the report was laid on the table, for the purpose of moving its acceptance.

Mr. Jordan remarked that he made the motion which he had, because the Chairman of the Committee who had made that report had informed that it was incomplete, and he was desirous to have it returned to him to complete.

Mr. Stewart supposed the Chairman could make any additional statistics in a supplementary report; but expressed his willingness to withdraw his motion of re-consideration if it was desired by any member to examine the reprt.

Mr. Spencer hoped the motion would be withdrawn for the present. The adoption of this report was not very important, excellent and able though it be. The first and most prominent business to be considered was the expediency of forming a State Society.

So the report was permitted to lay upon the table.

The Chair here named the following gentlemen to compose the Committee to report the business proper for the consideration of the Convention:

Alvin Stewart, of Oneida; J. A. Spencer, of Oneida; Luther Bradish, of Franklin; Joseph E. Bloomfield, of New-York; O. Titus, of Dutchess; A. L. Jordan, of Columbia; Gen. Welsh, of Chenango; Jesse Buel of Albany; Benjamin Walworth, of Chautauque; T. A. Leland, Steuben.

Mr. J. A Spencer moved the adoption of the following resolution, passed at the Convention in Utica:—

Resolved, That it is recommended to form a State Society for the promotion of Internal Improvements, and that this Convention, at its adjourned meeting, adopt measures to organize the same.

Mr. S. said he was desirous to have this resolution acted upon now, for the purpose of having it referred to the Committee of ten.

Mr. Hart thought the question on this resolution better be deferred until the report of the Committee of ten was made.

Mr. Spencer deprecated any delay of this resolution. He was desirous to have the great question settled at once—Shall we form a State Society or not? Upon this question he wished the expression of the Convention. If it was decided that a State Society should not be formed, he believed the briefer the session and the fewer the plans proposed the better.

Mr. Jordan thought it would be disrespectful to the former Convention, not to consider this question. It was there resolved to be expedient to form a State Society. They did not submit a plan. This they left for the present Convention to do; and he was desirous to obtain the sense of the Convention to-night upon this question.

Mr. Hart, of Troy, said he was not prepared to act; and he believed many others present were in a like situation.

Mr. Conklin, of Oneida, expressed the same views. He deemed the discussion of this resolution now, premature. He would therefore move to lay the resolution on the table.

Mr. Spencer regretted there appeared to be so much want of information on this first great step. He had hoped that members would have come here prepared to act upon this incipient question, at least, promptly. It was not proposed to adopt a Constitution, or say what the Society shall do after it was formed, but merely to say—shall we form such a Society? He wished the Convention to say whether we should do anything or nothing—on this great subject of Internal Improvement? If nothing, then no Society need be formed, and we might as well adjourn. But he hoped better things.

Mr. Carroll, of Livingston county, hoped that the resolution would be sanctioned. He was prepared to act now, and he trusted the majority of the Convention were.

Mr. Hart could not see why the gentleman from Oneida was so pertinacious in pressing this question to-night. If the question of forming a Society be the great question to be decided by this Convention, he supposed that it might be permitted to lay over until to-morrow.

Mr. Stetson offered a substitute to the resolution offered by Mr. Spencer, a resolution directing the Committee to inquire into the *expediency* of forming such a Society.

Mr. S. said he was of the number who wished a little time for reflection on this important question. He would not say but that he would be in favor of the formation of a State Society, and for its organization by this Convention, ultimately; but at present he would prefer a report from the Committee of Ten as to the expediency of the formation of such a Society. He did not wish to act too hastily, or to precipitate conclusions.

Mr. Dean, of Oneida, was opposed to the substitute, and in favor of the original resolution. He believed that a large majority of the Convention were in favor of the formation of a State Society, and of immediate action. He was sorry to see a disposition to delay this important question.

The question was then taken upon laying Mr. Spencer's resolution on the table; which was carried.

Mr. Stetson then withdrew his substitute —having offered it more for the purpose of postponing the final question until to-morrow, to give members time for reflection, than to create embarrassment, or an evasion of the question itself.

Mr. Gordon here moved an adjournment, but withdrew his motion at the request of a member.

The motion was renewed by Mr. Hart, of Troy, at the moment that

Mr. Bradish, (we believe) of Fraklin, offered a resolution directing the Committee of Ten to inquire into the expediency of forming a State Society; and if they *did* deem such a measure expedient, to report a plan for its organization.

Mr. Hart refused to withdraw his motion to adjourn: when the question was taken and the Convention adjourned to 3 o'clock to-morrow afternoon.

WEDNESDAY, Jan. 13,—4 o'clock.

After the reading of the minutes of yesterday,

Mr. Stewart, from the Committee of Ten, remarked that the Convention was aware that Mr. Gordon, first named as Chairman of the Committee, was compelled to resign that station, his private business demanding his attention at home. This resignation had caused his (Mr. S.'s) appointment. It was unexpected on his part, and he deemed it due to himself and the Convention to say, that *this* was his apology for the imperfection and brevity of the report. He trusted, however, that the report would not embarrass or retard the proceedings of the Convention.

Mr. S. then read the following report:—

We believe there is a general feeling in the public mind, that an enlarged system of

Internal Improvements, in the shape of Roads, Canals and Railroads, is the true policy for the State of New-York. By what means shall this belief and feeling be rendered the most available, to advance these great improvements? This is a question deserving our most serious consideration.

We believe that Nature has given to New-York a natural eminence in point of position and relation unsurpassed by any State or country on this continet. We believe her natural advantages—her natural capital—to be very great; but we also believe, that to that we may add almost as much more, by developing her entire capabilities by a grand and judicious system of Internal Improvements. If a kind Providence had done more for us than it has, room would not have been left for man to manifest his gratitude—discover his genius, and exhibit his patriotism.

We believe the more that public improvements are multiplied, the reason for complaints for taxation for their support will be diminished. For when the real estate of an individual is augmented in value, by a public improvement, or a new facility created to aid him in locomotion, or a new avenue opened for importing merchandise or exporting the produce of his soil, he must have a feeble idea of moral obligation, who would seek to evade the payment of his just part of such public work.

Taxation, toll, or impost, is the consideration money a people pay for a public blessing in the shape of an internal improvement. And we believe that the following is a fair rule by which to test the propriety of the State embarking in a public work:

Add the increased value of the lands and houses caused by the improvement running through the country where they are situated—add to this the time saved by man and beast—the reduced expense of the transit of merchandize or produce—add to this a reasonable sum for the agreeableness of manner of transacting business, by means of the improvement, as compared with old modes—then say if the interest on the capital sum these advantages are worth, exceed the interest on the capital required for the completion of the work;—then make it. It is, in the opinion of the Committee, demonstrated, if not mathematically, at least upon the principles of political economy, that the work should be prosecuted.

It is believed that were the present rates of toll preserved on the Erie Canal for 12 years to come, and the business transacted thereon was to increase in the same ratio it has for six years past, we should derive a revenue of three millions. Then say that half a million should be applied for repairs, improvements and use of Canal, we should still have left two and a half millions, or the annual interest, at 5 per cent. of 50 millions.

Your Committee have no question in asserting that whatever sum might be expended in the next twenty years, the State would reap a fourfold return. Every dollar expended in Internal Improvements, renders the State more desirable, more precious and more esteemed in the affections of its citizens, and draws forth their patriotic love. Every new mode of conveyance, by which time is saved, is a great object to the poor laboring man, for his time is his capital, and every hour lost in tardy locomotion, is a positive loss of his capital. A rich man thinks it hard to lose the interest of his money, but he is deeply affected at the loss of his capital; but the poor man who is travelling loses as much capital as he wastes of hours and days by a poor and tardy conveyance.

The Railroad is the poor man's road. It is the rich man's money expended for the benefit of himself and poor man.

Were an exclusive system of Internal Improvements adopted, and brought to completion, the facilities of intercourse would be so augmented, perhaps it is not too much to assert, that it would render life itself more valuable, by diminishing the stock of human misery, and adding to the state of human happiness.

The State of New-York will become, under the fostering care of intelligence and liberality, the garden of the American continent—a land in which Art shall give Nature fair play. New-York, standing at the gate-way of the ocean, holds the key in her hand which unlocks the treasures of the Americas.

This system goes far towards equalizing advantages. It gives the parts of the State which are sequestered, advantages bearing some proportion to those parts of the land on which Nature has poured out her bounties.

Why is that man rich? Becuse he lives in the city of New-York. Why is that man poor, of equal capacity to make money? Because he lives on sequestered barrenness. This poor man, which we have supposed, is the victim of position. To reduce the amazing difference of position, between one citizen and another, not by pulling down the fortunate, but by raising him up who is not so, is the consequence of a liberal system of Internal Improvements. Again, the money expended in these improvements, will mostly remain in this State, among our own citizens. It is not as though we were importing these improvements from a foreign land, and sending our capital there to purchase them. No, we buy these improvements from our own citizens. We buy their labor, provisions and materials: our own citizens receive the consideration money for the construction of these public works. But without consuming more of your time in general remarks, the question is asked, by what means shall light be collected and imparted to the public mind, so that New-York need no longer hesitate to take the high station the God of nature intended her.

Your Committee believe a State Society consisting of gentlemen of intelligence, leisure and patriotism, who are willing to aid in developing and perfecting the resources of this State, who shall meet annually at your Capitol, and impart to the public the information acquired during the year by the members of the Society, will best promote the interest we have at heart. We take the liberty of submitting a draft of a Constitution.

Your Committee believe that a Society, of which the most ambitious literary man might be proud of a membership, is the best plan this Committee can recommend, to secure the great objects of this Convention; which is, to have a body of our most patriotic citizens constantly in the field of inquiry, and bringing forth from their treasures "things new and old," by which the public mind may at last see the path of internal improvements too plain to ever lose its way.

All of which is most respectfully, &c.

ALVIN STEWART, Ch'n.

Mr. Buel said he was decidedly in favor of the recommendation of the report of the formation of a State Society. Such a society would be highly valuable to the State at large, in collecting statistical facts. The able report yesterday read to the Convention is conclusive evidence of what may be done in this department. In France there are Statistical Societies, and the important facts which they collect from the resources of the kingdom are found highly valuable, and prevent great labor to the Legislatures, and are of eminent service to the nation.—The proposition of forming a State Society met his views, and he was in favor of it.

Mr. Spencer remarked, that with a view to draw out the sense of the Convention, in relation to the formation of a State Society, he would move that the report, with the Constitution accompanying the same, be laid on the table for the present. He made this motion, for the purpose of calling up the resolution yesterday laid upon the table. He wished the question of forming a Society brought directly before the Convention, without being embarrassed by the Report or Constitution.

M. Stewart said he was sorry to differ with his friends from Oneida, but he thought it was not treating either the Committee or the Convention with due respect to pass by an original report to take up an old resolution, and thus crowd it in edge-ways.

Mr. Spencer regretted that his friend was so sensitive. He had made the motion, to have the question settled *apart* from the Report. Nothing could be farther from his mind than to treat disrespectfully either the Committee or the Convention.

Mr. Leland said, as the motion under consideration was to test the question, he would propose an amendment—to change the name of the Society to "the Statistical and Internal Improvement Society of the State of New-York." He thought the name would be more expressive of the objects of the Society.

At the suggestion of Mr. Jordan, Mr. Leland withdrew his motion for the present, and the original resolution—that a Society *should* be formed—was adopted unanimously.

The *Constitution* for the Goverement of the Society was then taken up, when

Mr. Leland proposed the alteration of the *name* as mentioned heretofore; but it was lost: when the Constitution was adopted.

The Constitution declares the object of the Society to be to develope the resources of the State, and to collect and impart information on all subjects connected with the advancement and prosperity of a general system of Internal Improvements.

The principle provisions of the Constitution are—

1st. The Society is to consist of one member from each county except New-York, which is to have four.

2d. The Society is to hold its meeting at the Capitol annually on the 2d Monday of January, and has power to confer honorary membership on eminent individuals out of the State.

Mr. Spencer moved that a Committee be appointed to nominate officers and members of the Society.

This resolution was adopted, as was also, the Report of the Committee of Ten, when the Convention adjourned, to meet to-morrow afternoon at 4 o'clock.

DETROIT AND ST. JOSEPH RAILROAD.—The Detrot Journal & Advertiser of January 2d says, and we certainly agree with them fully in the remark,

"Were our citizens to a man, fully impressed with the important results which will attend the construction of the Railroad from the St. Joseph to this city, we are

persuaded that the call by the Mayor for a full attendance at the adjourned meeting, at the City Hall this evening, would be responded to by an overflowing house. Those who have been in doubt as to its practicability, (if there are any such) should attend. We think such facts and data will then and there be presented, as will convince the most skeptical that the future commercial importance of Detroit, depends in a very great measure upon the vigor with which this work is prosecuted. Let no citizen suppose that he has no interest in it. Every merchant, mechanic, professional and laboring man, be he rich or poor, will participate to a greater or less extent in the general prosperity, which it will bring upon our youthful city. It has been truly remarked that in commencing this work we shall have to rely mainly upon our own resources; and as capital is limited here, the sum necessary to construct the work will have to be made up by an aggregate of small contributions. The shares amount to $50 each, payable in such instalments as may be required as the work progresses. We believe that there is not a man in any kind of business in this city, who is not able to subscribe for one, two, three, or more shares We say then, let every citizen attend the meeting to-night; let every fact which may bear upon the utility of this important work, be laid before the people—let vigorous and united exertions characterize the proceedings, which, with corresponding action in the county, will secure to us the construction of a noble work, which will be alike creditable to the enterprise of Michigan and important to her commercial interests."

MANHEIM AND SALISBURY RAILROAD COMPANY

At a meeting of citizens of the counties of Montgomery and Herkimer, friendly to the construction of the "Manheim and Salisbury Railroad," holden pursuant to public notice, at Russel's tavern in the town of Salisbury, on the 2d day of January, 1836, B. D. Winton, of Manheim, was appointed Chairman, and Henry Devereaux, of Nicholasville, was appointed Secretary.

A survey of the route, and an estimate of the expense of constructing the proposed Railroad having been made under the direction and superintendence of Mr. Robert Higham, one of the engineers of the Utica and Schenectady Railroad, and the maps, profiles and estimates, having been submitted to the examination of this meeting: Thereupon it was

☞ Resolved, That the citizens here present highly approve of the same, and of the report made by Mr. Higham.

Resolved, That in the opinion of this meeting, it is expedient to present a petition to the Legislature of the State, at the approaching session, praying for the amendment of the charter of said company, by which the capital thereof may be extended to the amount of three hundred thousand dollars, and the time for commencing the work may be continued until the 1st day of June, 1837.

Resolved, That for the purpose of opening from the valley of the Mohawk river, an easy, practicable, and direct communication to the extensive and valuable tract of land lying in the town of Morehouse and other towns in the county of Hamilton, it is expedient and necessary, in the opinion of this meeting, that the company should be authorized to extend their railroad to some convenient point upon the West Branch of the Sacondaga river, and that they be authorized to make a navigable communication from said river through Pesico Lake to Lake Pleasant, in the county of Hamilton, by such routes as may be most eligible.

Resolved, That the present Standing Committee be authorized to take preliminary measures for carrying the foregoing resolutions into effect; and to adopt such other measures as they may consider proper, to promote the object of said resolutions.

Resolved, That the proceedings of this meeting be signed by the Chairman and Secretary, and that the same be published in the Mohawk Courier, Albany Argus, and Evening Journal, and in the New-York Sun.

D. B. WINTON, Ch'n.

HENRY DEVEREAUX, Sec'y.

Newton, Sussex, N. J., January 9, 1836.

To the Editor of the Railroad Journal:

Sir,—At a meeting held two days since at Branchville, in this county, a resolution was passed, but by accident was omitted to be published, that, among other Editors, the Editor of the "Railroad Journal," of New-York city, be requested to publish the proceedings, a copy of which I accordingly inclose. You will much oblige the public of this county, by giving publicity to the proceedings. Respectfully,

GEO. H. M'CARTER,
Secretary of the meeting.

RAILROAD MEETING.—At a meeting of citizens of Sussex county, friendly to a Railroad, convened, pursuant to notice, at Branchville, on Thursday, the 7th of January, Joseph Northrup, Esq. was called to the Chair, and George H. McCarter and Pierson Hurd were appointed Secretaries.

The object of the meeting having been stated to be, to devise further means of forwarding the construction of a Railroad through the county, the following resolutions were adopted:

Whereas, the county of Sussex, in its products, is not surpassed by any comparative portion of the United States; and possessing, as it does, immense and numerous water powers, throughout the heart and centre of her area; and whereas, it is happily placed by nature in the line of route from the great west to the city of New-York; presenting in such a manner as will most advantageously benefit her citizens, a route, not only practicable but remarkably easy for a Railroad, upon which can be applied the locomotive power with advantage, and without the aid of stationary engines, from the city of New-York to the Delaware River.

And whereas, the Legislature of the State of New-Jersey, in the year 1832, granted a Charter for a Railroad, under the name and style of "The New Jersey, Hudson and Delaware Railroad Company," for ninety-nine years, to commence at any point on the Delaware, from the mouth of the Paulins Kill to Carpenter's Point, and from thence to the Hudson River opposite to the city of New-York, or to join on any Railroad leading to the said city.

And whereas, the people of the county of Sussex, as well as other adjoining counties, being deeply interested in the accomplishment of this great and important work: therefore,

Resolved, That this meeting take the necessary measures to bring before the public, and particularly to the notice of the capitalists, the importance of their Railroad route, and the great advantages which will arise from its peculiar location.

Resolved, That we are persuaded, from the facts of the feasibility of the route, and its comparative shortness to any other, being from seventy-five to ninety miles the nearest, that through the counties of Sussex, Morris, Essex and Bergen, will exist by a Railroad, one of the greatest thoroughfares in our Union.

Resolved, That to further the objects of this meeting, a delegation be appointed, to confer at Trenton, with a committee of the Morris and Essex Railroad, and according to a resolution of their Board of the 29th December, concert measures to effect the construction of this Road: Whereupon, Joseph Greer, Samuel Price, Joseph Northrup, jr., Zenas Hurd, Joseph E. Edsall, Uzal C. Haggerty, John Hull, Lyman Edwards, and George H. McCarter were appointed that Committee.

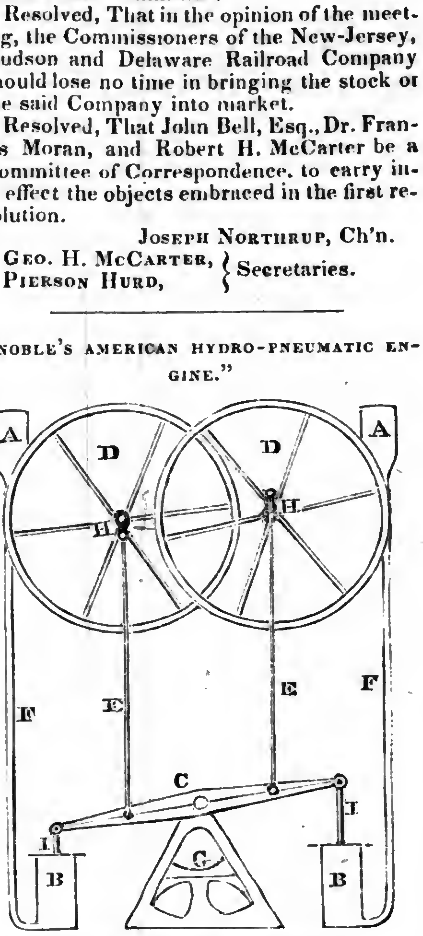
Resolved, That in the opinion of the meeting, the Commissioners of the New-Jersey, Hudson and Delaware Railroad Company should lose no time in bringing the stock of the said Company into market.

Resolved, That John Bell, Esq., Dr. Francis Moran, and Robert H. McCarter be a Committee of Correspondence, to carry into effect the objects embraced in the first resolution.

JOSEPH NORTHRUP, Ch'n.

GEO. H. MCCARTER, } Secretaries.
PIERSON HURD, }

"NOBLE'S AMERICAN HYDRO-PNEUMATIC ENGINE."



To the Editor of the Mechanics' Magazine:

Sir,—You will perceive in the Mechanics' Magazine of September, 1833, "A Suggestion for a New Motive Power," by myself, under the signature of G. N. The within described Engine I have presented to your notice, as being better calculated to show satisfactorily the principle upon which it depends for action, than the one above alluded to, as it is greatly improved. My attention has been drawn to this subject again, by the appearance of an article in your Magazine of November, 1835, headed "Galt's New Substitute for Steam," extracted from the London Mechanics' Magazine. By reference to the plan proposed by this distinguished gentleman, it will be seen that he intends elevating a piston, by means of a Bramah's press properly applied to force water under it; then, by discharging the water from below, to cause it to descend,

and by these means to acquire a motion and power as effectual and universal in its application as steam, without its danger of explosion. The question naturally occurs to a person examining the plan, "How is the press to be worked?" Undoubtedly by some auxiliary power, as steam, or by hand. If such is the case, (and that it is the article implies,) it should be recollected "*that whatever force is applied at one point can only be exerted at another, diminished by friction and other incidental causes;*" and also, "*that whatever is gained by the rapidity of execution, is compensated by the necessity of exerting additional force.*" The power, then, of the Engine is just equal to the force necessary to actuate the press, "*diminished by friction and other incidental causes.*" Hence, if the power of one man is sufficient to work the press, and consequently the Engine, it will be found that (supposing it applied to navigation) the man would move the boat with a greater velocity if he worked directly upon the oars or paddles. Now it will be seen that in the "American Hydro-pneumatic Engine" the necessity of a press is superseded, by continuing a pipe subjoined to the bottom of the cylinder perpendicularly upwards, and substituting the pressure of a column of water for the piston of the press. This pressure is, in its turn, suspended for a time by a pre-existent cause, which is put in action without a direct application of force. An engine might be worked with water by means of vertical pipes subjoined to a cylinder containing a piston, and the piston would be elevated with a force proportionable to its perpendicular height of pipe. If the water be now discharged from below the piston, and the supply obstructed, it will descend by its own gravity and the pressure of the atmosphere above—a vacuum being formed below by the discharge of the water. But the upward motion of the piston will be the most powerful. Now if a cylinder and piston be attached to each extremity of a working beam, the one will be exerting its maximum, while the other is exerting its minimum force, and the motion will be equalized. It is probable this method of using water where the fall is great and the supply small, is the most advantageous.

In the "American Hydro-pneumatic Engine" the same water is used continually, without any additional supply, except what is necessary to compensate for loss by evaporation.

References.—BB are two strong cast-iron cylinders, similar to those of a steam engine, but open at the top, containing pistons, fitted and packed in the usual manner with piston-rods. C, a working-beam, attached by fixtures for preserving a parallel motion to the piston-rods at each extremity. G, gallows-frame, for the support of the working-beam. DD, two balance wheels, moved by the shackle-bars EE, by the cranks HH. FF, are two pipes subjoined to the bottom of the cylinders, and continuing perpendicularly upwards, to any height not exceeding 32 feet. AA, are two air-tight chambers, attached to the top of the vertical pipes. There are slides or valves in the chambers, by which they can be made air-tight, or opened at the proper time. Also pipes for the conveyance of carburetted hydrogen gas, communicating with an iron retort or generator of gas. The slides for admitting and excluding the air, and apparatus for admitting and igniting the gas, and also the parallel motion, are not represented in the drawing. The drawing and description above is thought sufficiently simple to be well understood, without any additional trouble to your engraver, as the machinery for effecting the changes in different stages of the action is so simple as to suggest itself very naturally to any one.

We come now to the manner of putting it in operation. Water, or any other fluid, may be employed. The pipes and cylinders being filled, let the jet of gas in one of the chambers be fired, and the valves of the chamber closed, rendering it air-tight. The combustion of the gas produces a vacuum, raises the fluid in the pipes from beneath the piston, and allows the other piston to raise by the pressure of the column of fluid in the other pipe. The vacuum is now destroyed by opening a communication with the external air, and the vacuum being produced in the other chamber, the water returns to its original position, elevating the piston. Thus, a regular reciprocating motion is obtained, with a force equally applicable to driving all kinds of machinery with steam, with none of its danger. And the expense of working is comparatively small, nothing being requisite but a small fire for heating the retort.

It will also be seen that there is a limit to the size, and consequently power, of this Engine, as the pipe for raising the fluid employed cannot exceed 32 feet in height where water is used, and so in proportion to the density of the fluid mercury, oils, and other fluids may be made use of. And again, considerable difference may be made in the motion of this Engine by the comparative size of the pipe and cylinder. Where the pipe is small with reference to the area of the piston, the motion will be slow, with a great effective force, and the velocity will be greater where the pipe is larger, with less force. In the fast motion a greater quantity of the gas is consumed in a short time, and it is probable the same quantity is consumed in a longer time in a slow motion. Thus far I have endeavored to show, in my humble way, the *principle* upon which my "Hydro-pneumatic Engine" depends for its action. As before stated, I know not what Mr. Galt proposes, any more than is contained in the article in your last. But lest he should have hit upon my plan, I have published this, and shall claim the priority of invention, as I exhibited drawings of this nearly five years ago. It is a fact worthy of notice, that many important inventions of American origin have been brought out in England as original. Your talented correspondent, RUFUS PORTER, makes mention of one case, in the Rifle with a revolving breech—and there are many others.

The Aeranautical Steam Car published by your correspondent, Rufus Porter, is indeed very similar to the one proposed by me, and the coincidence is somewhat remarkable: it appears that both communications were received at the same time. But it was unnecessary for Mr. Porter to have supposed that the public would have thought he had taken any thing from mine, as his communications to this Magazine are of such a nature as to convince any person that he is a man of different stamp.

BUTLER G. NOBLE.

Dexter, N. Y., Dec. 17th, 1835.

From the London Mechanics' Magazine.

SELECT COMMITTEE OF THE HOUSE OF COMMONS ON ARTS AND MANUFACTURES.

MINUTES OF EVIDENCE.

Mr. John Jobson Smith, of the firm of Steward, Smith, and Company, Iron Founders, Sheffield, examined:—

What branch of manufacture do you particularly pursue?—Iron foundry, applied to ornaments.

Have you occasion to have models made to a great extent?—We expend about 1,500*l.* a year in the production of models of this kind for stoves and fenders alone.

[*The witness produced a model of a stove front.*]

Are your models, some of them, very beautiful?—They are very beautiful.

Has Sir Francis Chantrey expressed any opinion upon them?—Sir Francis Chantrey has seen some of them, which he said were the finest specimens of iron manufacture which he had seen in the kingdom.

In those works of art, how far is the inventor protected?—There is no protection at all; we have sent out such a thing as that on Monday morning, and it has been to Manchester, back again to Sheffield, and copied and returned to Manchester before Saturday night. The model which I am now speaking of cost us 50*l.* for men's labor.

Is the copy as good as your original work?—It is not; but they sell them so much cheaper, because they pay nothing for the production.

This, of course, is great injustice, and serious loss to the persons that invent the designs?—It is so great a loss, that we shall give up continuing it; I suppose that more than one-half of the patterns for stove-grates and fenders used in England have originated with us, but the piracy has come to such an extent, that unless there is some protection we must give it up altogether.

What would you suggest as a protection?—I should suggest some place, such

as the National Gallery or Somerset House, where those things should be registered and some mark put upon it, such as the royal cipher or crown, denoting the registry, and a protection given for a certain time, three years, perhaps.

Are you aware of the system by which patterns are protected in France?—I am not aware.

In the manufacturing towns of France there is a body consisting of one-half workmen and one-half masters, and to them the preservation of the patterns is confided by the law; the pattern is examined by this body, whose knowledge of the manufacture is sufficient to ascertain that it is original; the right of the presenter of it is recorded, with a given date, a small sum is paid for a protection for a certain number of years, and that record and the preservation of the pattern which is deposited in the hands of this body, enables him at once to enter legal proceedings against any pirater of the patent; do you think any such system of protection could be brought to bear in England, or can you suggest any better system of protection than that?—I should almost fancy that it would be impracticable in this country, because there is not such a location of the casting of iron.

Do you think a central board would answer the purpose?—I should think the object might be effected by a central board, where an actual cast of the original model might be deposited and registered, and left there a certain time for examination as to its originality, and the fact of its being registered might be proof of its originality after a certain time.

Would not the great difficulty be, that the persons who purloined patterns are ordinarily very inferior men, who could hardly repay the damage they have done?—It is not the case in articles of this kind, because there must be a considerable capital invested in the manufacture to produce it.

You think if you could verify the fact of your being the inventor, there would not be much difficulty in inflicting the penalty?—I think not.

You think it would not be worth the while of the inventor to go to the trouble and expense of registering unless the invention was worth protection?—No.

What are the class of artists that you employ for the production of patterns?—Some artists in London have been employed to make patterns for this description of goods. The young man that made this which I have produced has had no education in the art; he has studied from nature altogether, and this is a specimen of his production; he has risen so as to have the reputation of being the first in the trade.

Is he a person of considerable natural talent?—So much so that we have given him a share in the business on account of his natural talent.

Are those models drawn upon paper?—Yes; and if we were to confine ourselves to publishing them on paper, the law would give us a title to protection for them, but as soon as we bring them out in the form of a manufactured article we lose all right and title.

Are there several artists in Sheffield capable of producing such models as these?—There are several.

Have they increased of late years?—No.

Do they get tolerable wages?—They do not get very good wages, because the manufacturers in the neighborhood so depend upon piracy, that they do not employ them; but if protection were afforded them, each manufacturer would be forced to employ an artist.

You think that if art were better protected in this country, there would be a greater demand for beautiful designs?—There would, because the general taste is so much better than it was, that very superior things are now in demand.

To what do you attribute the improvement in the public taste?—I have sometimes attributed it to the fact of there being so many fine models in plaster for the external and internal decorations of rooms, by which means they have become better spread.

Do not you think that the opening of our intercourse with the continent has led to a great improvement in the national taste?—It has. French ornaments and French style have become introduced into this country, and become ingrafted into our own style.

Have you been able, notwithstanding the heavy duties upon this species of article, to export any to France?—No; we can send none to France; there have been some smuggled to France.

Do you think that the foreign models are superior or inferior to the English?—In this branch of manufacture I think they are inferior.

Are you aware that grates are not used in France?—They are used in France, I believe; they are porcelain grates very generally.

Are there persons employed at Sheffield to form those designs on paper?—No.

Have you attended to fenders as well as grates?—Yes.

Are the artists employed at Sheffield generally uneducated, or do they undergo some previous education in art?—They have had no education at all; it is a few men of natural talent, who have been accidentally directed to drawing very early, who have followed it up in this way.

Do you know any place in this country where a young man could obtain such knowledge?—No.

Have you a Mechanics' Institution at Sheffield?—We have.

Do not they instruct young men gratuitously in design?—They have got several works of design, but there is no instruction given; those works, however, have been of great service.

Do you think it would be a good thing to extend the means of instruction in design among the people?—Certainly.

And especially to open collections of the best specimens?—Yes.

Have you often heard among artists a wish expressed that the knowledge of art should become more accessible to them?—Yes.

Do you know any class of persons in this country who are capable of teaching that kind of art to which you allude?—I am not aware that there are any except at very great expense.

Have the parties who draw those patterns been instructed at all in drawing?—Not at all.

And the state of the law is such that there is little encouragement to artists?—A capitalist will not purchase the higher order of talent, because no sooner does he produce it than it is stolen from him.

What can an artist obtain per week by devoting his time to the production of models, in Sheffield?—About 3*l.* or 4*l.* if he is a clever man.

It is then the best paid labor?—It is.

How many artists do you suppose in Sheffield are solely employed in producing models?—Not above four.

Have they been all successful?—One of them has not been very successful.

Do not you think the public taste is so much improved that encouragement would be found for the production of articles more and more beautiful?—We find that we cannot produce articles too expensive for the public taste of the present day. Could we employ artists of a higher character, I am satisfied that the public would buy whatever was produced.

You think that cost would be no barrier to the sale of beautiful articles of art?—No; I should not myself hesitate in expending 200*l.* or 300*l.* in the production of a model for a grate to-morrow, if I had protection for it; but now it is certain that every thing worth pirating is pirated in three months; many things that are very good are pirated in fourteen days after the time of their production.

As the taste is perpetually varying, how long would you conceive a sufficient protection to a pattern?—I think three years would be the least. The custom of the manufacturers of those things is to visit their correspondents once in six months, and it frequently happens that there is some reason for not having a new thing at the time, and it is frequently a twelvemonth before a pattern comes fairly before the public. I think we should have a fair protection for three years.

Unless you give rather a long period to the protection of a design, is not the effect of it to allow only a man of large capital to reap the advantage from the protection, because he only can put out a sufficint quantity of the pattern to remunerate himself?—Yes; every person to produce things of this kind must keep an extensive establishment about him. Besides the payment of the designer and the modeller, there must be workmen who get high wages after they have been designed and modelled.

Would the amount of capital employed in your business depend upon whether you had a protection for two years or three years?—No.

Does what you state apply, not only to your own line, but to all other lines in Sheffield?—Yes.

And more especially to steel and plated goods?—All the articles of plated goods that are stamped.

Have you conversed with persons whom you think most capable of judging of the

propriety of legislative measures to protect such inventions?—I have.

Is the plan you have suggested of a central board the result of your inquiries among them?—It was my own opinion. I have not spoken to others respecting the details of the protection, but only generally; and I have the authority of Sir Francis Chantery to say, that he decidedly coincides in my views, and he thinks that it is most desirable that something should be done for the protection of arts of design.

Do you consider that the suggestion you have made would be practicable without interfering with the general convenience of manufacturers throughout the kingdom?—There is a certain class of manufacturers whose convenience it would most materially interfere with, in the same way that the police interfere with the practices of certain men.

You say that you think you ought to have it for three years; by what means could the numerous manufacturers of similar articles throughout the kingdom know when the period had expired?—I would say, that upon each article registered there should be a royal cypher and a crown cast, and a penalty should be attached to the casting that without a register, and there should be a penalty attached to casting it after the period of protection had expired, so that the public would know what articles were under the protection.

Suppose you put a crown upon an article on the 27th of July, how could a man that makes similar articles in Scotland, upon seeing one of those grates, discover from it whether your protection commenced in 1835 or 1837?—There would be the central register here, which should be open to the public, and he might obtain a drawing of any particular design by applying to the Register-office, and if it was worth his while to make it, it would certrinly be worth his while to apply for a drawing of it; but if it was necessary, the date might be put upon most things; upon a large article it might be done with the greatest facility, but there are many things so small, that we could hardly put the date upon it; for instance, an ornament that would have to be cast in the sand.

Do not you think, that if there was not the facility of copying that now exists, any new invention would be more slowly promulgated through the people?—We visit every town in England twice a year, and therefore the whole country has an opportunity of having those things if they please. The fact is, that instead of each house making designs for itself, or each employing an artist competing with the artist of another house, there are not above two or three now producing models for the whole of the kingdom.

Do you think it would be possible to effect the object in this way, by allowing the inventor to permit other persons to use the invention upon payment of a certain sum to himself?—I do not think that could be done. I think men would be more disposed to produce their own, than to live upon the reputation of their neighbors.

Is not there great difficulty in discovering what is a distinct pattern, and what is only a variation from a previous pattern?—There is the greatest difficulty there; but I think persons would not be willing to produce a pattern that was doubtful as to its originality.

Do not a great number of ornaments consist of a combination of old materials, and is it not likely that any other individual might combine these materials in a manner so similar as to make it difficult to know whether he had the object of piracy in view, or whether the similarity was not casual?—There would be so much of the particular mind and style of the artist, as to fairly constitute an original.

Is not this particular grate now before the Committee a combination of common ornament?—There has never been any thing approaching this before.

Unless it were so distinct, would it be worth your while to pay so much to your designer for it?—Certainly not.

Mr. John Martin examined:

You are well known as the painter of many eminent works: in your early professional education, had you occasion to acquire a knowledge of those manufactures that depend somewhat on the arts?—Yes.

State what branch you became acquainted with?—That of coach-painting.

What information can you give us on this portion of the subject?—I fear very little; only with regard to art there is great deficiency in drawing and coloring, as we know by the works on coach panels, but there is capability of a great deal of improvement, with the assistance of schools, or rather museums.

It would give, you think, a greater developement to art?—Supposing, at museums, such as the British Museum, there were professors capable of instructing; I mean for the study of the human figure, lanscape painting, architecture, and every other useful branch.

Have you pursued any other branch of manufacture connected with the arts?—China-painting; when I first came to London it was just going out of fashion, for it depends on fashion when not sufficiently advanced by the assistance of art.

What do you think of the state of art in regard to china-painting?—It is very low indeed, in consequence of the deficient knowledge in drawing and the arts in general; I believe it has gone down considerably since Mr. Muss and Mr. Marsh (who was a very eminent flower-painter at that time) left it.

Do you suppose that instruction is required for the artist in china-painting?—Yes, a knowledge of drawing is decidedly necessary; it was their knowledge of drawing, &c. that made Mr. Muss and Mr Marsh so superior to others; but owing to the decline of china-painting they were compelled to leave it; and it has since entirely gone to the ground.

When you speak of painting in china, do you include in that enamel-painting?—Painting on china is a sort of enamel-painting, but that which is generally understood by enamel-painting is the style in which Mr. Bone and Mr. Muss attained such pre-eminence; that it is strange that so splendid and truly national a collection as Mr. Bone's "Eminent characters of the Elizabethan age," should not long ere this have been lodged in the British Museum or National Gallery.

Have you turned your attention to the difference or the relative state of china painting in France and England?—I have seen some French painting on china, and upon the whole I think the finish is much higher.

Do they draw better?—Yes; the French are better draughtsmen, almost in every thing; I suppose they have a better opportunity of learning; besides it is patronised by Government.

You think for china-painting that instruction in correctness of design is very much wanted by our artists?—Yes.

For instance, you mean in anatomy, perspective and proportion?—Yes, every branch of art might be obtained in a museum where every one is permitted to go; but there are no professors in the British Museum, and the students can only learn by seeing others draw on the spot from things which are worth drawing; the Elgin marbles, for instance.

Do you not think it desirable that an artist should possess a knowledge of anatomy?—Certainly, for the drawing of the human figure or animals.

Might it not be desirable to give them opportunities of understanding *ab initio*, beginning with the skeleton, and going on to the whole proportion?—Yes.

And the study of the muscles?—Yes, and proportion, which has never been attended to.

Would a young man learn all these, according to this division of labor in the art, merely by a museum?—I think so, by proper masters.

You would have masters?—Yes; masters are necessary to give the proper direction to the pursuits of the student; but one master might teach two or three branches of the art, as follows: one master should teach anatomy and proportion; another, architecture, isometrical perspective and perspective; a third, landscape and nature in general; indeed, professors might be appointed to teach every branch of art, science, and literature; as in the British Museum every thing requisite is on the spot, and few alterations in the establishment would be needed. The National Gallery, and the National Gallery of Practical Science, might become branches of the British Museum. The grand object of a student should be to divide his time so as not to lose any, and not to give too much study to one pursuit or branch of the art. I firmly believe that the arts are useful to every branch of manufacture in the land; there is hardly a branch one can name that is not useful, from the lowest to the highest state of society; even to our legislature, drawing is useful, for they are not capable of judging of a plan without a knowledge of it; and they are consequently compelled to apply to practical men, and sometimes to dull-headed practical men, who are likewise often unacquainted with drawing, to have their opinion on any new principle in plans that may be laid before them.

Have you any other observations to offer as to china-painting?—No more.

You conceive, that were the artists instructed better in the principles of drawing, by improving the beauty of their productions, you would extend their sale?—Yes, and it would not depend too much on fashion, as it did when it was merely a passing thing, except that it would pass into other countries, and the beauty of design and workmanship would be admired in foreign countries, and be valuable in the commerce of that article.

At present, in china-painting, do we invent designs, or simply copy old ones already existing?—When I commenced, I invented my own designs, but that was peculiar, perhaps, to me; Mr. Muss and Mr. Marsh used occasionally to design their own.

At present do we invent as much, or copy more?—It has fallen so low, that what is done is not worthy of being called invention; the French *are beating* us hollow.

Independently of extending the sale of works of art, you would think you would confer on them a permanently intellectual interest, were the artists well instructed?—Yes; when we understand drawing, we cannot bear to look at a thing ill drawn; it affects the feelings in an uncomfortable manner.

Do you not think that the Wedgwood ware, which is made from the cheapest and commonest materials, by being made of beautiful forms and being covered by beautiful designs, has attained a rank it otherwise could not have obtained?—Yes, certainly; they are beautiful works of art, and though of the commonest materials, we are delighted with the forms. Painting will only interfere with the beauty of the form when it is very excellent; it is a rule in composition never to put an ugly object before a graceful one.

You mean that genuine beauty becomes permanent, and independent of fashion?—Yes, accidental circumstances can never affect real beauty; I have seen beautiful pieces of china in form disfigured by bad painting; in consequence of that, I have my china generally without any painting, as I like the form undisturbed; and though the other cost more, I would rather have given the larger price for the plain china, than for that which was painted, unless the painting was good.

Do you think china-painting might become an extensive means of developing designs?—Yes, it is perpetually before us; every day we see china; at all our meals the elegant and beautiful china is always before us; we are delighted with a piece of beautiful workmanship, and it might be rendered very cheap if there were a great number of clever draughtsmen as china-painters, but you could not find them now.

Few things come so constantly under the eye as china?—No, very few.

Can you give any information as to the state of glass-painting?—Yes, I was more occupied by glass-painting than any other branch before I became an artist.

Have the goodness to give the Committee such information as you have been induced to collect on the subject of glass-painting?—Glass-painting has fallen almost to the same level as china-painting; but it might be greatly superior now to what it was in ancient times. There is an ignorant opinion among people that the ancient art of glass-painting is completely lost; it is totally void of foundation, for we can carry it to a much higher pitch than the ancients, except in one particular color, which is that of ruby, and we come very near to that. We can blend the colors and produce the effects of light and shadow, which they could not do, by harmonising and mixing the colors in such a way, and fixing by proper enamelling and burning them, that they shall afterwards become just as permanent as those of the ancients, with the additional advantage of throwing in superior art.

Do you think that the glass-painting artist wants instruction in correctness of design as much as the china-painter?—Yes, more, as it is a higher branch of art; but one of the greatest drawbacks of glass-painting, and the great cause of its being neglected, is this: it is so liable to be broken, that no person can venture to pay the artist sufficiently for his labor, on account of the thin and brittle material on which he is obliged to work.

You think there is a want of encouragement?—Yes, or else glass-painting must have surpassed all other branches of art in splendor, as it is capable of producing the most splendid and beautiful effects, far superior to oil-painting or water-colors; for, by the transparency, we have the means of bringing in real light, and have the full scale of nature as to light and as to shadow, as well as to the richness of color, which we have not in oil-painting nor in water-color.

When you were employed painting on glass, did you find the Excise laws present any great obstacle to the improvement?—Yes, that was the greatest obstacle. We intended to make experiments on plate-glass; I did, and succeeded with it, but the expense of plate at that time, in consequence of the heavy duty, finally put an end to those experiments, as we could neither afford to purchase such expensive glass, nor to erect larger annealing-kilns, for if not properly annealed, the glass is liable to fly. I believe I was the only person who made experiments on plate-glass; they were supposed to be successful, only I could not afford to carry them on, for the reason before given. This is the principal cause of the fall of painting on glass, but if I could have made my experiments duty-free, I should have succeeded, for the plate-glass is so thick that it would be safe from being broken by ordinary means, and it has besides another advantage, that plates can be obtained sufficiently large to obviate the necessity for those bars which interrupt the present works.

Are the artists who pursue glass-painting now well educated in drawing?—No, the want of that knowledge has helped its decline; Mr. Hedgland, the architect, Mr. Hoadly and Mr. Oldfield, are, I believe the principal glass-painters remaining.

At the present time you think the cause of the badness of execution is owing to the want of education in drawing?—Partly so; I should have painted some of my own subjects, as the effect produced on glass would be particularly adapted to them, if the experiments, &c. had been less expensive. I have always regretted the cost of the experiments, as works executed on plate-glass on a very large scale would have been most magnificent in cathedrals or great public buildings; the knowledge and experience we had gained from our various experiments would have enabled us to produce grander works than had ever yet been seen in public buildings. I did not leave this branch of art without establishing a mode which has been, and will remain in use as long as glass-painting is an art.

Why did you discontinue it?—I could not get a sufficient price for a highly-finished work to pay for the hazard; I painted some very highly-finished paintings which were purchased by Lord Ennismore, who was very fond of glass-painting, and I finished Mr. Charles Muss's works, when he died in 1824.

After you left glass-painting you became historical painter and engraver, and have executed your own designs?—Yes.

Is there any protection for copyright in those original compositions?—Not the least; for the expense is so great, that even if we gain our action we sustain great loss, and can only recover so much as we can prove has been sold; and it is no easy matter to prove more than the sale of one or two prints, although we may know a thousand have been sold; we are therefore ruined if we go to law. I have in my own person experienced great losses from the system, as the French copies of my works are brought over from France and sold in every part of the country. I was told that various shops in Windsor had got my works lithographed and selling at very low prices, to my complete ruin; and if I am not protected by some new law, I shall be compelled entirely to leave that branch of the profession by which I live; for my pictures are so extensive and cost me so much labor that I cannot subsist by painting, as very few can pay me 1,000*l.* or 2,000*l.*, and I cannot execute them for less.

What is the principal defect; this expensiveness of the law?—Yes, in a great measure; it costs so much money to carry the law into execution, and as it is not exactly clear, we are not sure, after all, that we shall not be beaten, though our proofs are ever so good. The person may come forward with false witnesses, and swear that he did not sell.

But you have obtained an injunction?—No, I cannot get an injunction; I applied for one to prevent a person from exhibiting a copy of my work in a sort of diorama of Belshazzar's Feast, in Oxford street, and that person contested it with me. This diorama was a most infamous piece of painting, and the public

were given to understand that I was the painter; this was ruining my reputation, and at the same time taking that from me which ought to be my own, my copyright. I ought to have the power of demanding so much money for permission, but this copy was made not only without my leave, but my name given as the painter. I endeavored to stop the exhibition by an injunction, but was referred to a jury.

Is there any remedy that presents itself to your mind for protection?—Yes; I think I could be protected with regard to the law of copyright of engravings, &c., and take this opportunity of showing how incorrect is any opinion that may prevail as to the sufficiency of the present protection; for the plagiarist is not only safe from prosecution on account of the expense of such prosecution outweighing all the advantages that can be derived from a verdict; but as in my own case, he even comes into the field with a cheaper production, supported by all the effect of the advertisements, and other expensive means of publicity that my own performances had led me to adopt. He not only robs me of my ideas, but establishes a lucrative trade on the effects of my pecuniary outlay; wherefore I have always thought, and I still think, that the copyright should remain in the person of the designer, so long as he lives, and of his heirs, so long as they possess the works, the same as any other property, unless, of course, there be a distinct written agreement to the contrary. That it should be so is obvious, but there is not in fact any real protection to copyright, owing to the uncertain state of the law on the subject. Supposing, for example, that in the case of pirated copies of my engravings, I do by chance obtain a verdict from a jury, I can only recover the amount of what I can prove the defendant to have actually sold, which is my sole compensation for the thousands that are known to have been sold, but which it would be impossible to prove by evidence, since open book accounts of such transactions are never kept. Or take another case, of a picture being copied for a dioramic or other exhibition; suppose that on applying for the injunction, his Honor is not able to distinguish the difference between a picture of Belshazzar's Feast and a piece of lace, and leaves it for a jury to decide whether a diorama is to be considered a painting, or a copy coming under the meaning of the Act; all the satisfaction I obtain is heavy law expenses, with a certainty of an enormous increase if I hazard an action. The above cases are enough to prove that there is no efficient protection; but there are many other ways of infringing a copyright, one of which is, that any unprincipled person may copy an early and most imperfect work, and publish it as if just executed, although the publication of such a puerile attempt would never have been sanctioned by the artist from a regard to his own reputation. I will venture to suggest a method of protection; a committee of gentlemen and artists might be appointed to sit at the museum about once in the fortnight or month; say in the following towns, namely, for England, London, Bath, Liverpool, Birmingham, Hull, and Newcastle-upon-Tyne; for Scotland, Edinburgh and Glasgow; and for Ireland, Dublin and Cork, for the purpose of receiving and registering impressions of original works, after which the copyright should be considered as fixed; and all false copies found in any part of the United Kingdom, after the copyright has been fixed, should be seized. We should, likewise, have the power of seizing all foreign copies as smuggled goods, and treating the possessors accordingly. Thus no print should be protected unless deposited at the Museum, or whatever other place or places might be appointed; I think by that it would be put a stop to. I would have it at the British Museum, certainly; it would be desirable also to have them in each manufacturing town.

(To be continued.)

Experimental Researches into the Laws of the Motion of Floating Bodies. By J. S. Russell.—It was the object of these inquiries to assist in bringing to perfection the theory of Hydrodynamics, and ascertain the causes of certain *anomalous facts* in the resistance of fluid, so as to reduce them under the dominion of known laws.

The resistance of fluids to the motion of floating vessels is found in practice to differ widely from the theory, being, in certian cases, double or trible of what theory g ve and in other and higher velocities, much less. These deviat ons have now been ascertained to follow two simple and very beautiful *laws*:—1st. A law giving a certain *emersion* of the body from the fluid as a function of the velocity. 2nd. A law giving the resistance of the fluid as a function of the velocity and magnitude of a wave propagated through the fluid, according to the law of Lagrange. These two laws comprehend the anomalous facts, and lead to the following

Results.

1. That the resistance of the fluid to the motion of a floating body will rapidly increase as the velocity of the body rises towards the velocity of the wave, and will become greatest when they approach nearest to equality.

2. That when the velocity of a body is rendered greater than that due to the *wave* the motion of the body is greatly facilitated: it remains poised on the summit of the wave in a position which may be one of stable equilibrium; and this effect is such that at a velocity of nine miles an hour the resistance is less than at a velocity of six miles behind the wave.

3. The velocity of the wave is independent of the *breadth* of the fluid, and varies with the square root of the *depth*.

4. It is established that there is in every navigable stream a certain velocity at which it will be more easy to *ascend* the river against the current than to *descend* with the current. Thus, if the current flows at the rate of one mile an hour in a stream four feet deep, it will be easier to *ascend* with the velocity of eight miles an hour on the wave, than to *descend* with the same velocity behimd the wave.

5. That vessels may be propelled on the summit of waves at the rate of between twenty and thirty miles an hour.—[Proceedings of the British Association at the Dublin Meeting, August, 1835, London and Edinburgh Philadelphia Mag., vol. vii., p. 302.]

On an Economic Application of Electro-magnetic Forces to Manufacturing Purposes. By Robert Mallett.—The separation of iron from brass and copper filings, &c., in work-shops for the purpose of the refusion of them into brass, is commonly effected by tedious manual labor. Several bar or horse shoe magnets are fixed in a wooden handle, and are thrust, in various directions, through a dish or other vessel containing the brass and iron turnings, &c., and when the magnets have become loaded with iron, it is swept off from them by frequent strokes of a brush. This is an exceedingly troublesome and inefficacious process.

It appeared to the author that a temporary magnet of great power, formed by the circulation of an electric current round a bar of iron, might be substituted adventageously. The following is the arrangement which he has adopted. Several large round bars of iron are bent into the form of the capital letter U, each leg being about six inches long. They are all coated with coils of silk-covered wire, in the usual way of forming electro-magnets of such bars, and are then arranged vertically, at the interval of five or six inches from each other.

All the wires from these coils are collected into one bundle at their respective poles, and there joined into one by soldering, a large wire being placed in the midst of them and amalgamated. A galvanic battery is provided, which, if care be taken in making the junctions at the poles, &c., need not exceed four, or, at most, six pairs of plates, of from twenty inches to two feet square.—The poles of this terminate in cups of mercury, which are so placed that the large terminal wires of all the coils can be dipped into them, or withdrawn easily.

The rest of the arrangement is purely mechanical. The required motions are taken from any first mover, usually a steam engine. The previously described arrangement being complete, a chain of buckets is so contrived as to carry up and discharge over the top of the magnets a quantity of the mixed metallic particles: most of the iron adheres to the magnets, while the so far purified brass falls into a dish or tray placed beneath to receive it. This latter is also one of a chain of dishes, the horizontal motion of which is so regulated that the interval between two dishes is immediately under the magnets, in the interval of time between two successive discharges of the mixed particles on the bars.

At this juncture the communication between the galvanic battery and the magnets is interrupted by withdrawing the wires from the cups of mercury, and the result is, that the greatest part of the adhering iron drops off and falls in the space between the two dishes. The next dish now comes under the magnets, the communication is restored, and a fresh discharge from the buckets takes place, and so the process is continued.

Some iron constantly adheres to the magnets but this is found of no inconvenience, as it bears but a small proportion to the total quantity separated.

The author has had an imperfect apparatus of the sort above described at work for some time, and has found it to answer; and suggests the application of electro-magnets for somewhat as analagous objects in various manufactures. He particularly mentions needle and other dry grinding.—[Proceedings of the British Association: Lond. and Edinb. Phil. Mag., vol, vii., p. 305.]

HUNTER'S STONE-PLANING MACHINE.

Fig. 1.

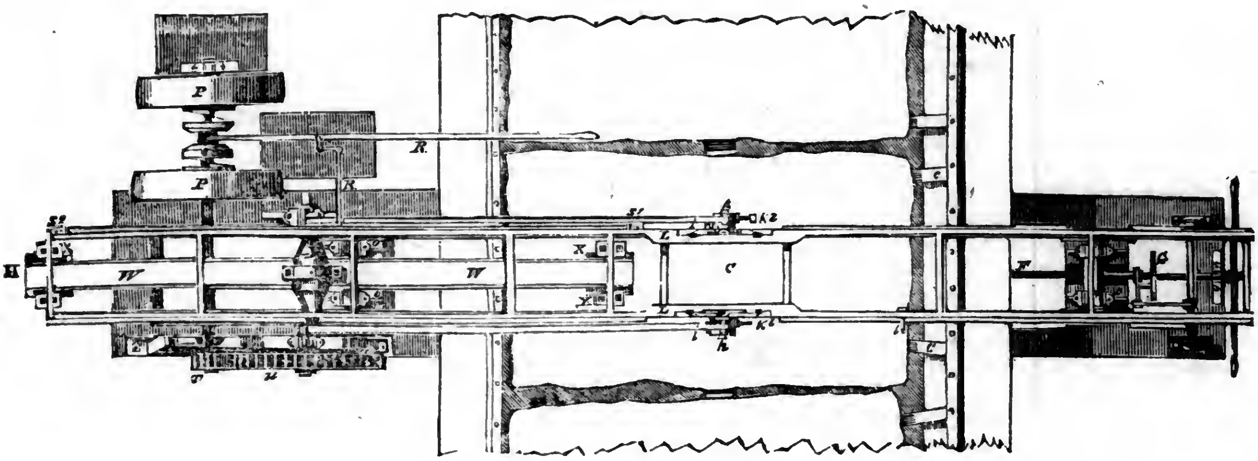
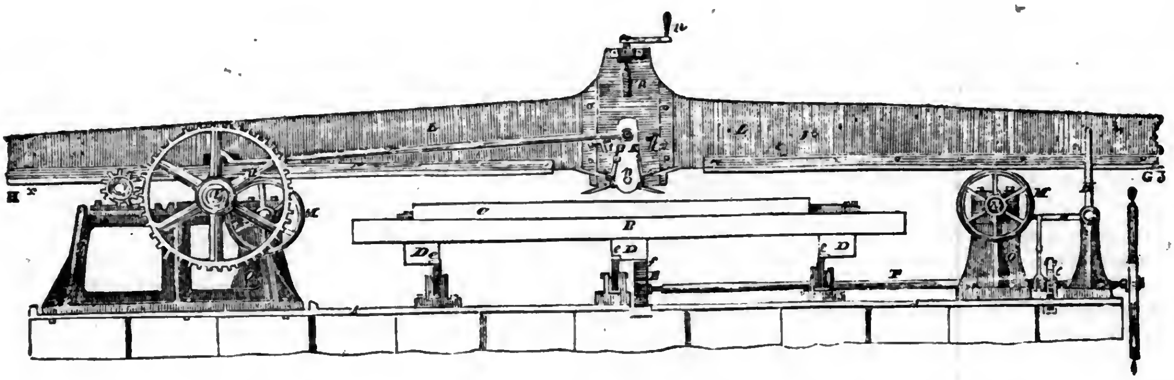


Fig. 2.



ELEVATION.

Fig. 3.

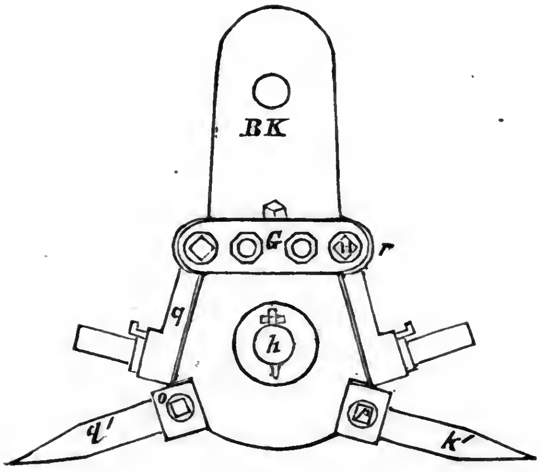
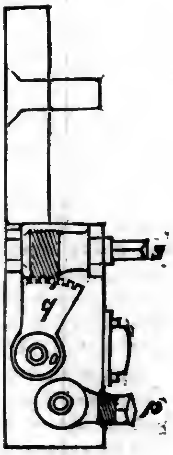


Fig. 4.



From the London Mechanics' Magazine.

HUNTER'S STONE-PLANING MACHINE.

Among the few exceptions to the universality of steam-power as a first mover, which existed a year or two ago, by far the most important was its very limited applicability to the cutting, dressing, and fashioning of stone. Many attempts had been made—some of them by machinists of first-rate eminence—to construct a steam-power machine which should supersede the mason's hand-mallet and chisel; but one and all had proved entirely abortive. Difficulty there was none in contriving steam-machinery that would slice or hew in pieces, and even with great nicety, the stoutest blocks which the quarry could furnish; but the difficulty lay in this, that the immense friction to which metal points or edges are subject, when brought with great force and in rapid succession into contact with so hard and gritty a material as stone of every description, caused so prodigious a waste in tools, that it far more than counterbalanced any advantage that could result from superior celerity of execution.

The merit of overcoming this serious objection, and of adding thus one more to the triumphs of the steam-engine, belongs to Mr. James Hunter, the Superintendent of the Leysmill Quarries, near Arbroath. After several years of thinking and contriving, and experiments without number, he has invented a power stone-planing machine, which is so ingeniously and judiciously contrived, that it cuts and dresses the largest blocks of stone not only with as much exactness as can be done by hand, but with so little injury to the tools, and with so much rapidity, as to leave all hand labor, in point of economy and despatch, at an immeasurable distance.

We have before presented our readers with some samples of the wonderful capabilities of this machine, (see the Report of Messrs. Carmichael and Kerr, C. E., published in our 612th Number,) and we are glad to have it now in our power to lay before them the first description which has appeared of the machine itself, to which we shall add some additional information of great interest which we have been favored with by the patentee respecting its performances.

The engraving (fig. 1) on our front page represents a plan of the machine as it appears in its complete state when fixed and ready for working, to a stone bed or foundation; and fig. 2 is an end elevation thereof. The steam-engine employed is omitted in both views.

The machine, of which AA is the sole or foundation plate, consists of three principal parts; *first*, a platform, which carries the stones to be planed; *second*, two tilt or cant blocks, which hold the planing tools; and, *third*, a traversing-frame, in which these tilt or cant blocks are fixed, and by means of which the tools are brought into action against the surface of the stone.

1. The *platform for the stones*. On the sole or foundation plate AA, three rows of traverse-rollers *a a a* are fixed. B B is the platform on which the stones C C are laid; it moves to and fro on the rollers *a a*, and is formed of planks, four inches thick, laid across three longitudinal beams D D, and securely bolted thereto. The two parallel bars *b b* nailed to the surface of this platform are about an inch thick, and faced with plate-iron; they serve as ledges within which to secure and steady the stones C C, by means of loose chocks of wood of different sizes. Where the longitudinal beams D D D of the platform rest or bear on the traverse-rollers *a a a*, they are strengthened to meet the extra pressure by under-plates of iron *e e e*. To the bottom of the central beam a toothed rack *f* is fixed, which extends from end to end.

2. *The cant or tool blocks*. BK, BK, are two blocks fixed into the traversing-frame, one on each side, with two tools i^1 i^2, k^1 k^2, in each. Fig. 3 is a front view and fig. 4 a side view, of these cant-blocks, on a longer scale than in figs. 1 and 2. They turn on studs *h h*, which are fixed in vertical sliding-blocks *m m*, which are moveable up and down by the screws and handles *n n*, so as to be adjustible to any thickness of stone that may be required to be cut. The two tools marked i^1 and k^1 are roughing tools, and those marked i^2 and k^2 are finishing tools. All are of a round form, and about an inch in diameter; the two finishing ones have chisel or broad mouths. Both sets of tools are fixed in wrought-iron tubes *o o* by means of adjusting screws *p p*, which tubes are turned so as to fit accurately into holes bored in the cant-blocks B K. To each set of tubes in which the finishing tools are fixed a short lever *q* is keyed on, the upper end of which is slightly curved and toothed, and above it there is a horizontal screw *r*, which works into the teeth of this lever *q*, so that by applying a spanner to the square head *s* of the screw *r*, the finishing tool may, through the medium of the screw, the lever, and the tube, be adapted with the greatest nicety to the surface of the stone to be planed and dressed. No such nice adaptation is necessary in the case of the roughing tools, and to them, therefore, no such adapting lever is applied. G, fig. 3, is the cover for the pivots of the screw *r*. Two brackets are affixed to the face of the vertical sliding-blocks *m m*, in the manner represented in fig. 1, and two screws, *t* and *u*, are inserted therein, which screws serve to limit the arc described by the cant-blocks B K, B K, in turning on the studs *h h*, as afterwards more particularly explained.

3. The *traversing-tool frame*. L L is a large sliding-frame, in the centre of which the working or planing tools are fixed, and which has a space of about six feet to traverse in, three on each side of the position in which it is represented in the engravings. This frame rests on four wheels or friction-rollers M M M M, affixed to the shafts N N, which revolve in brackets O O O O. PP are two pulleys, which revolve on an axis fixed in the standards G G, one of which is worked by an open strap, and the other by a cross strap, so that they may revolve in opposite directions, and thus give a reciprocating motion to the frame L L. Q is a clutch between the pulleys P P, connected with the handle and crank R R, which are acted upon by studs or catches S^1 and S^2, projecting from the sides of the sliding tool-frame L L in such manner as to make the clutch operate on each tool alternately. T is a pinion fixed to the end of the axis of the pulleys P P. U, a spur-wheel, into which the pinion T works, V the axis of this spur-wheel, on which axis there is fixed a pinion (not seen in the engravings), which works into a sliding-rack W W, the teeth of which point downwards. X X X X are the bearings on which the rack W W slides. Y Y is a strong beam fixed across the back of the rack W W, the ends of which project through the sides of the sliding-tool frame L L. Z Z are two connecting-rods, which pass from the ends of the beam Y Y to the blocks in which the planing-tools are fixed, as before explained. E is a pinion, which works in the toothed rack *f* on the under side of the central longitudinal beam of the platform B. F is a shaft, to one end of which the pinion E is fixed. G is a ratchet-wheel, near to the opposite end of the shaft E. H H is a pall and crank attached to a cross shaft, supported by the standards *l l*, which acts on the ratchet-wheel G. I is a pin, fixed in the side of the traversing-frame L L, and which, as that frame moves towards the side G*z*, catches the upright arm of the crank H, and presses it forward in that direction. K is a wheel, which, operating through the intervention of the shaft F, pinion E, and rack *f* on the platform B, throws it entirely back when all the stones upon it have been planed, or returns it under the planing tools if any part of the work requires to be gone twice over.

The *mode of operation* requires but little additional explanation. The platform being filled with blocks of stone, the vertical blocks *m m* are so adjusted that the roughing tools shall strike each block of stone as it passes under them, at such a depth below the top surface, as to sever and throw off before them large portions of the stone at a time, taking care always that the depth shall be within such limits as that the line of least resistance shall terminate in the top surface of the stone, so that the fractures shall all tend in that direction. When this adjustment has been made, the sliding-frame L L is to be moved towards H *x*, and as it traverses in that direction the sliding-rack W W carries the cross-beam Y Y in the same direction, until the connecting-rods Z Z have drawn the cant-blocks over as far as the screw *t*, when the roughing tools *i* and k^1 will be brought into operation against the stone, and so continue till the projecting stud or catch S comes in contact with the crank R, and throws the clutch off the pulley then in operation on to the other pulley, which will make the frame return in the opposite direction G*z*. The sliding-rack W W carries back at the same time the cross beam Y Y, till the connecting-rods Z Z push the cant-blocks over against the screw *u*, when the tools i^1 and k^1 are brought into play, and so continue till the catch S^2 comes in contact with the crank, and again reverses the motion. At the moment of this last reversal of the motion taking place, the projecting pin I also throws over the upright arm of the pall and crank H H (in a manner similar to the yard-beam of a power-loom), and brings

forward the platform B with the stones for the next operation of the planing tools. The pall and crank H H falls back of its own weight into its former position, as soon as the pin I recedes from it. When the roughing tools are first brought into action, through the traversing of the frame L L towards H *x*, they commonly leave the surface of the stones in ridges, but the finishing tools being farther back, take off these ridges when returning, and so on till the planing of the blocks is completed.

No time is lost in clearing the platform of the finished blocks, as the men in attendance on the machine are removing the blocks at one end while the machine is at work at the other, and a minute or two suffices to return the platform. The frame L L generally traverses at the rate of 30 feet per minute, and a set of stones filling the platform from end to end, can be planed in about 45 minutes. As each tool wears it can be readily removed for the purpose of being repaired, or replaced by new tools by loosening the adjustings-crews *p p*.

The master feature of the invention appears to us to consist in the means provided for so adjusting the roughing tools (which have the roughest part of the work to perform), that they shall strike the blocks of stone as they pass under them, not *upon* the surface, as usual, but at *such a depth below it*, that the surface is driven off in large portions at a time. Not only are two or three tools thus able to do the work of a great many,* but the tools have time given them between each stroke to cool; or, to speak more properly, the strokes are made at such intervals that the tools never get sufficiently heated and softened to lose their original tempering. And hence this somewhat paradoxical consequence, that *the greater the thickness of surface which the tools have to cut away, the greater will be their efficiency, and the less they will be injured*: for the lengths of stone driven off at each stroke will always be proportional to the depth of the cutting, and the rest given to the tools in exactly the same ratio. We are informed that, in point of fact, the wear of iron is less by one-half in taking off two inches at a time than in taking off half an inch.

Another valuable though subordinate feature of the apparatus, is the ingenious manner of securing the tools in their places —the union of absolute fixedness while in operation, with the greatest facility for removing them as they are worn out and required to be repaired or replaced. The shaking or recoil after each stroke of the tools is stated to be so small, as to be hardly perceptible to the eye.

An important consequence of the equability of the force applied to the tools is, that the facing given to the stones by this machine is much smoother and sounder than any facing which can be given by the mallet and chisel. The surface of hand-wrought stones is always so bruised, or, what is technically called *dazed*, to a certain depth through the unavoidable varieties of strength and direction with which the chisel is applied, and this dazed portion has all to be rubbed off by the polisher before a sound face can be obtained. But in the case of the machine-planed stones, the surface is left in so nearly sound a state, that the labor and expense of after-polishing is reduced more than one half.

The stones, to the cutting and dressing of which this machine is advantageously applicable, must not, of course, be any of an exceedingly precious description—none of the rarer marbles for examples; but such as exist in so great abundance, that an inch more or less cut away from a surface is of no consequence, and such too as acquire their chief value from the labor bestowed on extracting them from the quarry, and dressing them for use. The sorts of stone to which the patentee considers it to be most applicable, are sandstones, limestones and freestones, in all their varieties.* The power and velocity requisite vary considerably, according as the stone is soft or hard. Thus, for example, the Arbroath, which is a sandstone of very close and firm grain, admits of a degree of speed many times greater than some of the softer sandstones; and requires a power just so many times less. Again, stone harder than the Arbroath would require both the strength of the machine and the power of the steam-engine to be proportionally increased.

During the last summer there were six of these machines at work in the Leysmill Quarries, which planed upwards of 170,000 feet of pavement. They are worked by one steam engine of 6 horse power, which has to work besides two inclined planes, up one of which the stones are dragged from the quarry to the machines.

We have before spoken of the Report of Messrs. Carmichael and Kerr, C. E., on the performances of these engines, and must here content ourselves with referring our readers to it for some very important and satisfactory details on this head. The attention of the Highland and Agricultural Society of Scotland having been drawn by one of its members to this Report, their Secretary was directed to request W. F. Lindsay Carnegie, Esq., the Proprietor of the Leysmill Quarries, to favor them with "a statement showing the comparative expense of machine-dressed stone and that dressed by hand." The following is an extract from Mr. Carnegie's answer to this application:—

"In the first place, looking at the Report of the engineers (Messrs. Carmichael and Kerr), it will be seen that the wages of the people employed in dressing 4,400 feet, amounts to 6*l.* 15*s.* 6*d.*; this includes the wages of all employed in laying on, dressing, turning, and taking off the stones, and also the wages of a person employed in repairs and the construction of additional machinery. To the above may be added for coals 15*s.* (our local situation enhances this item considerably), and for interest of fixed capital, and wear and tear about 2*l.* The calculation will then stand thus:—

Wages	6*l.*	15	6
Coals	0	15	0
Interest	2	0	0
4,400 feet, at	9	10	6

about four-tenths of a penny per foot. It is more difficult to state what the exact cost of dressing the same stones by hand would amount to. I may say, however, with perfect safety of being within the mark, that the stones in question could not have been dressed by hand at less than four times the cost by the machine, and that this is rather below than above the ordinary rate of difference.

"It was purposely left to the engineers to take their choice of any of the machines as they found them in the ordinary course of working, no notice having been given to the men, nor any preparation made.—As it happened, the stones in hand came from one of the most indifferent strata of the quarry, and the results shown came proportionately below the usual average.

"Had it been thought desirable to show off the machine to the greatest advantage, it might easily have been done, and without the slightest deception, very different results might have been brought out.—Thus, on account of their great weight, large stones, such as landings, grave-stones, &c. are previously squared in the quarry; when laid on the level, therefore, they fill accurately all the space the machine traverses.

"Suppose such a stone, 12 feet long by 6 broad, and 8 1-2 inches thick, and that it were required (an ordinary case) to be reduced to 7 inches in thickness. I am quite safe in saying, that the machine will do this in forty minutes, leaving the surface so smooth, that 9*d.* in hand-labor would bring the 72 feet to a perfect polish.

"Estimating as above the cost of working four machines for sixty hours at 9*l.* 10*s.* 6*d.*, forty minutes of one machine would amount to 6*d.*, but say an hour or 9*d.* as the cost of hewing 72 feet by the machine, that is about one-eighth of a penny per foot.

"To bring the stone to the same state by hand, the mason would require to go over it with four operations. He would, to speak technically, 1st, 'dab it over rough with a puncheon;' 2d, 'broach it close with a puncheon;' 3d, 'scabble it with a chisel;' 4th, 'angle drove it for polishing.' In this state, in consequence of the bruising operation of his chisel on the face being greater than that by the machine, it would cost twice as much to polish it.—The cost of the above four operations, at the lowest estimate, would be 2 1-2*d.* per foot. Thus the cost of hewing by hand and by machinery, would, in this case, be as 20 to 1.

"In estimating the outlay by the machine, ample allowance is made for the handling of the stones, the chief expense in the wages of the extra people attached to the mill, while nothing is charged for the assistance the mason would undoubtedly

*In a stone-planing machine lately patented, the capabilities of which were much talked of for a time, there were no less than from 30 to 40 tools, to be applied in rapid succession to the stone.

*We are authorised by the patentee to state, that if any proprietor or lessee of a quarry, who may be desirous of trying the applicability of the machine to any particular species of stone, will forward a block of it in a rough state (carriage free) to Mr. Hunter Leysmill, near Arbroath,) it will be returned to him planed and polished, along with an accurate report of the time occupied in the work, power applied, wear of tools, &c. Or, parties sending to Mr. Hunter two blocks capable of being turned into vases, according to patterns or drawings sent therewith, will receive in return one vase along with a report, &c. free of charge.

require in setting up and moving this stone. If this were taken into account, it would go far to double the comparative difference."

After receiving the above information, the Society thought the matter one of so much public importance, that they appointed a Special Committee of their number to repair to Leysmill, to "examine the machine in operation," and report the result of their personal examination. The Committee consisted of the following gentlemen:

Lord Panmure.
Mr. Carnegie, of Craigo.
Mr. Hawkins, of Dunnichen.
Mr. Millar, of Ballumbie.
Mr. Proctor, of Halkeston.

This Committee paid a visit to the quarries, accordingly, on the 29th of June last, and the following is their report to the Society:—

"With reference to the statements contained in a letter of date the 10th day of June current, from Mr. Lindsay Carnegie to the Secretary of your Society, your Committee are convinced that these statements are fully borne out, and beg to submit the result of their own observations—the following facts:—

"There were put upon the bed of the machine at the same time, three pavement-stones, in a rough state, and of unequal thicknesses, the first of which contained $12\frac{1}{2}$ superficial feet, requiring to be reduced two inches in thickness; the second, containing $16\frac{1}{2}$ superficial feet, requiring to be reduced three quarters of an inch; and the third, containing 18 superficial feet, and requiring to be reduced one inch and a quarter; the whole of which stone, amounting in all to 47 superficial feet, were reduced and polished in thirty minutes, including in this the time occupied in shifting the irons.

"Your Committee beg further to state, that with a view of comparing the working of the machine and hand labor, they interrogated Mr. Donald Mackay, master mason and builder, in Arbroath, who stated that to have accomplished the same work in the ordinary way by the hand, would have occupied a good mason five days and a half, at a cost of 15*s.* 9*d.*, according to the present rate of wages in this part of the country; whereas, according to calculations submitted by Mr. Lindsay Carnegie, and which your Committee have every reason to believe correct, the expense would amount to about 1*s.* 7*d.*

"In addition to the trial above noticed, your Committee saw stones, of the hardest quality, from different quarries in the country, dressed by the machine with a corresponding advantage; and your Committee cannot close this report without expressing their conviction of the great advantages to be derived from the extended operation of Mr. Hunter's machine, as being the means of preparing for the market as pavement, a quality of stone, which, without its assistance, could never be turned to account, as also the great saving to be obtained by its application to this hewing and dressing of all sorts of freestone.

"Your Committee beg leave also to report, that by the same steam-power they saw in operation the same principle applied as an experiment to a turning machine; from which they are satisfied that it may be applied with economy and advantage to the turning of stone vases, and other ornamental work."

"Leysmill, June 29, 1835."

The concluding passage of the preceding Report recalls to mind that we have yet one of the most valuable properties of this machine to notice—namely, that besides facing and dressing blocks of stone, it can be made (with the help of a lathe coupled to it) to turn, bore, and hollow them as well. Columns, ballisters, vases, drilled chairs and sleepers for railways, &c., may all, by this machine, be produced with a degree of accuracy, despatch and economy, wholly unattainable by hand labor. We mentioned in our notice of the last Meeting of the Institute of British Architects, (vol. xxiii., p. 349), one remarkable proof of this, which Mr. Carnegie presented to that Society, namely, a handsome vase turned out of the solid block, in the course of a single day's work, twenty inches high, and eighteen across the mouth. But this is nothing, we find, to what Mr. Hunter is making preparations to accomplish in the course of next winter's leisure. He talks with great confidence of being able to produce vases four feet high!—exact copies of our finest antiques, in all but the ornamental tracery, which must still remain to be done by hand. Of the ease with which holes might be drilled in stones by such combined machinery, the following extract from a letter, which we have seen from an eye-witness, furnishes equally striking evidence. He is describing a first trial in boring made by Mr. Hunter. "The stone," he says, "was old quarried and of the hardest yolk, and $5\frac{1}{2}$ inches thick, the bore $1\frac{3}{4}$ inch diameter, and the time in going through the stone was exactly $2\frac{1}{2}$ minutes; *it ran through it like wood.*"

The Arbroath stone on which Mr. Hunter's machines have been hitherto chiefly employed has been long in great request for foot-pavements, market-places, kitchen floors, &c.; and now that it can be produced by means of machinery in any quantities, will probably become still more and more so. It possesses this great advantage over the Yorkshire flag, that it resists the damp much better and dries more quickly; while it is, at the same time, equally cheap. In this point of view it has but one rival, the Caithness flag, to which however it is, in uniformity and homogeneousness of texture, vastly superior. In Scotland this species of stone, painted and varnished, is now getting into extensive use as a substitute for marble; it is a great deal more durable than Scagliola, and not half so expensive.

WINDMILL SHIP.—The *Biblioteca Italiana* mentions, that one Guiseppe Bruscetti, an engineer, has constructed a ship which is propelled in the manner of a windmill. "The vessel has two paddles like a steamboat, and the mechanism of the windmill is so contrived, that if there is any wind at all, from whatever quarter it may blow, the vessel is propelled by the action of the sails, and may be steered in whatever direction is desired." We suspect that this is but an Italian resuscitation of some of the many schemes of the same kind which have been broached in England—two or three of them in our own pages. If Signor Bruscetti will consult our 16th vol., p. 65, he will see what he has to expect, should he ever attempt to carry his ideas into practice on a large scale.—[London Mechanics' Magazine.

BRUSSELS RAILWAY.—The projectors of this Railway took credit for 100,000 passengers only, as the number that would avail themselves of it in travelling between this city and Antwerp; but although it has not been opened more than five months, the number already exceeds 200,000.—[Brussels Paper.]

From the London Mechanics' Magazine.

SOWERBY'S PATENT IMPROVEMENTS FOR SECURING SHIPS' WINDLASSES.

Sir,—Many nautical men having complained of the want of publicity of many patent windlass in some of the distant ports, whilst it is being so generally adopted and appreciated in those where it is known, I will feel obliged by your inserting the accompanying description of its construction, action, and advantages, in your widly-circulated and valuable Magazine. As the safety of both life and property, as well as the quick performance of the voyage, so often depends upon the security and efficacy of a ship's windlass, improvements in its construction are of great importance to all connected with shipping, and, consequently, to a numerous class of your readers; to such the following may be found interesting, and for them it is more particularly written, by

Yours respectfully,
THOMAS SOWERBY.

Patent Windlass Works, near Shadwell Dock Basin, London, Oct. 7, 1835.

Fig. 1 is a section of the windlass body and side-view of the iron cylinder, which is firmly wedged thereon, with part of the flange broken off, to show the position of the patent iron pall and riding chock when riding at anchor. The pall and riding-chock are each made on the segment of a circle, with teeth on their concave sides, corresponding with the teeth on the cylinder.

Fig. 2 is a front view of the same, and part of the windlass body; also of the wedge bolt, which is inserted above the pall to lock it when riding. The pall-plate is bolted to the pall-bit, and has a bolt passing through its flanges, by which the pall is guided when working. The shoe or deck plat is also bolted to the pall-bit, and, through a timber, to the deck, and has a bolt through its flanges for guiding the riding-chock, also a slit parallel with the deck for guiding the bolt passing through the wood or riding-chock wedge.

Action and Advantages of the Patent Pall.

Before getting the anchor, the riding-chock is ungeared from the cylinder by driving out the wood-wedge by a short crow or lever, and the lock-bolt is withdrawn from above the pall. When the

windlass is hove round, the pall rises and falls perpendicularly in the succession of the teeth on the cylinder, thus palling at once every tooth on nearly a quarter of its circumference. It thus offers a more solid resistance than a series of palls, such as have been commonly used, and which are shown at fig. 3, and its action against the pall-bit is much nearer to the deck. It cannot possibly trip or be upset, as, from its wedge-like form, it becomes but more firmly fixed as the strain increases. Neither is it injured by screwing or otherwise straining the deck-timbers, but fits alike, however the windlass is raised or depressed; on which account it has proved particularly valuable to ships carrying wool, hemp, and other screwed cargoes, from many of which the common palls had been taken out. If the cable ride, or a handspike foul, the windlass may be immediately run backward by lifting the pall. It si always in full pall, and to meet a sea, or for riding or veering the cable, it may be instantly converted into an efficient riding-chock by inserting the lock-bolt, which effectually prevents the windlass from being moved either way.

Fig. 1.

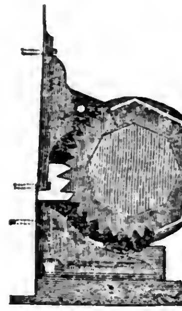


Fig. 2.

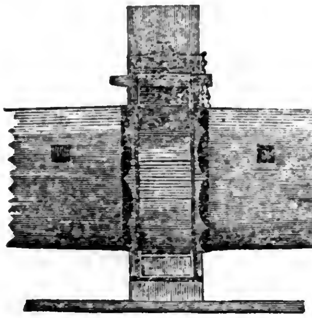
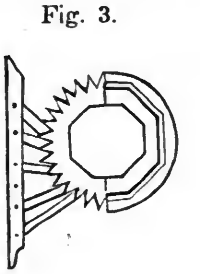


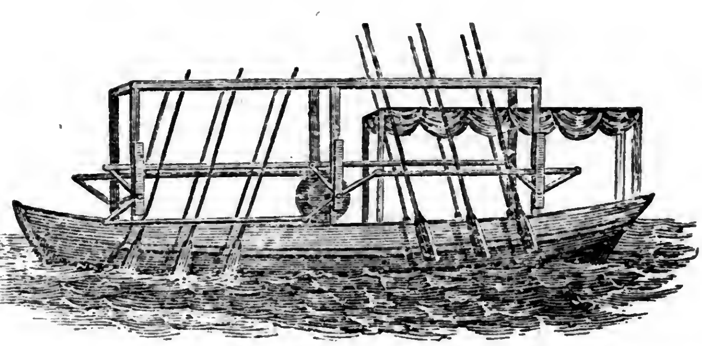
Fig. 3.



Of the Riding-Chock.

For riding, the pall being locked, the riding-chock is raised by a lever, and the wood-wedge driven in until the chock is firmly geared with the teeth on the cylinder. By this simple and quick operation, the windless becomes a complete fixture with the pall-bit and deck, which cannot be removed whilst they remain fast, as it is secured alike in every direction, being literally embedded in iron. It is so readily applied, that the windlass may be chocked or unchocked instantaneously, and at any time, as the pall and chock fit alike to every part of the cylinder. It does not strain the windlass from the pall-bits, like the common wood riding-chocks, but supports it to the pall. It occupies less space, and allows the windlass to be made shorter, if required.

The whole apparatus can be applied to any ship windlass, and at a less expense than the common palls and the wood riding-chocks. It is more easily fitted, and not liable to get out of repair; and is peculiarly adapted to the use of chain cables. It has already been adopted on board of vessels from 30 to 960 tons register, including East and West Indiamen, English and foreign traders, steam-packets, cutters, &c.; and the reports of the many intelligent and experienced commanders who have it in use, and who have put it to the most severe and complete trial, are at once gratifying and conclusive as to the many great and important advantages it possesses. In short, all agree in allowing it to combine compactness, cheapness and security.



We are indebted to N. Sargeant, Esq., Editor of the Philadelphia "Herald," for the following cut and description of the "first steamboat." It opens anew the question as to whom belongs the credit of first applying, or attempting to apply, steam to navigation.

The First Steamboat.—The honor of having originated the application of steam power to propelling vessels has been so generally awarded to Fulton, that any attempt at this day to transfer his laurels to another may seem equally unseasonable and hopeless. Yet it is a fact known to many of our citizens, that twenty years before the great experiment of Fulton and Livingston on the Hudson, a steamboat had been constructed in this city, under the sole direction of a then obscure and still almost unknown individual. This individual was John Fitch, by trade a watchmaker, who, in the year 1785, conceived the project of making a vessel to be propelled by the force of condensed vapor. When the idea occurred to him, as he himself tells us, he did not know there was such a thing as a steam engine in existence; and his having entertained so vast a scheme, as that of constructing a steamboat, seemed to him afterward so extraordinary, that he attributed it to insanity. At all events, the eagerness and perseverance with which he pursued the idea thus presented, evince no ordinary degree of enthusiasm. Being utterly unequal to embarking in the enterprise on his own resources, he, through one of his friends, made application to Congress for aid, stating as an inducement to the furtherance of the plan by that body, the great increase of value which would be given to the lands at the west by this improved method of river navigation. The subject attracted much attention—many persons of high standing in Congress thought favorably of it—a committee was appointed to examine the papers and report—and there the matter was allowed to drop. Foiled in this attempt, he applied for assistance to individuals; but at first, with no better success. Those who had intelligence to comprehend and means to aid his scheme, were cautious of embarking in a new enterprise which it was evident must involve heavy expense, and the result of which appeared so uncertain. In 1786 he communicated his ideas to Voight, an ingenious mechanic, who cordially approved his plan, and promised every assistance. Between June and August of this year he constructed a model, which worked to his entire satisfaction. By unwearied exertion he at length succeeded in interesting about twenty persons in his plan, and inducing them to take shares of 50 dollars each. Even this was paid very reluctantly, and he found himself obliged to make application to the State Legislature for further aid. A letter which he wrote on this subject to Gen. Mifflin, shows how sanguine were his anticipations of the results he should obtain. He reckons confidently on a speed of seven or eight miles an hour, and on being able to navigate the sea as well as rivers with his new invention. His application however failed, and he found himself greatly embarrassed by want of the requisite funds, at the same time that he was regarded by the company as pledged to persevere in his enterprise. The works were commenced in May, 1787, and completed during the summer. It was found, however, in addition to failures in smaller parts, that the power of the engine was inadequate to propel the boat, and that it was necessary to construct a larger cylinder. A second application was made to Congress for aid, but failed. The cylinder, when made, proved imperfect, and it was concluded to try the old one in a boat of smaller size. In 1788, the boat made a trip from

Philadelphia to Burlington; but on her arrival there, when success seemed to have crowned his exertions, the boiler sprung a-leak, and became useless. The boat was towed back, repaired, and again commenced running. In October, a passage was made to Burlington in three hours and ten minutes, and others at nearly the same rate. Still, on the whole nothing was gained on the rate of land travel, and in this respect the result was a failure. In June, 1789, a larger cylinder was tried, but still without much improvement in speed. In disgust, Fitch abandoned the management of the concern, and threw the responsibility upon Voight, retaining only the place of assistant and adviser. In 1790 the boat was again altered, and the 12th of April another trial was made. She performed well, and the business of the summer was tolerably prosperous. In the mean while, Fitch was principally engrossed in legal proceedings for the securing of a patent. His claims were contested by Rumsey, who maintained that to himself belonged the honor of priority in applying steam to the propelling of boats. What were the real merits of Rumsey, we shall not undertake to determine. A boat constructed on his plan was tried in London, and failed. Fitch gained his patent, but it was never attended with any pecuniary advantage. The company continued together another year; but with so little profit, that in April, 1791, a meeting was held, and a proposal made to abandon the enterprise. Others, still sanguine, were in favor of another trial, with a new boat, and improved machinery. This project, however, was not executed. The last struggles of the PERSEVERANCE terminated in the year just named, and she was consigned to a neglected old age in Kensington docks. Fitch died, under great pecuniary embarrassment, in 1793. He had filled several small MS. books with personal and general narrative more or less connected with his great scheme, which he bequeathed to the Philadelphia Library, with the proviso that they were to remain closed for thirty years. He seems to have been determined that one generation should pass before he again submitted his reputation to the tribunal of human opinion. The books, which were opened in due time, contain a minute account of his perplexities and disappointments, written in a manner which shows that these had not left his temper unruffled, or inspired him with very kindly feelings towards mankind. There are interspersed in the narratives many shrewd remarks, and even humorous sallies, but their general tone is desponding and querulous. His mind, naturally strong and original, seems to have received from the circumstances in which he was placed an unhappy bias; and the tone of expression in which he appears to have indulged, must of itself have been an obstacle to his success. Of the boldness of his conception, and the perseverance with which he followed it up, there can be but one opinion; and had fortune seconded his efforts, and his means been equal to the accomplishment of his designs, there can be no doubt that he would now hold undisputed the honor of having given to the country this most noble and useful invention.

The above wood cut conveys a correct idea of Fitch's boat, as originally planned; but in the one actually constructed, he so far modified this plan as to place the paddles of the boat astern.

A dreadful accident occurred on the Philadelphia and Reading Railroad, on the 13th inst, three miles below Reading. In blowing rocks, a fragment, weighing 300 lbs., fell on a shanty, crushing in its course to the ground floor, the wife and child of Mr. Jno. Boyle, blacksmith, employed by Mr. Anderson, the contractor. The death was instantaneous and the bodies were horribly mangled.—[Mercantile.]

DEFENCE OF THE PURITANS

Extracted from a notice of the fourth volume of "Sparks' American Biography," in the North American Review, for January:—

The time cannot be distant, when that whole chapter of English history, the age of the puritans will be written with new perceptions of its connexion with the great cause of free government, of liberty of conscience, and political reform. Nothing can be narrower, less generous, less philosophical, than the tone, in which those lofty spirits have been alternately assailed and defended. The English of the present day, who owe it to the Puritans that they are not tossed, like a shuttlecock, from the pikes of an enraged populace to the bayonets of a military police, as their neighbors in France, hurry over the history of the commonwealth with a kind of compassionate or supercilious *non chalance;* and even we, we, to our shame be it said, we, descendants of that noble stock, we, sprung from the best blood of that high-souled race, we are eternally tasking our wits to find apologies and excuses for our fathers. Apologies for the asserters of the liberty of conscience; excuses for the men that invented representative government; and broke the iron yoke of feudalism! Exquisite degeneracy; dainty unworthiness of our origin! What, could Burke himself, loyal to the core,—with the streaming horrors of the French revolution before his eyes, and wrought by them to a political, and almost to a physical phrenzy, could even he say of the leaders of the great English rebellion, "whilst they attempted, or affected changes in the commonwealth, they *sanctified* their ambition, by advancing the dignity of the people whose peace they troubled. They had long views. They were men of great civil and military talents, and if the terror, the ornament of their age. The compliment made to one of the great bad men of the old stamp, (Cromwell,) by his kinsman, a favorite poet of that time, shows what it was he proposed, and what indeed to a great degree he accomplished, in the success of his ambition:

> "Still as *you* rise, the *State*, exalted too,
> Finds no distemper, while, 'tis changed by *you*;
> Changed like the world's great scene, when without noise,
> The rising sun night's vulgar light destroys."

These disturbers were not so much like men usurping power, as asserting their natural place in society. Their rising was to illuminate and beautify the world. Their conquest over their competitors was by outshining them. The hand, that, like a destroying angel, smote the country, communicated to it the force and energy under which it suffered!" Abstract from this splendid eulogium, the qualifications manifestly attached to the praise, to the end that the praise might be forgiven by himself and his age, and what a tribute remains!—Cromwell and the men with whom and by whom he subverted the British monarchy, sanctifying their ambition by promoting the dignity of the State, men of great civil as well as great military talent, the ornament of their age; proposing as they rose to elevate their country with them, and to a great degree effecting what they proposed; not so much the usurpers of the places of other men, as asserters of their own; illuminating and beautifying the world, as the rising sun illuminates and adorns the heavens; outshining not trampling down their competitors;—and if they smote their country like a destroying angel, imparting to it at the same time, the force and energy of the destroyer, to smite down and blast its enemies! And shall this be said of Cromwell and his peers,—this by Burke;—this at the height of the panic of the French Revolution; this in a discourse intended as a warning cry, a *vox clamantis*, to rouse England and Europe into a crusade against revolutionary France! And shall we, the citizens of a free republic, founded by the long suffering puritans, the inhabitants of a mighty continent, by their nerve and counsel added to the civilized world; shall we who live in an age when even the heaven defying horrors of that French revolution begin to be partly forgotten, in the brilliant development of power and talent which it occasioned; begin to be in some measure excused, for the ages of crying oppression which preceded it; begin to be in no small degree atoned for, by the civil regeneration of feudal Europe to which it gave the impulse; shall we, while the whole civilized world, struggling on triumphant, with joyous strides or convulsive starts, is shaping its institutions of civil polity more and more upon the principles first practically set forth and exemplified by our puritan fathers;—shall we, being what we are, and whence we are, and where we are, shall we basely qualify the homage due to these illustrious shades? the men who were faithful when Cromwell and his associates were faithless? Miserable prudery! Why do we not boldly and roundly, without strain or qualification, vindicate their fame, defend their characters, and assert that their very faults were the instruments, with which Providence vouchsafed to accomplish this great work? "They were dark and austere;" they needed to be; the children of sunshine would have drooped and fainted under the terrors and gloom of the enterprise. "They persecuted those who differed from them." They had a right to do that, which is falsely called persecuting those who differed from them. The man, who possesses the power at home, and persecutes his brother who differs from him; the man who at home will not let his neighbour live in peace and die in his bed, because he differs from him, is a tyrant. But the victims of persecution, the men who have given up native land, and home, and forefather's graves to those who will not tolerate their difference, and crossed the awful deep, and found out a place of refuge in the horrid wilderness, where hardships and danger are their constant attendance, those men have a right to their own way, in their own desert. They have a right to be undisturbed by sights and sounds and doings and sayings, which shock their sense of religious decency. No wandering, melancholic, or fanatic opinionist has a right to invade their place of voluntary exile, and claim the toleration and protection of the banished society, for his own annoying peculiarity. The utmost he can demand is a right to do what they have done, quit them in peace, and seek a wilderness still more remote, where he, in his turn, may claim a right to worship God according to his own peculiarity. "But the puritans were cruel, and hung persons charged with witchcraft;" and what should we do? If we honestly believed, as they honestly believed, that the wretched victims of these delusions, were in personal league with the enemy of man; if we saw the incarnate principle of Evil where they saw it; if the state of philosophy, of public sentiment, of popular theology, was to us what it was to them, and we believed ourselves to be fighting a perilous battle, amidst the flashing fires of the opening pit; are we quite sure, that we should go into the ghastly contest, with soft and elegant phrases on our lips, and mild and placid affections in our bosoms? No, no. Let it suffice us to be ourselves tolerant and merciful. Let us be content with our own liberality; our own abhorrence of persecution, which in us would be our crime; but let us not judge great and honorable names of other days, by a standard either of opinion or duty, which does not apply to their age, their circumstances, or their vocation. Do not let us quarrel with the noble and massy edifice, because it was the work of successive generations; because it did not rise like an exhalation from the soil; because they who laid the foundation did not carry up the head stone. Let us not murmur at the oak, because it did not shoot up from the acorn like a mushroom, in a single night. Let us not impeach the wisdom of our forefathers for not bringing to perfection in a day, the system of social institutions, which required for its perfection that it should not be the work of a day; which required precisely, more than every thing else, the operation of successive years, the seasoning of long time, the discipine of experience, the rectification of errors by their results, the preparation for one stage of advancement in the training of a former stage, the enthusiasm caught from prophetic glimpses of a gradually unfolding future.

We are informed that Major General Scott, accompanied by several subaltern Officers of the Army, will leave Washington this morning, or to-morrow, for the south to join the U. S. troops in Florida.—Naval and Military Chronicle.]

First Lieutenant. R. P. Parrott, of the 3d Artillery, has been nominated to the Senate as Captain of Ordnance, to supply the vacancy occasioned by the death of Captain R. Bache.—[Naval and Military Chronicle.]

A CARD.

TO THE SUBSCRIBERS AND FRIENDS OF THE

RAILROAD JOURNAL, MECHANICS' MAGAZINE, NEW-YORK FARMER, AND APPRENTICE'S COMPANION;

All of which publications have been delayed *nearly a month*, in consequence of the destruction by the late conflagrution of the press and materials with which they were printed. The Editor and Proprietor desires to say, that they will all be again regularly issued in a few days, and forwarded with care and punctuality.

In consequence of the heavy loss sustained by the fire, including not only nearly all my *printing materials*, but also *nearly all* my stock of *back volumes*, *sheets*, and *numbers* of the different publications, and all of my *stereotype plates* of *five* volumes of the Mechanics' Magazine, I am compelled to ask the indulgence of their patrons for a few days, until I can get a new office arranged, so as to present the works to them improved both in *appearance* and in matter—and as I have relinquished the management of the business department of the New-York American, for the purpose of devoting myself exclusively, hereafter, to my publications, I hope to render them more interesting and more useful than I have heretofore been able.

I am also induced by my losses, which amount to over eight thousand dollars, to request each friend of my publications to aid in *extending their circulation*, and of each present subscriber the favor to remit the balance due, if any there be, and in advance for the year EIGHTEEN HUNDRED AND THIRTY-SIX, that I may be able to make the works worthy of increased patronage, and useful to community.

D. K. MINOR, EDITOR AND PROPRIETOR.

NEW-YORK, January 15, 1836.

☞ The follow ng publications are issued by the subscriber, at No. 13 NASSAU STREET, New-York, viz:—

RAILROAD JOURNAL,

Devoted to INTERNAL IMPROVEMENTS, and the Improvements in Machinery—in weekly numbers, of 16 quarto pages each—price FIVE DOLLARS a year, *in advance*.

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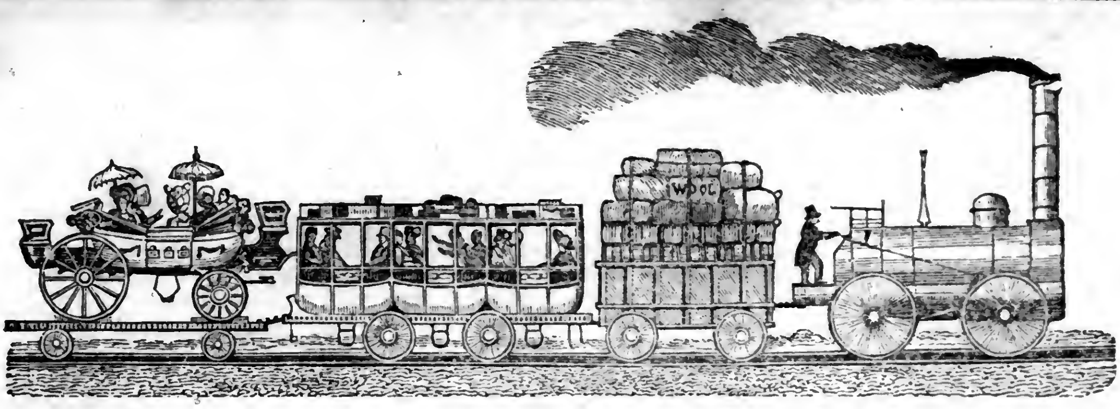

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, JANUARY 16, 1836. [VOLUME V.—No. 2.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 16, 1836.

INTERNAL IMPROVEMENT CONVENTION.—We publish in this number, notwithstanding a part has before been given, the entire proceedings of the late Internal Improvement Convention, held at Albany. The object of the Convention is to promote and extend the work of Internal Improvement *in the State*, and beneficial results must necessarily flow from the intercourse of intelligent gentlemen, from all parts of the State, who are interested in the extension of such works. The association of such gentlemen with such views, will necessarily be the means of diffusing useful information, and in *that alone* which is necessary to insure the progress of a *general* system of useful improvement.

As an evidence of the good which will result from the Convention, we refer with great pleasure to the Report herewith given, made by the Committee, of which Mr. Joseph Blunt was Chairman, in relation to the Common Roads and Bridges of this State. It shows a state of things, an expenditure to little purpose, of which few, very few, persons are aware. It should be widely circulated, and generally read.

At the Convention, it will be perceived that a State Society was formed, to promote the object, for which the Convention assembled, and a meeting of that Society has, we understand, been called for the 11*th inst.* at Albany. A circumstance, we apprehend, to be regretted, in consequence of the short notice which the members will have, and the difficulty of attendance to others, and especially of this city. It seems to us, that the 1st of May would have been a better time, as then travelling would have been good, and business will call many of those interested to Albany and this city. A meeting however is called, and will, we hope, be well attended—and at that meeting measures should be taken to expedite the construction of a better means of travelling between this city and Albany, as well as in many other parts of the State.

ICE BOAT.-It appears by letters from Philadelphia, that on Thursday 18th, the Ice Boat of the Camden and Amboy Railroad was still crossing, though the ice was so strong as to interrupt every other sort of navigation.

☞In reply to several inquiries from subscribers, whether we shall be able to supply missing *numbers of the last year*, we will say to all, that we hope to be able to supply *most* of them; at present, however, we are unable to say how many, as the numbers which *were* saved have not yet been assorted and arranged, for want of room to do so.—A few days, however, or as soon as we can get a suitable place, will enable us to forward such numbers as we have on hand.

"*First come first served,*" is an old rule, and every request for *numbers* is registered, and will be answered at the earliest possible period—especially those accompanied by *a remittance* for the Journal.

TO SUBSCRIBERS AND POST MASTERS.—It sometimes occurs that numbers of this periodical are returned by a subscriber, or Post Master—without writing upon it the Post Office, or name of subscriber, and therefore we cannot tell whose to stop.—In all cases of returning a number, we should be much obliged by having the name of the subscriber and Post Office written upon the margin or cover:—☞*but much better pleased at receiving the money for a year in advance.*

PUBLIC DOCUMENTS.—We are indebted to C. W. Wever, Esq., of the Baltimore and Ohio Railroad, for a copy of the 9th Annual Report of the Baltimore and Ohio Railroad Company.

Also to J. E. Bloomfield, F. B. Cutting, and Holmes Hutchinson, Esqrs., for the Annual Report of the Canal Commissioners, for the past year, and their Report of 26th January, under the act of 11th May last, in relation to the Enlargement of the Erie Canal.

We have also a copy of the Report of the Canal Commissioners of Pennsylvania, in relation to the Canals and Railroads of that State, from all which we shall make such extracts as we may deem of interest to the readers of the Journal. The communication of CLINTON, and of SMEATON, are at hand, and will appear in our next.

AVERY'S ROTARY ENGINE.—We gave in No. — vol. 4, of the Journal, a description of this engine, accompanied by a drawing of one we then had in use.

The account we then gave was founded upon the performance of other engines of the same description, one of which we had several times seen in operation, and not upon the performance of our own, which was in several respects different from any other which had been in use, and which we were then putting in operation, with a boiler upon a new plan, constructed for anthracite coal, and the first of the kind which had been made.

In the construction of this *boiler* it was designed to try an *experiment*, and to ascertain if a certain amount of labor, the driving of a double cylinder *registering printing* machine, (which required three men to turn it

about seven hours a day,) could be performed with a given quantity of fuel. The *boiler*, however, on trial, was found insufficient, and another one, one of Dr. Nott's tubular boilers, was obtained from the Novelty Works of this city, which was put into successful use a few days previous to the destruction of our office, press, and engine, by the great conflagration.

With this boiler, and a furnace of 16 inches long, by 9 broad, and 18 high, the coal resting upon one of Dr. Nott's revolving grates, we were able to drive our machine eight hours, constantly, and steam blowing off much of the time, with *one hundred and fifty* lbs. of Schuylkill coal, and we doubt not, but that, with some trifling improvements which were in course of preparation, and would have been completed within one week, we should have been able to drive *two* such machines with 200 lbs. of the same kind of fuel.

We regret exceedingly the want of an opportunity to try the power of the engine fully, with a given quantity of fuel and water, as we are confident that the results would have been so highly satisfactory to all parties interested, and a statement of them an answer so satisfactory to the numerous inquiries by letter, and verbally, which we had omitted to answer, until we could give positive statements of actual performances, which we intended to do, as soon as we could speak positively.

The loss, however, of the engine and machine, and every thing connected with them, has put it out of our power, for the present, to give such a statement as our *entire confidence* in the value of the engine prompts us to. This much we can say, and feel confident that future results will bear us out in the assertion, that a Rotary Engine of this description, with a boiler of *five* to *fifteen* horse power, will *cost less*, require *less fuel*, less expense of *repairs*, and of *attendance*, and perform as much labor, as any other engine with which we are acquainted, with the same boiler.

Other engines of the kind are in use in different parts of the country as well as in this city, of which we shall have more to say anon.

For the Railroad Journal.

New-York, Jan. 28, 1836.

Sir,—Having several times been storm-stayed upon Railroads, and obliged, at two different times, to remain out all night, in consequence of snow being on the track, I take peculiar pleasure in witnessing the operation of any apparatus or contrivance for clearing snow or ice from the rails. Being at Newark on Monday last, I had the pleasure of witnessing the performance of a very simple contrivance of L. A. Sykes, the Engineer of the New-Jersey Railroad, which far surpassed any thing of the kind I ever before saw, both in regard to its simplicity and its effective operation. I saw it clear the rails perfectly of a very tenacious sleet and ice four or five inches deep, without causing any apparent diminution in the speed of the engine, and was told that in some places it passed through a snow and ice of ten inches in depth. I understand that it was designed principally to clear the rails of ice and sleet, but is equally beneficial in clearing off a light snow. The apparatus consists simply of a pair of bars or levers attached to the front end of the engine, and standing nearly in an upright position, and operated upon by a rope or chord. It is used without the least possible danger, even at the greatest speed, and is so small that it can be conveniently carried at all times upon the engine or tinder car, and can be easily attached or detached, at any time, in one or two minutes. Railroad managers or superintendents will do well to call and see the contrivance, as it is certainly a very valuable improvement. Yours, &c.,

A Traveller.

INTERNAL IMPROVEMENT STATE CONVENTION.

At an adjourned meeting of the Internal Improvement Convention of the State of New-York, at the Capitol in the City of Albany, on Monday the eleventh of January, 1836, the Hon. Samuel Cheever was appointed President, and A. J. Parker, Esq., Secretary.

The following were delivered to the Secretary as the names of gentlemen selected by the different counties, and of those who appeared as delegates to the Convention.

Albany.—Samuel Cheever, Thomas W. Olcott, Jesse Buel, John V. L. Pruyn, John C. Schuyler, Daniel Dorman, Augustus James, Jared L. Rathbone, James Savage. Ezra P. Prentice, Henry L. Webb, Joel B. Nott.

Alleghany.—John Griffiin, Calvin T. Chamberlin, Luther C. Peck, Walter S. Church.

Broome.—George Park, Judson Allen, Daniel S. Dickinson and Ashburn Birdsall.

Cataraugus.—Andrew Mead, D. M Day, C. J. Fox.

Chautauque.—Walter Smith, Richard P. Marvin, ——— Campbell, Benjamin Walworth.

Chenango.—— Mead, —— Knowlton, Augustus C. Welch.

Clinton.—James B. Bradshaw, Lemuel Stetson.

Columbia.—Ambrose L. Jordan, Shennon Miller, Ayres M. Stebbins.

Cortlandt.—Cephas Comstock, Chauncey Reed.

Delaware.—John Griffiin, Jas. W. Knapp. Amasa J. Parker, Noadiah Johnson, Samuel Gordon, Stephen C. Johnson.

Dutchess.—Thomas Taber, Obadiah Titus, Joel Benton, George W. Slocum, Daniel D. Aikin, Taber Belden, Alexander H. Grant, James M. Abbott, Samuel Pugtley Columbus Reed, Walter Sherman, William Hunt, Allen Thompson, Silas Harniss, Jacob Sisson, James Hooker.

Franklin.—Luther Bradish, Asa Hascall James Duane.

Greene.—Jacob Haight, Isaac Van Loon. Abraham Van Vechten, James Powers, John Kuisted, Abraham Baker.

Herkimer.—— Beckwith.

Lewis.—Thomas Baker.

Livingston.—Charles H. Carroll, William T. Cuyler, George W. Patterson, William H. C. Hosmer.

Monroe.—Fletcher M. Haight, James Smith.

Montgomery.—David Spraker, Henry V Berry, Joseph Blair, Jacob Johnson, John Hoogkisk.

New-York.—Joseph E. Bloomfield, David C. Colden, Philip Kearney, Morgan L Smith, Samuel Sherwood, Dudley Selden. Philip Hart, ——— Redfield, Wm. Howard

Niagara.—Hiram Gardner, A. H. Porter, John Beach, Bates Cooke, Seymour Scoville Amos S Tryon.

Oneida.—Samuel Farwell, David Wager, Charles P. Kirkland, J. A Spencer, Horatio Seymour, W. Crafts, S. P. Lyman, A. Hutchinson, N. Deveraux, T. F. Faxton, Alvan Stewart, P. S. Root, John Dean, Ebenezer Robbins.

Orange.—Robert Sly, Thomas Van Etten, Charles Borland, jr.

Otsego.—Levi Beardsley, Albert Benton, Sumner Ely, L. J. Walworth, Ivory Holland, J. O. Morse, I. E. Crary, F. A Lee, H. Phinney, Wm. Baker, E. Crafts, Hiram Bostwick, Luther C. Saxton, Seth Chase.

Rensselaer.—R. P. Hart, G. R. Davis. J. P. Cushman, Stephen Ross, Daniel Gardner, Isaac McCorniche, R. D. Tillman, L. G. Carman, Amos Briggs, R. J. Knowlton, A. Walsh, Elias Parmelee.

Saratoga.—Henry Granger, Earl Stimson, Lee Benedict.

St. Lawrence.—Jabez Mills, Preston Ring, William S. Paddock.

Steuben.—George Huntington, Hervey Switzer, L. B. Searl, Ziba A. Leland.

Sullivan.—John P. Jones, S. G. Demmick, P. Pelter, Friend Wheelock.

Tioga.—— Sutton, —— Goodwin.

Tompkins.—Charles Humphrey, William R. Fitch, George B. Guinnip.

Ulster.—Jacob Trumphour, H. W. Romayne, Dr. Brevier.

Warren.—William Griffing, William McDonald.

On motion of Mr. Spencer, it was

Resolved, That a Committee of seven be appointed to nominate suitable officers for this Convention: whereupon the following gentlemen were appointed members for the Committee.

Joshua A. Spencer, Richard P. Hart, A. J. Parker, J. E. Bloomfield, Luther Bradish, Thomas W. Olcott and Ambrose L. Jordan.

Convention adjourned to meet to-morrow afternoon at 3 o'clock.

Assembly Chamber, Tuesday, Jan. 12, 1836.

Convention met pursuant to adjournment.

Mr. Spencer, from the Committee appointed to nominate officers for the Convention, made the following report:

For President, Hon. Samuel Cheever.

Vice Presidents, Sumner Ely, Charles Borland, jr.

Secretaries, David C. Colden, Fletcher M. Haight.

The report of the Committee was adopted, and the officers named took their seats.

On motion, it was

Resolved, That the following gentlemen, delegates from the State of Connecticut, be invited to take seats in this Convention: Aaron Seely, E. T. Hoyt, Alex. H. Holley and Samuel I. Robbins.

On motion of Mr. Jordan, the proceedings of the Convention at Utica were read by the Secretary.

The report of the Committee appointed at the Convention held at Utica, to collect information as to the cost of the county and post roads, was presented and read, and on motion of Mr. Jordan, laid on the table.

ROADS AND BRIDGE REPORT.

The Committee appointed at the Convention lately held at Utica, on the subject of Common Roads, beg leave to report, that, pursuant to the resolution of the Convention, a circular was addressed to the clerks

of the several towns in the State, requesting information as to the length of the public and turnpike roads, and the number of bridges in their respective towns, together with the annual cost of keeping them in repair. Answers have been received from 266 towns, and at the time of making the report answers are daily coming in, so that hopes are entertained of making a complete statement of the annual cost of the roads of the State from actual returns. The results of the answers already received show that in 266 towns, having 523,488 inhabitants, the length of public roads is 19,924 miles.

The number of days' work annually assessed for their repair is	416,271
The amount of money annually expended in addition for the same purpose,	$23,931
The length of turnpike roads is	579 miles.
The annual expense of repairing the same	$9,816
The number of bridges	1221
The annual expense of repairing the same	$32,962

The whole number of towns in the State is 791, and the towns making returns are about one-third of the whole, but the population returning is scarcely two-sevenths of the whole population, and the returns therefore may be fairly estimated at that ratio. According to that rule we have the following results:

Length of all the public roads in the State	69,734 miles
The number of days' work assessed for their repair	1,456,948
The additional money expended for the same purpose	$84,258
The number of public bridges	4,274
The anuual cost of keeping them in repair	$115,363

Estimating the value of each day's work at 75 cents, and the assessed labor will amount to the sum of $1,092,711, to which the sum of $84,258 must be added, and we have the enormous sum of $1,176,969 annually expended in the State of New-York for repairing common roads, besides $115,363 annually expended for the repair of public bridges, besides double that sum in constructing new ones. This, too, it must be recollected, is independent of the sums expended for turnpikes and toll bridges.

If this vast sum expended in each year had produced results proportionate to its amount; if it had effected any visible or permanent improvement in the condition of the common roads, the public might be reconciled to the burden thus annually imposed.

It is manifest, however, that no such improvement is to be found. On the contrary, the public roads in this State have not visibly improved for years. Their condition in those seasons of the year when good roads are required is intolerably bad. No epithet, however strong, can properly characterise their wretched state. When the snow has covered them in the winter, and when the summer's sun has dried and improved them, they are passable; but when these natural agents cease to exert their beneficial influence, and their improvement is left to man, judging only from the results, we should conclude that his sole object was to confine the traveller by walls and fences to an artificial ditch, and so prevent him from availing himself of the natural surface of the fields on either side of the road to accelerate his journey.

Such are the results of the present system, expensive and burdensome as it is to the people of the State. Your Committee are naturally led to inquire into the causes of its total failure.

Among these we are induced to assign the foremost place to the incapacity and inefficiency of the agents appointed to carry the road laws into effect.

The path-masters do not seem to have the least knowledge as to the true principles upon which roads should be constructed. Instead of properly locating, grading, ditching, and constructing a road of hard materials, they content themselves with laying out a road, not according to the face of the country, but so as to suit the views of the owners of land upon the route; and the grading, ditching, and providing the materials is one operation—consisting of dragging earth and generally vegetable mould from the sides to the centre of the space appropriated for the road, to be levelled, graded, and packed by the wheels of the wagons passing that way.

Roads of this description, made by heaping up mud from the sides, must necessarily be muddy in rainy weather. There is no charm in the action of the carriage wheels to prevent the earth taken from the ditches from becoming mud on the road as well as on its sides. It consequently is soon carried from the road to fill up the side ditches, and the whole becomes in the fall of the year a quagmire, where there is no choice between the road and the ditches. The least reflection as to the nature of roads will show, that no other result could be expected.

A road is an artificial contrivance or machine for facilitating the transportation of heavy loads, and its efficiency depends upon the perfection of its construction. For instance, upon the common roads in their present condition 30 bushels of grain are considered a load for a pair of horses, while upon a Macadamised road the same team can transport with the same exertion 75 bushels.

The obstacles to be overcome are friction and gravitation, which are increased, the first by the softness of the road, and the second by its deviation from a level line.

The proper remedies for these difficulties are to lay out the road as far as practicable through a level country, and to construct it of hard materials, so cemented together that they present a smooth and level surface for the wheels to move upon. The former remedy can be applied by any surveyor who will take the pains to examine the face of the country through which the road is to pass, with the view of selecting a practicable route. The other remedy is more difficult of attainment. Where stones can be procured, it is necessary that they should be broken to a size that they can unite with the body of the road, and thus form one mass. Large stones only serve to break up the road, and to render it rough and impassable.

After a full trial upon the roads of England, MacAdam came to the conclusion that no stone should be used in covering a road that could not be passed through a ring 2 1-2 inches in diameter. Stones of greater size do not cement with the others, and remain to break up the surface of the road.

Another difficulty to be overcome grows out of the action of the elements upon the road. Moisture and frost are the great destroyers of roads, by alternately softening and breaking the surface. To prevent this the road, while its surface should be hardened so as to prevent the moisture from penetrating, it should be so formed that the water will readily run off to the sides, where there should be ditches connected with the natural water courses of the country. The road will thus be kept dry, and the frost will have comparatively little effect upon its surface. The best shape of a road of 30 feet breadth is a segment of a flat ellipsis, with the side channels about nine inches below the surface in the middle. This shape facilitates the passage of the water to the sides, and when the surface is properly constructed will keep it dry and hard.—The ditches should be sufficiently deep to be below the bottom of the metal or materials used in making the road to serve the purpose of draining, and in April and October they should be cleared out so as to afford an easy passage for the water from the road.

The draining under the present system requires a complete reform, as it is of the greatest importance, and requires no great expenditure. With a surface constructed of broken stones cemented into one mass, and with good drains, roads are enabled to resist the action of the elements, and the large expenditure made in their construction is amply repaid by their greater efficiency and durability.

In some parts of the State, however, as, where clay predominates, there is a difficulty in procuring stones of the kind used in constructing roads.—This does not often happen, and when it does there is an abundance of material to supply the deficiency. Bricks may be used, as in Holland, to form good roads, and when of suitable form and united with mortar, they will make a covering for a road equally capable with broken stones of resisting the action of the elements. These bricks should be much larger than the ordinary building bricks, burnt hard and placed in mortar upon a surface properly shaped and graded, so as to form a covering for the ground impervious to water.

It has also been suggested that in those parts of the State where lumber is cheap, that good roads might be economically made by using wood to cover their surface.—This may be done either in the mode adopted in Russia, by placing square blocks upright upon the ground, and so closely packed together as to present a smooth and compact surface; or the track may be covered with planks raised a few inches from the ground, united together like a continuous bridge—the planks being placed across the road where undulating, and lengthwise where level.

Either of these modes would form hard and level roads, and although the committee are not prepared to express an opinion as to their relative cost and duration, they are fully satisfied that either mode would be economical compared with the wasteful and useless expenditure of money and labor made under the existing system. From the best information to which the committee has had access, they estimate the cost of a road thirty feet track properly Macadamised to be $5000 per mile; one of burnt clay $4000; one of wooden blocks $4000; one of planks $3500. These, however, are mere estimates, and may vary much from the truth.

It would probably be the wisest policy to adopt the Macadamised system where practicable, and to make portions of roads upon each of the other modes in order to bring them all to the test of experience.

On one point, however, there is no doubt in the committee that the present system should be entirely abandoned, and a mode adopted which shall sooner or later give a hard and uniform surface to the public roads. This is necessary, not only to facilitate the transportation of the produce of the State to market, but to redeem the community from the reproach of annually expending millions without effecting or even approximating to the object proposed by the framers of the law relating to common roads.

The mode of effecting that reform is a subject admitting of different opinions. To undertake at once to Macadamise all the roads in the State would be an effort, in the opinion of many, beyond the ability of the community. The cross roads in counties are not enough travelled to warrant such an expenditure at this time, and in general they are in better order than the more frequented roads. While the system of repairing roads, therefore, requires a total change in the agents employed to superintend its execution, it would probably be the best policy to apply the reform in the mode of constructing roads in the first instance to the post routes, and to devote the greatest portion of the money raised to rendering them perfect before undertaking those of minor importance. When those are once well constructed the annual expense of keeping them in order will be small, and the reform of the other roads upon the same principles can then be undertaken, until the public roads throughout the State shall be put in perfect order.

The changes which your committee think could be advantageously made in the present system with the view of producing such a result, are an alteration of the present law so as to establish five road commissioners in each county, who shall be empowered to order the construction and repair of all the stage roads, and to employ a surveyor, under whose superintendence these roads shall be constructed and repaired. Instead of assessing the farmer so many days' labor, the assessment should be made payable in money or in broken stone of the proper size and kind, to be delivered at specified places —such a quantity of stone to be an equivalent to a day's labor. The roads then could be repaired under the immediate superintendence of the surveyor, who should be held responsible to the commissioners for their condition.

What is done in this way would then be thoroughly done, and in a few years the marked improvement of the roads would demonstrate the superior economy of those thus constructed.

Indeed so strongly is the committee impressed with the advantages of at once commencing this reform upon an extensive scale, that they would recommend the anticipation by way of loan on the credit of the State of one half of 20 years' assessments, the amount raised to be rateably divided, and at once applied under proper superintendence to the construction of the principal stage roads in the several counties of the State.

Inasmuch as the amount now annually raised for the repair of roads equals $1,176,-969; this sum to be thus raised by loan would be $11,769,690, which could be immediately applied to the construction of those roads, leaving the sum of $588,484 to be annually raised by assessment, and applied to the repair of roads, and a like sum to be appropriated to the repayment of the loan. To this might be added the tolls to be collected on particular roads, in case the Legislature should deem it expedient to make those who used the roads contribute, as in England, to their maintenance and repair. To this mode of maintaining roads may be fairly attributed the excellence of those in England, where the roads of particular districts are placed under the control of trustees, who have authority to manage the roads as a productive estate, and who are thus enabled to improve the roads at the expense of those who use them—borrowing money for constructing and repairing them, and repaying its principal and interest from the proceeds of the tolls.

If, after determining upon the construction of the principal roads upon proper principles, similar powers should be given to the County Commissioners for Roads, a great reform would be effected, and the means of transporting produce to market much facilitated, without increasing the annual assessments. The importance of this improvement in common roads would well justify such a step on the part of the State. With good roads, every farmer in the State would be enabled, at a comparatively small expense, to carry produce which is now useless to market. The difference in the expense of transportation to the first purchaser, so important an item in the ultimate cost of produce, would be 50 per cent., making a diminution of one half of the present cost. Taking the average amount of produce raised on a farm of 100 acres, beyond what is required for the use of the farmer, to be equivalent to 400 bushels of grain—an amount believed to be below the real quantity; and with the present roads fourteen journies to the market town, with a two horse wagon, will be required to transport it to market—a labor which, if the average distance of each farm be estimated at 10 miles, would employ a wagon, horses and driver, fourteen days. With Macadamised roads, the same labor could be performed in six days, with more ease to the horses and less injury to the wagon, making a saving to every farmer in the State, of eight days in the transportation of the produce of a small farm, and a saving proportionably greater upon larger farms.

This illustration of the superior economy of good roads might be applied to other branches of industry, and their results would show an enormous expenditure of time and money thus indirectly made by the people of the State, in transportation on bad roads, to the amount, probably, of $10,000,000 annually, a sum sufficient to put all the roads of the State in good order. This saving in time and money is not the only benefit that would accrue to the State from the adoption of the policy proposed. By the expenditure of the principal sum raised by loan, in constructing and repairing roads in the several counties, money would be circulated, labor employed, and the energies and enterprise of the whole community would be stimulated by the actual execution of a policy calculated to diffuse the benefits of public improvements throughout the State—not advancing one part at the expense of the whole, but giving to each county its just share, and conferring upon all equal, and at the same time, substantial benefits. Among these may be mentioned a more rapid increase of the population of the State.

With good roads the second and third class of lands may be made equally productive with the most fertile, where the roads are bad—the difference in the expense of transportation being more than an equivalent to the difference in the quantities produced.

Emigration from the State will be thus checked, and the better and more substantial class of emigrants from other States will be induced to settle here. A similar policy is recommended in relation to the construction of bridges. All the bridges over small streams, and many of those over the large rivers, should be made of stone, or brick, where stone cannot be procured. Such structures would be permanent, requiring little or no repair, and though more expensive in the construction, are more economical than wood, when the expense of construction and repair is spread over twenty years.

A similar mode might be adopted in constructing the bridges, i. e., dividing the annual assessments into two parts, the first to be appropriated for twenty years to the extinguishment of a loan equal to one half of twenty years' assessment, the loan to be applied, under the direction of the *State*, in constructing permanent bridges in the several counties, and the residue to be used for keeping those in repair, whose permanent construction is to be postponed.

Your Committee are aware that the policy recommended is liable to the objections that it will involve great expenditure, and that it is novel. Objections always ready with the timid, the unenterprising, and those who deem the existing condition of things as not susceptible of improvement.

The policy recommended, however, is not meant merely for the present generation. Like the public buildings and the canals of the State, and the aqueducts of cities, roads are intended to be permanent.

They belong to the State, an existence that is to last through ages, and her public works should all be constructed with reference to an equally enduring existence. Economy in a State is not consulted in limiting the expenditure to merely what serves the present occasion; but in looking forward beyond the wants of the present generation, and having carefully consulted the ability of the community, proportioning the expenditure to the importance of the object to be attained.

The subject referred to the Committee they deem of the highest importance, whether considered in reference to the present or the future, and they recommend that a memorial should be addressed to the legislature, expressing the views set forth in this report.

All which is respectfully submitted, in behalf of the Committee.

J. Blunt, Chairman.

New-York, Jan. 9, 1836.

On motion of Mr. Gordon, it was

Resolved, That a Committee of ten be appointed by the Chair, to report to this Convention subjects for its consideration.

The Chair appointed the following named gentlemen: Messrs. Gordon, Spencer, Bradish, Bloomfield, Titus, Jordan, Welch, Buel, Walworth, Leland.

Mr. Gordon stated that it was his intention to leave the city the following morning, and was excused from serving on the same, and Mr. Alvan Stewart appointed in his place.

The following resolution was offered by Mr. J. A. Spencer. "That it is expedient now to consider the resolution reported at the Utica Convention, in relation to the formation of a State Society."

The resolution, on motion of Mr. Kirkland, was laid on the table.

The Convention adjourned to meet in the Assembly Chamber to-morrow afternoon, at 3 o'clock.

Assembly Chamber, Wednesday, Jan. 13, 1836.

The Convention met pursuant to adjournment, Judge Cheever presiding.

Mr. Stewart, from the Committee appointed to report subjects for the consideration of the Convention, presented a report, together with a draft of a Constitution of a State Society, and which being read, the report was accepted.

Mr. S. then read the following report:

We believe there is a general feeling in the public mind, that an enlarged system of Internal Improvements, in the shape of Roads, Canals, and Railroads, is the true policy of the State of New-York. By what means shall this belief and feeling be rendered the most available, to advance these great improvements? This is a question deserving our most serious consideration.

We believe that nature has given to New-York a natural eminence in point of position and relation unsurpassed by any State or country on this continent. We believe her natural advantages—her natural capital—to be very great; but we also believe, that to that we may add almost as much more, by developing her entire capabilities by a grand and judicious system of Internal Improvements. If a kind Providence had done more for us than it has, room would not have been left for man, to manifest his gratitude—discover his genius, and exhibit his patriotism.

We believe the more that public improvements are multiplied, the reason for complaints for taxation for their support will be diminished. For when the real estate of an individual is augmented in value, by a public improvement, or a new facility created to aid him in locomotion, or a new avenue opened for importing merchandise or exporting the produce of his soil, he must have a feeble idea of moral obligation, would seek to evade the payment of his just part of such public work.

Taxation, toll, or impost, is the consideration money a people pay for a public blessing in the shape of an internal improvement.—And we believe that the following is a fair rule by which to test the propriety of the State embarking in a public work:

Add the increased value of the lands and houses caused by the improvement running through the country where they are situated—add to this the time saved by man and beast—the reduced expense of the transit of merchandise or produce—add to this a reasonable sum for the agreeableness of manner of transacting business, by means of the improvement, as compared with old modes—then say if the interest on the capital sum these advantages are worth, exceed the interest on the capital required for the completion of the work, then make it. It is, in the opinion of the committee, demonstrated, if not mathematically, at least upon the principle of political economy, that the work should be prosecuted.

It is believed that were the present rates of toll preserved on the Erie Canal for 12 years to come, and the business transacted thereon was to increase in the same ratio it has for six years past, we should derive a revenue of three millions. Then say that half a million should be applied for repairs, improvements and use of Canal, we should still have left two and a half millions, or the annual interest, at 5 per cent. of 50 millions.

Your Committee have no question in asserting that whatever sum might be expended in the next twenty years, the State would reap a fourfold return. Every dollar expended in Internal Improvements, renders the State more desirable, more precious and more esteemed in the affections of its citizens, and draws forth their patriotic love. Every new mode of conveyance, by which time is saved, is a great object to the poor laboring man, for his time is his capital, and every hour lost in tardy locomotion, is a positive loss of his capital. A rich man thinks it hard to lose the interest of his money, but he is deeply affected at the loss of his capital; but the poor man who is travelling loses as much capital as he wastes of hours and days by a poor and tardy conveyance.

The Railroad is the poor man's road. It is the rich man's money expended for the benefit of himself and poor man.

Were an exclusive system of Internal Improvements adopted, and brought to completion, the facilities of intercourse would be so augmented, perhaps it is not too much to assert, that it would render life itself more valuable, by diminishing the stock of human misery, and adding to the state of human happiness.

The State of New-York will become, under the fostering care of intelligence and liberality, the garden of the American continent—a land in which Art shall give Nature fair play. New-York, standing at the gate-way of the ocean, holds the key in her hand which unlocks the treasures of the Americas.

This system goes far towards equalizing advantages. It gives the parts of the State which are sequestered, advantages bearing some proportion to those parts of the land on which Nature has poured out her bounties.

Why is that man rich? Becuse he lives in the city of New-York. Why is that man poor, of equal capacity to make money? Because he lives on sequestered barrenness. This poor man, which we have supposed, is the victim of position. To reduce the amazing difference of position, between one citizen and another, not by pulling down the fortunate, but by raising him up who is not so, is the consequence of a liberal system of Internal Improvements. Again, the money expended in these improvements, will mostly remain in this State, among our own citizens. It is not as though we were importing these improvements from a foreign land, and sending our capital there to purchase them. No, we buy these improvements from our own citizens. We buy their labor, provisions and materials; our own citizens receive the consideration money for the construction of these public works. But without consuming more of your time in general remarks, the question is asked, by what means shall light be collected and imparted to the public mind, so that New-York need no longer hesitate to take the high station the God of nature intended her.

Your Committee believe a State Society consisting of gentlemen of intelligence, leisure and patriotism, who are willing to aid in developing and perfecting the resources of this State, who shall meet annually at your Capitol, and impart to the public the information acquired during the year by the members of the Society, will best promote the interest we have at heart. We take the liberty of submitting a draft of a Constitution.

Your Committee believe that a Society, of which the most ambitious literary man might be proud of a membership, is the best plan this Committee can recommend, to secure the great objects of this Convention; which is, to have a body of our most patriotic citizens constantly in the field of inquiry, and bringing forth from their treasures "things new and old," by which the public mind may at last see the path of internal improvements too plain to ever lose its way.

All of which is most respectfully, &c.

Alvin Stewart, Ch'n.

Mr. Spencer called for the consideration of the resolution heretofore offered by him, and which was then laid upon the table. The resolution being the first of a series reported to the Convention at Utica, by the Committee of which Mr. Jas. E. Bloomfield was Chairman:

Resolved, That it is recommended to form a *State Society for the promotion of Internal Improvements*, and that this Convention, at its adjourned meeting, adopt means to organize the same; the duty of which Society shall be, to collect and diffuse such information as may be deemed of public utility. The Society shall consist of a member from each county in this State, who shall appoint such officers and agents, and adopt such by-laws and regulations as they may deem necessary.

Mr. Leland moved to amend the resolution so that it should read "for the formation of a Statistical and Internal Improvement Society." The amendment being withdrawn, the resolution was passed.

The consideration of the Constitution, as reported by the Chairman of the Committee of ten, being called for, the same was read by its articles and adopted, in the form and words following:

CONSTITUTION.

Art. 1. This Society shall be called "The New-York State Society for the promotion of Internal Improvements."

Art. 2. The object of this Society shall be to develope the resources of the State, to collect, preserve and impart information, on all subjects connected with the advancement and prosperity of the State, and the promotion of a general system of Internal Improvements.

Art. 3. The officers of this Society shall be, a President, two Vice Presidents, two Secretaries, one for correspondence, and the other for recording the proceedings of the Society, together with a Treasurer.

Art. 4. This Society shall consist of four members from the city and county of New-York, and one member from each of the other organized counties of this State.

Art. 5. The Society shall hold an annual meeting on the second Monday of January in each year, in the city of Albany, and report to the public the proceedings of the Society for the past year.

Art. 6. The officers of this Society shall be elected annually; a majority of the members thereof shall have power to alter this Constitution, to fill all vacancies occurring in their own body, and to elect, as honorary members, distinguished individuals residing out of this State.

Art. 7. Fifteen members of this Society shall form a quorum for the transaction of the ordinary business, and a less number shall have power to adjourn.

Art. 8. The Society shall have power to pass all necessary by-laws, rules, and regulations for its government.

Art. 9. A special meeting of this Society may at any time be called by the President or presiding officers thereof.

On motion of Mr. Spencer, it was

Resolved, That a Committee of twelve be appointed by the Chair, eight of whom shall be taken from the Senatorial Districts, one from each, to nominate suitable persons as officers and members of the State Society.

The Chair appointed the following gentlemen members of the Committee.

I. A. Spencer, A. J. Parker, Charles Borland, James Powers, Philip Kearney, D. D. Aikin, Ambrose L. Jordan, L. Stetson, Sands Higginbottom, L. Beardsley, D. D. Nixon, Bates Cook.

Convention adjourned to meet to-morrow at 4 o'clock in the afternoon.

—

Assembly Chamber, Thursday, Jan. 14, 1836.

Convention met pursuant to adjournment, Judge Cheever presiding.

Mr. Spencer, from the Committe of twelve, reported the following gentlemen as having been selected and nominated as suitable persons for officers and members of the State Society:

List of Members and Officers.

FIRST DISTRICT.

New-York.—Joseph Blunt, David C. Colden, James B. Murray, Philip Kearney.
Richmond.—Minthorn Tompkins.
Kings.—Gen. J. G. Swift.
Queens.—David S. Jones.
Suffolk.—Sidney Smith.

SECOND DISTRICT.

Westchester.—Allan McDonald.
Putnam.—Walker Todd.
Dutchess.—Albro Aikin.
Ulster.—Henry Barclay.
Sullivan.—John P. Jones.
Orange.—Robert Dennison.
Rockland.—— —— Blauvelt.
Delaware.—Noadiah Johnson.

THIRD DISTRICT.

Columbia.—Jonas White.
Rensselaer.—Stephen Ross.
Albany.—Jesse Buel.
Schenectady.—John I. De Graff.
Schoharie.—Abraham L. Lawyer.
Greene.—Luke Kiusted.

FOURTH DISTRICT.

Saratoga.—John W. Taylor.
Washington.—Henry C. Martindale.
Warren.—William Hay.
Essex.—Henry Ross.
Clinton.—William Swetland.
Franklin.—Luther Bradish.
St. Lawrence.—Gouverneur Ogden.
Montgomery.—Isaac H. Tiffany.

FIFTH DISTRICT.

Madison.—John B. Yates.
Oneida.—Joshua A. Spencer.
Oswego.—Christian J. Burkle.
Jefferson.—Orville Hungerford.
Lewis.—Sylvester Miller.
Herkimer.—Dr. Doolittle.

SIXTH DISTRICT.

Otsego.—Erastus Crafts.
Chenango.—Augustus C. Welch.
Broome.—D. S. Dickinson.
Tioga.—Thomas Maxwell.
Steuben.—Ziba A. Leland.
Tompkins.—Heman Camp.
Cortlandt.—John Miller.

SEVENTH DISTRICT.

Onondaga.—Moses Burnet.
Cayuga.—Nathaniel Garrow.
Seneca.—Asher Tyler.
Wayne.—Wm. H. Adams.
Ontario.—Bowen Whitney.
Yates.—Aaron Remer.

EIGHTH DISTRICT.

Monroe.—Anstarchus Champion.
Livingston.—George Hosmer.
Alleghany.—Philip Church.
Cattaraugus—Frederick S. Martin.
Genesee.—David E. Evans.
Orleans.—William James.
Niagara.—Samuel De Vaux.
Erie.—Peter B. Porter.
Chautauque.—William Peacock.

For President, Jesse Buel.

For Vice Presidents, Luther Bradish. John B. Yates.

Corresponding Secretary, David C. Colden.

Recording Secretary, Robert Dennison.

Treasurer, John I. De Graff.

On motion of Mr. Stewart, the report was adopted by the Convention.

On motion of Mr. Spencer, the 6th article of the Constitution was amended by adding thereto the words "that the above named officers shall be elected annually;" and the following was adopted as the 9th article of the Constitution:

"A special meeting of this Society may at any time be called by the President or presiding officer thereof."

Mr. Spencer moved the following resolutions, which were passed unanimously.

Resolved, That the several gentlemen who have been elected officers and members of this Society be, and they are hereby respectfully requested to accept thereof.

Resolved, That every officer and member who shall enter upon and faithfully discharge the important duties of his station, will deserve to be ranked among the public benefactors of his country, and receive the enduring gratitude of his fellow citizens.

Resolved, That every intelligent and patriotic citizen of this State, is earnestly reqested to lend his aid in advancing the diversified and great objects committed to the charge of the Society-

Resolved, That this Convention, entertaining an entire confidence that the Society, by its organization, in the execution of its plan, will be influenced by no local or sectional jealousies, or polotical party considerations, but that its labors will be characterized by a patriotic devotion to the public weal.

Resolved, That in view of the rapid increase of the population in the Valley of the Missisippi, and the country bordering on the Lakes, whose wants are to be supplied from our Atlantic cities, and whose surplus products are there to find a market, an enlightened public policy demands of New York, the exertion of her utmost energies in the construction of public works, which shall expedite and cheapen communication between her cities and that vast region of fertile country.

Resolved, That the thanks of the Convention be presented to the Committee appointed at Utica for their very able report in part on the subject of Post and County Roads, and that they are respectfully requested to prosecute their useful labors, and report the results to the State Society organized by this Convention.

Resolved, That our thanks be tendered to the Honorable the Assembly for the use of their Chamber during the sitting of this Convention.

Resolved, That the proceedings of this Conventon be published by the Corresponding Secretary, and that he be authorized to affix the names of its officers thereto.

On motion of Mr. Jordon, it was

Resolved, That this Convention do respectfully submit for the consideration of the Legislature the propriety of appropriating some suitable room in the Capitol for the use of the Society.

On motion of Mr. Kirkland it was

Resolved, That the thanks of this Convention be presented to the Honorable Samuel Cheever for the satisfactory manner in which he has presided over its deliberations.

On motion of Mr. Kirkland, the Convention adjourned.

Samuel Cheever, President.
Sumner Ely, Charles Borland, Jr. } Vice Pre'ts.
Fletcher M. Haight, David C. Colden, } Secretaries.

THE FOLLOWING TABLE EXHIBITS THE RETURNS WHICH WERE RECEIVED FROM TOWN CLERKS.

Albany County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Coeymans,	2723	85¼	2105	$125	5¾	$504	$475
Knox,	2189	75	1413	30			30
Rensselaer,	3685	160	258	190	20	300	
	8597	310½	3776	$345	25¾	$805	$505

Coeymans, 24 bridges. Knox, 3 bridges. Total, 27 bridges. 7 towns, having 44,923 inhabitants, made no returns.

Alleghany County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Allen,	898	72	690	$200			
Amity,	872	75	1271	250			$500
Belfast,	743	50	700				250
Birdsall,	543	61	412	50			
Bolivar,	449	75	675	250			
Genesee,	219	27	360	250			
Haight,	655	53	1185	100			
Portage,	1839	150	1750	250			200
Rushford,	1115	60	1039	250			120
Scio,	602	19	716	250			200
	7941	642	8798	$1850			$1270

Allen, 7 bridges. The $200 applies mostly to bridges. Amity, 15 bridges. Belfast, 16 bridges, of which one is built by the county, costing $1000. Birdsall, 4 bridges: expense of bridges included in expense of roads. Genesee, no expensive bridges; roads mostly new. Portage, 10 bridges. Rushford, 21 bridges. Scio, 4 bridges. Total, 77 bridges, on which 400 days work in addition are given. 16 towns, having 18,335 inhabitants, made no returns.

Broome County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Lisle,	4378	40	1107½	$	8	120	
Nanticoke,		35	220				
Vestal,	946	107	1000	75			
Windsor,	1280	120	1760				100
	6604	302	4087½	$75	8	120	100

Lisle, 3 bridges, which cost $1,400. Windsor, 1 bridge. Total, 4 bridges. 7 towns, having 10,975 inhabitants, made no returns.

Cattaraugus County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Franklinville,	903	68	1159	83	21	221	332
Fudom,	1505	95		1280			150
Hinsdale,	919	70	1250	250			230
Machias,	735	57	900				75
Napoli,	852	75	1392				
New Albion,	380	67	1016				25
Perrysburgh,	2440	140	2959	250			
	7734	572	8776	1863	21	221	812

Franklinville, 17 bridges. Fudom, 10 public bridges. Napoli, no public bridges, excepting those built by the town; roads in bad condition. New Albion, 2 bridges, which cost $206.00. Total, 29 bridges. 14 towns, having 8,990 inhabitants, made no returns.

Cayuga County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Niles,		99	1740	22			
Auburn,	4486	17¾	2480		2		
Ledyard,	2427	75	223	50			100
Locke,	3310	42	1241½				50
Mentz,	4143	100	2946				200
Sennet,	2297	70	2334		5½	275	
Scipio,	2691	54	1918½				
Sterling,	1436	80	2000	200			
Sumner Hill,		48	1000				
Victory,	1819	68	1693				25
Moravia,		55	1400				15
	22609	708¾	18976	272	7½	275	390

Niles, in 1834, there were expended on the roads $120. Auburn, 4 bridges. Ledyard, 5 bridges. Mentz, several bridges. Victory, 3 bridges. Total, 12 bridges. 12 towns, having 25,339 inhabitants, made no returns.

Chatauque County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Busti,	1680	50	1552	50			
Carroll,	1015	100	1142				250
Charlotte,	886	50	1278½	163			
Ellicott,	2101	73	2177	800			700
French Creek,	420	27	450				250
Mina	1388	52	1041				30
Pomfret,	3380	119	3235½		40		350
Portland,	1771	56	1352				162
Ripley,	1647	80	1682½	60			100
Sherman,		59	867	150			
Stockton,	1605	72	1511				160
Westfield,	2477	83	2619				250
	18370	821	18907½	1223	40		2252

Carroll, 10 bridges. Ellicott, 8 bridges. French Creek, 8 bridges. Mina, 5 bridges. Sherman, 2 bridges, which cost $150 each; some smaller ones, which cost from 40 to 60 dollars. Stockton, 6 public bridges, besides several smaller ones. Total, 39 bridges. No returns from 12 towns, having 16,301 inhabitants.

Chenango County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Columbus,	1661	65	1300		6		
Coventry,	1576	60	1083		7	80	
Green,	2962	167	2049	211	10	100	4600
Linckleau,	1425	30	727				
Macdonough,	1232	80	1365½				
Oxford,	2943	100	2330	100	4		175
Preston,	1213	50	1155				16
Smithville,	1859	100	1240				
	14671	652	11249½	311	27	180	4791

Green, 3 bridges. Preston, 25 public bridges, generally supported by an annual tax. Total, 28 bridges. No returns from 11 towns. having 22,567 inhabitants.

Clinton County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Beekmantown,	2391	150	1350	250	6		150
Champlain,	2456	88	1665	50			300
Plattsburgh,	4913	120	4500				
	9760	358	7515	300	6		450

Beekmantown, 25 bridges. The turnpike is a military one, made at the expense of the United States. Champlain, 24 bridges. Plattsburgh, 14 bridges, one cost $2000, 1 cost $1800, 2 cost $1500, 10 cost about $3000. Cost of repairing roads and bridges differ from $250 to $500. Total, 63 bridges. No returns from 5 towns, having 9584 inhabitants.

Columbia County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Stockport,		25½	1520				750
Austerlitz,	2245	100	1100		8	300	75
Canaan,	2063	40	2000		6	100	50
Claverack,	3000	72	1560		13	650	400
Clermont,	1203	34	587				300
Copake,	1676	135	1270		3		120
Ghent,	2783	75	1535	325	8	448	
Taghkanich,	1654	60	1000	250			
	14624	541½	10572	575	38	1506	1695

Stockport, 12 bridges. Canaan, 1 bridge. Claverack, 23 bridges. Clermont, 7 bridges; one wholly supported by the town. Copake, 20 bridges. Ghent, the expense of bridges included in that of roads. Taghkanich, 4 bridges: their expense included in that of roads. Total, 67 bridges. No returns from 10 towns, having 25,283 inhabitants.

Cortland County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Cincinnatus,	1308	60	1200				
Cortlandville,	3673	110	2635	1			200
Freetown,	1051	36	644				20
Homer,	3307	80	2100				
Marathon,	895	50	950	150			832
Preble,	1435	46	867½				50
	11669	382	8396½	151			1152

Cortlandville, 5 bridges. Preble, 7 public bridges. Total, 12 bridges. A Railroad is anticipated. No returns from 5 towns, having 12,122 inhabitants.

Delaware County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Andes,	1860	85	1422				
Bovina,	1340	89	997				
Colchester,	1424	110	1313	68			
Hancock,	766	90	832	250			
Harpersfield,	1976	100	1300		12		
Middletown,	2303	140	1951	250			50
Tompkins,	1774	90	1547	200			
	11531	704	9362	768	12		50

Andes, 1 bridge, cost $500, now in a useless condition. Colchester, 1 bridge, cost $1250, another is contemplated by the inhabitants, which will probably cost $1200 or $1500. Total, 2 bridges.

Dutchess County.

Amenia.	2339	60	1339		7	170	17262½
North-East,	1689	70	1000				
Pleasant Valley,	2419	55	1350		6¼	unk'n	100
	4168	185	3689		13¼	170	273½

Amenia, 8 bridges. Pleasant Valley, 3 public bridges. No returns from 15 towns, having 46,758 inhabitants.

Erie County.

Lancaster,		50	1750				250
Amherst,	2485	125	2605				500
Aurora,	2423	80	2606				250
Boston,	1521	77	1446	250			400
Clarence,	3360	7*	200				5
Collins,	2123	100	3250	150			100
Concord,	1895	220	1884	200			170
Hamburgh,	3351	75	4000	50	4		250
Newstead,	1926	17	1438	188			
Wales,	1470	60	1716				838
	20556	811	20695	838	4		1925

Lancaster, 9 bridges. Amherst, 16 bridges. Aurora, 13 bridges; $250, not enough for repairing bridges, should be $500. Boston, 7 public bridges; roads in bad order. Clarence, the clerk has returned only the stage road. Collins, 15 brides. Hamburgh, 10 public bridges. Newstead, 3 bridges, which cost about $500. Wales, 18 bridges. Total, 91 bridges. * Stop Road.

Franklin County.

Malone,	2207	90	1700	$250			$100

12 bridges. 14 towns, having 17,080 inhabitants, making no returns.

Genesee County.

Alabama,	816	75	1625	$250			$40
Bergen,	1508	42	1031	100			50
Bethany,	2374	60	1600	250			
Byron,	1936	75	1682				
Castle,	2264	80	1995				
Darien,		74	2500				200
Elba,	2678	125	2185	250			
Java,		60	2200	200			20
Middlebury,	2416	72	1626	92			40
Perry,	2792	75	1674	130			96
Warsaw,	2474	70	1810	250			
	19258	808	19928	1522			446

Alabama, 2 State bridges; causeway, or log road, the dearest and worst, in the long run. Bergen, 3 bridges. Bethany, 10 bridges. The ordinary means authorised by law wholly inadequate to render roads and bridges permanently good. Byron, 12 bridges, 2 of which cost for rebuilding, $500, last year. Castle, 3 bridges, which cost $350 to build. Darien, 12 bridges; this returned from Darien Centre. Java, 2 bridges; only $75 have been received this year, for repair of roads. Middlebury, 7 bridges. Total, 51 bridges. No returns from 14 towns, having 32,889 inhabitants.

Greene County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Hunter,	1960	60	1094	$100	10	$700	
Lexington,	2548	95	1700	150			$100
New Baltimore,	2370	70	1685		11	unk'n	350
Windham,	3476	85	1800	75	13	800	
	10349	310	6274	325	34	1500	450

Lexington, 2 bridges. New Baltimore, 3 large bridges, several smaller ones, and are a heavy burden. Windham, 4 expensive bridges. Total, 9 bridges. No returns from 6 towns, having 19,176 inhabitants.

Jefferson County.

Adams,	2995	80	2250				$100
Alexandria,	1523		1650				250
Le Ray,	3430	125	2000	$100			150
	7948	205	5900	100			500

Adams, 7 bridges. Alexandria, 6 bridges. Le Ray, 6 bridges. Total, 19 bridges. No returns from 15 towns, having 40,567 inhabitants.

King's County.

New Eutrecht,	121	17	735				

No returns from 5 towns, having 19,318 inhabitants.

Lewis County.

Pinckney,	783	50	486½	100			507

Pinckney, 3 bridges. No returns from 10 towns, having 14,175 inhabitants.

Livingston County.

Caledonia,	1618	50	1409	$59			
Geneseo,	2675	82	2754	150			
Groveland,	1703	94	1200	250			$250
Leicester,	2042	75	2250	75			425
Livonia,	2665	100	2200				70
Sparta,	3777	106	2796½	250			200
Springwater,	2253	63	1800				
York,	2636	80	2937½	107			60
	19369	650	17338	$891			$1005

Geneseo, 2 bridges, besides several smaller ones; one rebuilt in 1833 at a cost of $2770; the other to be rebuilt at a cost of $3000. Groveland, 7 public bridges, costing from $50 to $100 each. Leicester, $525 appropriated, this year, being $100 more than usual. Livonia, 7 bridges. Sparta, 8 bridges. York, 3 bridges. Total, 27 bridges. No returns from 4 towns, having 8350 inhabitants.

Madison County.

Georgetown,	1094	40	712		1		
Hamilton,	3220	100	2400		16		
Madison,	2544	70	1800		6		$120
	6858	210	4912		23		$120

Georgetown, several bridges. Hamilton, 16 bridges; $800 appropriated for builiding stone butments to 2 or 3 of said bridges. Total, 16 bridges. No returns from 10 towns, having 32,179 inhabitants.

Monroe County.

Chili,	2010	98	1319	50			250
Clarkson,	3251	124	3000	200			100
Gates,	7117	56	1641	150			
Henrietta,	2310	70½	1945½	250			
Mendon,	3057	96	2226				250
Pittsford,	1032	15	1488	50			33
Rush,	2101	70	1963				200
Sweden,	2938	72	2753	50			
Wheatland,	2239	60	1875				150
	26855	661	18210½	750			983

Chili, 9 bridges. Clarkson, 14 bridges. Gates, 2 bridges to build, which cost $100. Henrietta, few bridges, which are but of trifling expense. Mendon, 30 br dges. Pittsford, 4 bridges. Rush, 3 bridges. Wheatland, 4 bridges. Total, 66 bridges. No returns from 7 towns, having 23,007 inhabitants.

Montgomery County.

Name of Town.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Amsterdam,	3354	82	2681		12	600	150
Ephratah,	1818	66	1600	60			500
Mayfield,	2614	114	1623	40			200
Northampton,	1392	79½	977				300
Stratford,	552	50	402				325
Lake Pleasant,	266	62	243				150
	10001	453½	7526	100	12	600	1625

Amsterdam, the roads are in a very bad condition. Ephratah, 22 bridges. Mayfield, 20 bridges. Northampton, bridges are numerous. Stratford, 27 bridges. Lake Pleasant, 5 bridges. Total, 74 bridges. No returns from 13 towns, having 34,917 inhabitants.

Niagara County.

Hartland,	1584	85	2400	150			25
Porte,	1491	70	1173	250			
Somerset,	871	61	1122	100			
	3945	216	4695	500			25

Hartland, 5 bridges. Porte, the expense of bridges included in days' work. Somerset, the roads generally bad, opportunity for making them good. Total, 5 bridges. No returns from 8 towns, having 14,540 inhabitants.

Onondaga County.

Tabius,	3071	76	915		10	$125	
Onondaga,	5668	121	2123	$60	9	50	
Pompey,	4812	140	3550	4	2	unk'n	213
Skaneatelas,	3812	85	3555	250	7¼	50	
	17363	422	10143	314	28¼	225	213

No returns from 13 towns, having 41,611 inhabitants.

Ontario County.

East Bloomfield,	3861	75	1710				$100
Bristol,	2952	250	1180				225
Canandaigua,	5162	152½	4064½		2	$100	237
Hopewell,	2202	70	1330	$20	6	258	97
Manchester,	2811	72	2245				200
Naples,	1943	45	1425	100			100
	18931	664½	11954½	120	8	358	959

East Bloomfield, 4 bridges. Bristol, 12 bridges. Canandaigua, 6 bridges. Hopewell, 8 bridges. Manchester, 5 bridges. Naples, 12 bridges. Total, 57 bridges. No returns from 8 towns, having 21,236 inhabitants.

Orange County.

Crawford,	2019	62	2120		6		$250
Goshen,	3361	80	2032		8		50
Hamptonburgh,	1365	51	1123				250
Montgomery,	3885	100	2626		8	$160	123
Warwick,	5009	175	3860	$600	20		250
	15639	468	11761	600	42	160	923

Hamptonburgh, 6 bridges. Montgomery, 6 bridges. Warwick, several bridges. Total, 12 bridges. No returns from 9 towns, having 29,727 inhabitants.

Orleans County.

Gaines,	2121	68	1214				$100
Shelby,	2048	85	2000	$92			200
	4169	153	3214	92			300

Gaines, 5 bridges. Shelby, 7 bridges. Total, 11 bridges. No returns from 6 towns, having 14,604 inhabitants.

Oswego County.

Hastings,	1494	75	1900	250			
Mexico,	2671	175	2604	75			125
Oswell,	501	16	440	250			100
Palemo,		50	1500	100			
Parish,	968	65	683	55			65
Redfield,	341	31	300	250			
Volney,	3629	75	2052	137			
	9604	487	9479	1117			290

Oswego County—(continued.)

Hastings, roads in a wretched condition. Mexico, 30 bridges. Oswell, 3 bridges. Redfield, 7 bridges. Volney, expense of bridges included in that of roads. Total, 40 bridges. No returns from 14 towns, having 17,500 inhabitants.

Otsego County.

Name of Town.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Burlington,	2459	80	1500				
Decatur,	1110	40	750				
Edmeston,	2087	75	1268¾		6	90	
Exeter,	1690	40	1000				
Middlefield,	3323	112	1870½		16		330
Otego,	1148	100	1907		5	unk'n	150
Otsego,	4363	120	2000	370	8		300
Plainfield,	1626	60	1070		2	10	
Richfield,	1752	24	1287½	50	9	220	30
Unadilla,	2313	86	1660	100			115
Westford,	1645	63	1273				
	23497	800	15586¾	520	46	320	925

Middlefield, 6 public bridges over Cherry Valley creek, and one-half of 2 bridges over the Susquehanna. Otego, 6 bridges. Otsego, 20 bridges. Plainfield, 5 bridges. Richfield, several bridges. Unadilla, 5 bridges. Total, 42 bridges. No returns from 12 towns, having 27,875 inhabitants.

Putnam County.

Patterson,	1529	50	1150				

No returns from 4 towns, having 11,099 inhabitants.

Queen's County.

No returns.

Rensselaer County.

Berlin,	2019	40	1200	500	6	unk'n	
Grafton,	1681	67	1400	50			
Greenbush,	3216	70	1670		14	700	250
Petersburgh,	2011	60	1621¾				800
Schaghticoke,	3002	40	1750		3	180	500
	11929	277	7542¾	550	23	880	1550

Berlin, the $500 is much more than is usual. Petersburgh, 30 bridges. Schaghticoke, 6 bridges. Total, 36 bridges. No returns from 9 towns, having 37,495 inhabitants.

Richmond County.

No returns.

Rockland County.

Ramapo,	2837		1725		6		200

No returns from 3 towns, having 6551 inhabitants.

Saratoga County.

Corinth,	1412	80	1150				
Edinburgh,	1571	60	1024				25
Providence,	1579	67	1203				
Saratoga,	2461	87	1844	250	7	210	500
Sar. Springs,	2264	60	1723				200
Waterford,	1473	7	370		2	80	10
	10760	361	7314	250	9	290	735

Edinburgh, a float bridge. Providence, the bridges are kept in repair by labor assessed. Saratoga, 7 bridges. Saratoga Springs, 10 bridges: there is a railroad in the town, 5 miles long, which cost $50,000: the bridges cost $7,000. Waterford, 10 bridges. Total, 28 bridges. No returns from 14 towns, having 27,919 inhabitants.

Schenectady County.

No returns.

Schoharie County.

Cobleskill,	2988	62	2323		7		75
Jefferson,	1743	80	1200		8	60	
	4731	142	3523		15	60	75

Cobleskill, 3 bridges. No returns from 8 towns, having 25,171 inhabitants.

Seneca County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Covert,	1791	63	1550				
Fayette,	3216	86	2867	250	12		350
Lodi,	1786	61¼	1307½	50			218
Junius,	1583	55	950				
Romulus,	2089	70	1500	15			235
	10460	335¼	7774½	315	12		803

Lodi, 7 bridges. Romulus, the bridges are short and high. Total, 7 bridges. No returns from 6 towns, having 10,581 inhabitants.

St. Lawrence County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Brasher,	826	57	820	$250			
Canton,	2439	72	2800	250			
Depeyster,	813	38½	619				
Gouverneur,	1430	100	1649	250			$100
Hopkinton,	827	40	617	250			
Lawrence,	1097	58	822	250	6	$100	
Madrid,	3459	500	2346				250
Massena,	2068	88	763	250			300
Morristown,	1600	100	1870	180			320
Russell,	541	45	580	250			75
Stockholm,	1944	120	1924	250			
	23244	718½	22210	2180	6	100	1045

Brasher, 5 bridges; expense of building said bridges, $2500. Expended for making roads, during last five years, $3000. Canton, 3 bridges; one cost $1300, one $400. Gouverneur, 4 bridges. Madrid, 52 bridges. Massena, 3 bridges; original cost, about $3000. Russell, 6 bridges. Stockholm, several bridges: the roads, although of great expense, are bad. Total, 73 bridges. No returns from 13 towns, having 13110 inhabitants.

Steuben County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Addison,	944	70	1200	250			100
Homby,	1572	50	900	150			
Jersey,	2391	100	1600				
Painted Post,	974	76	1257	250			20
Pulteney,	1724	67	1390	255			
Wayne,	1172	60	825	128			
	8707	423	7172	1033			120

Addison, 2 bridges; money for these 2 bridges raised by subscription. Jersey, 2 bridges. Painted Post, 1 bridge. Total, 5 bridges. No returns from 18 towns, having 25,044 inhabitants.

Suffolk County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Easthampton,	1668	120	471				
Riverhead,	2010	110	2000				50
	3678	230	2471				50

No returns from 7 towns, having 23,102 inhabitants.

Sullivan County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Fallsburgh,	1173	80	1268	250			15
Bethel,	1192	120	630	240	9	220	
Thompson,	2457	140	1650	150	20	400	100
	4722	340	2548	640	29	620	115

Fallsburgh, 1834, one bridge cost $600, and a stone one $1500. Total, 2 bridgces. No returns from 6 towns, having 7642 inhabitants.

Tioga County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Barton,	972	90	1385	25			
Berkshire,	1711	50	720	50			200
Elmira,	2892	65	2300				125
Newark,	1027	65	1100				
Nichols,	1254	60	365				
Oswego,	3076	150	3000		10		250
Richford,	[illegible]	38	897		8	50	15
	11162	518	9767	75	18	50	590

Berkshire, 14 bridges. Elmira, 7 bridges. Newark, 3 bridges. Nichols, a toll-bridge across the Susquehanna. Oswego, bridges are numerous; one of them cost $13,000, and has had $200 expended on it for repairs. Richford, 1 bridges. Total, 26 bridges. No returns from 11 towns, having 22,689 inhabitants.

Tompkins County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Enfield,	2332	70	1735	250			
Groton,	3597	114	2702				
Hector,	5212	684	5000	80			
Ithaca,	5270	80	4930	661	8	unk'n	
Lansing,	4020	200	2400				250
Ulysses,	3130	85	2120				200
	23561	1233	18947	991	8		450

Enfield, there have been about $35 appropriated to build a bridge. Groton, a tax of $2500 was raised to build a new bridge. Hector, one toll-bridge receives $700 a year. Lansing, 8 bridges. Ulysses, 14 bridges; cost of said bridges $2200. Total, 24 bridges. No returns from 4 towns, having 12,984 inhabitants.

Ulster County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Esopus,	1770	40	1122				25
Hurley,	1408	40	897	4562	10		
Kingston,	4170	91	2228	250	4½	300	45
New-Paltz,	5098	180	3330		9	500	250
Plattkill,	2044	79	1485		6½	215	
Shandaken,	966	24	853		18	unk'n	100
Ellen Ville,		95	2961				285
	11396	549	12871	48121	48	1015	685

Hurley, 6 bridges. Kingston, 2 bridges. New-Paltz, 6 bridges. Ellen Ville, 22 bridges; $400 raised by voluntary subscription for the benefit of a road. Total, 36 bridges. No returns from 8 towns, having 25,154 inhabitants.

Warrren County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Bolton,	1467	85	1173½				120
Caldwell,	797	44	567	20			
Hague,	721	13	600	150			25
Johnburgh,	985	66	877	250			80
Luzerne,	1362	65	1145	75			15
	5332	273	4332	495			2 40

Bolton, 2 bridges. Caldwell, 5 bridges. Hague, 6 bridges. Johnburgh, 5 bridges. Luzerne, 1 bridge. Total, 19 bridges. No returns from 4 towns, having 6464 inhabitants.

Washington County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Easton,	3758	90	2891	212			
Granville,	3881	200	3256			2	1000
Greenwich,	3847		1953				250
Hampton,	1069	30	775				
Kingsburgh,	2606	72	768	100			
Putnam,	718	35	532½				204
Salem,	2972	56	[illegible]				
White Creek,	2446	80	[illegible]				200
	21297	533	13399	310		2	1654

Easton, 3 bridges, annual expense included in that of roads. Granville, 9 bridges. Greenwich, 5 bridges. Hampton, 3 bridges. Kingsburgh, 2 bridges, expense included in expense of roads. Putnam, 2 bridges. White Creek, 2 bridges, one cost $1500, the other $2000. Total, 26 bridges. No returns from 9 towns, having 21,338 inhabitants.

Wayne County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Arcadia,	3901	175	3097	100			250
Galen,	3631	105	2500	250			
Lyons,	3603	105	2617				700
Ontario,	1585	40	1447	20			
Rose,	1641	48	1433	80			
Savannah,	886	51	674				10
Williams,	1801	56½	1695				
	17068	581½	13463	450			960

Arcadia, 6 bridges. Galen, 3 bridges, first cost, $1500, second, $600, third, $600. Lyons, 6 bridges. Savannah, 1 bridge. Total, 16 bridges. No returns from 8 towns, having 16,575 inhabitants.

Westchester County.

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.
Bedford,	2750	70	2438				50
Cortlandt,	3840	77½	1778	180	4		250
Greenburgh,	2195	44	1460				
New Rochelle,	1274	14	682	20	2½	25	
Rye,	1602	33	842½	25	6	40	40
Somers',	1997	45	1200				250
Westchester,	2362	37		750	12	466	250
Yorktown,	2141	70	1434		4	100	254
	18054	320½	9834½	875	28½	631	1094

Bedford, 7 bridges; $600 have been raised during the last two

Westchester County—(continued.)

NAME OF TOWN.	Population.	Length of Public Road.	Days' Work.	Additional Money.	Turnpike.	Cost of Turnpike.	Annual Cost of Bridges.

years, in laying out and altering roads. Cortlandt, 15 bridges. New Rochelle, bridges kept in order by day's work assessed. Somers', 4 bridges. Westchester, 3 bridges. Yorktown, 9 bridges. Total, 38 bridges. No returns from 13 towns, having 18,402 inhabitants.

Yates County.

Barrington,	1854	75	1270				$20

Barrington, 2 bridges. No returns from 7 towns, having 18155 inhabitants.

In the columns of additional money, cost of turnpike, and annual cost of bridges, fractions of dollars are omitted.

Sixth Annual Report of the Superintendent of Graduation, Masonry, and Construction of the Baltimore and Ohio Railroad.

Office of the Superintendent of the Baltimore and Ohio Railroad.

Ellicott's Mills, Md., 1st Oct., 1835.

To Phillip E. Thomas, Esq.,

President of the Baltimore and Ohio Railroad Company:

Sir,—At the date of my last annual report, the graduation, masonry, and construction, of the Baltimore and Ohio Railroad, and of the lateral Railroad to Washington City, were rapidly advancing. I have now the gratification to report that the operations, on the Baltimore and Ohio Railroad, then in progress, have since been finished, and that the road was, on the first day of December, 1834, formally opened for travel and traffic from the "Point of Rocks" to Harper's Ferry: And that on the first day of July last, the construction of the lateral Railroad to Washington City had been so far advanced, as to admit, on that day, of the passage of a locomotive engine, with a train of cars, over it, very nearly as far as the north line of the District of Columbia, in the vicinity of Bladensburg, and on the 20th of that month was formally opened for travel to that line. Owing to a disappointment in the receipt of rails from England, the remainder of the line, extending from that point to the Pennsylvania Avenue, in the City of Washington, and embracing a distance of about five miles, could not be prepared for use before the 25th day of August, on which day it was opened, with appropriate ceremony, for the regular conveyance of passengers.

In addition to the accompanying tables, marked B 1, 2, 3, 4, 5, 6, and other papers, marked T. U. V. W. X. Y. Z., only a few observations are necessary, to present a full report of the proceedings of this department. These tables exhibit the work in detail and its cost, and the papers also furnish copies of such printed notices and other information as is generally given to persons disposed to take contracts under this Company, as well as the manner the various kinds of work are required to be executed when contracted for.

Graduation and Masonry of the Baltimore and Ohio Railroad.

The 6th Division of this road extends from the end of the 5th Division at the "Point of Rocks," on the left bank of the Potomac river, to the bridge of the Messrs. Wager, across that river at Harper's Ferry. The first two miles and ten poles around the Narrows, occasioned by the lower and upper Points of Rocks, and the last two miles, beginning east of Miller's Narrows, and extending along those and Harper's Ferry Narrows, to the bridge at Harper's Ferry, were graduated for the reception of the railway, by the Chesapeake and Ohio Canal Company. The graduation and masonry of the intermediate space, comprehending a distance of 8 miles and 119 82-100 poles, were generally commenced about the 15th July, 1834, and were so rapidly prosecuted that the completion of the railway upon it was effected by the first day of the December following. The quantity of earth removed and supplied, inclusive of rock, on this intermediate space, was 150,224 cubic yards, at the gross cost of $58,993.34, exclusive of contingencies, but inclusive of grubbing, clearing, and transportation; or at an average cost per cubic yard of 39 27-100 cents; or of $42.21 a pole lineal, and of $13,508.08 a mile. Table B No. 1 exhibits the names of contractors by whom this work was so energetically and satisfactorily executed, their prices, &c.

The masonry built upon this intermediate part of the 6th Division is detailed in table B No. 2, and is there shown to have amounted to 13,536 3-4 perches, of 25 cubic feet to the perch. It is contained in five bridges, numerous culverts, and two detached walls. Its gross cost was $54,129.24, and average cost per perch $3.99 86-100. The table referred to presents the names of the contractors and their respective prices.

Table B No. 3 is referred to for a succinct view of the cost of the graduation and masonry of the whole line of this road from Pratt street, Baltimore, to Harper's Ferry, and inclusive of the branch road to the city of Frederick. By this table the quantum of the graduation of the whole line is shown to have required the removal and supply of 2,660,937 cubic yards of earth, inclusive of a large proportion of rock, at a cost of $883,140.74, and the construction of 93,419 1-2 perches of masonry, at a cost of $372,497.01, aggregately amounting to the sum of $1,235,637.75, being at the average rate of $15,561.58 a mile. By an inspection of the recapitulation to this table, it will be perceived that the average aggregate cost per mile of the graduation and masonry declines in amount regularly from the end of the 1st Division to the termination of the road as follows, viz: at the end of the 1st Division it is $46,354.81—of the 2d $29,252.35—of the 3d $20,376.18—of the 4th $17,671.72—of the 5th $16,128.84—and at the end of the 6th $15,840.04,—and, inclusive of the lateral branch to the city of Frederick, it is only $15,561.58.

By this table it is further shown, that the average cost per cubic yard of the 2,590,689 yards of earth, inclusive of a large proportion of rock, as well as of the grubbing and clearing, which was handled in effecting the graduation of the line to Harper's Ferry, was 32 12-100 cents, and that the average cost of the whole per cubic yard, when the 70,248 yards, fully half of which was rock, and its cost, of the branch to Frederick, is added, is raised to 32 43-100 cents.

And that the 93,419 1-2 perches of masonry, inclusive of the cost of four superstructures of wood, one of which, that across the Monocacy river, was very extensive, cost at an average, on the whole line, to Harper's Ferry, inclusive of the branch to Frederick, $3.98 84-100 a perch.

This large quantum of masonry is partly contained in a very great number of gothic and common culverts, and a few detached walls, but much the larger portion of it in the following described bridges, all of which were designed by my late intelligent and energetic assistant, Mr. Robert Wilson, except the Carrollton, the Patterson, and the Oliver viaducts, which were designed by myself, and that with a superstructure of wood across the Monocacy river, which was designed by Mr. Lewis Wernwag, its enterprising contractor, viz:

The "Carrollton viaduct," over Gwynn's falls, of two arches of 80 and 20 feet chord respectively.

The "Patterson viaduct," of four arches, 2 of 55 feet, and 2 of 20 feet chord respectively, built across the Patapsco river.

The "Oliver viaduct," of 3 arches of 20 feet chord each, over the Frederick turnpike road, and Ellicott's branch.

The bridge across the Monocacy river, of 3 spans of 110 feet each.

One across the greater Catoctin creek of 2 arches, of 50 feet chord each.

One over the Frederick turnpike road, and a contiguous branch, near Parrsville, of 2 arches, of 20 and 10 feet chord, respectively.

One across the west fork of the Patapsco river, near Marriottsville, of one arch of 40 feet chord.

One across Ballinger's creek of 1 arch, of 30 feet chord.

Four of 1 arch each, of 25 feet chord, viz: across Gadsby's run, Gillis' falls, Bush and Israel's creeks.

Seven of 1 arch each, of 20 feet chord, viz: across Gwynn's run, Robert's run, Caton's branch, a branch opposite the Union factory, Piney run, the Tuscarora, and lesser Catoctin creeks.

One of 20 feet span, superstructure of wood, over the Frederick and Georgetown turnpike road.

One of 1 arch, of 15 feet chord, across Dorsey's run, near the Avalon works.

One across Clagget's branch, of 15 feet span, superstructure of wood.

Three of 1 arch, of 14 feet chord, viz: over Warfield's road, Davis' and Marriott's branches.

Nine of 1 arch each, of 12 feet chord.

One of 12 feet span, superstructure of wood, and four of 1 arch each, of 10 feet chord.

Bridge across the Potomac River, at Harper's Ferry.

This heavy work has been very recently put under contract. It is expected that it will be completed within one year. The contractors are Charles Wilson, for the masonry, and Lewis Wernwag, for the superstructure of wood, both of whom are well known to the Company as contractors of skill, energy, and fidelity.

Construction of the Baltimore and Ohio Railroad.

As soon as practicable after the superintendency of this branch of the service of the Company was confided to me, measures were adopted to obtain a supply of the requisite materials for the construction of a single track of railway from the "Point of Rocks" to Harper's Ferry, and for such parts of a second track, as were indispensable, as passing places. It was found very difficult to obtain a supply in the short time it was desired. The greater portion of the string pieces are of yellow pine, procured in North Carolina, and partly conveyed by the Chesapeake and Ohio Canal from Georgetown, and partly by the Railroad from Baltimore to the "Point of Rocks." The sleepers were procured in the immediate neighborhood of the work. The plan upon which the work was executed is fully set forth in the accompanying paper Z. The horse path was paved in such places where the railway was in contact with other roads, and particularly in the street of Berlin, at Weverton and at Harper's Ferry Narrows, at which latter places its site is also that of the Frederick and Harper's Ferry turnpike roads. The remainder was Macadamised in the best manner, with stone of the hardest quality, reduced to particles not exceeding four ounces in weight. Twelve miles and 119 5-10 poles of first track, and 295 80-100 poles of second track and ten turnouts were laid, at a gross cost of $47,353.49, inclusive of the cost of all materials, (except the prime cost of the rails,) their inspection, transportation, distribution, &c., and of the cost of the horse path, superintendence, and all other contingent expenses, which is an average cost of $3,561.25 a mile. But the prime cost of 22 tons of rails, the quantity used on a mile, at $45 a ton, or $990 a mile, must be added to $3,561.25, which shows the actual cost per mile to have been $4,551.25, inclusive of the cost of nearly, if not all, the turnouts which will be necessary when the second track shall have been laid continuously throughout the whole line.—The horse path cost at the high rate of $783.12 84-100 a mile, owing to the inconvenience of obtaining stone of suitable character, and the rapidity with which the work was executed. The second track may be laid at a less average cost.

The contractors who laid the rails were Messrs. John Littlejohn, Matthew Borland, and James Thompson—the turnouts were inserted by Messrs. Reuben Aler and Jesse Hay, and the horse path was formed by Messrs. Thos. M. Macubbin and David Lemmon.

Graduation and Masonry of the Lateral Rail road to Washington City.

This road was divided into five parts, denominated the First, Second, Third, and Fourth Divisions, which terminate at the north boundary line of the City of Washington, and the City Division, which ends at the basin of the city canal at 6th street west, in Washington, which has yet only been graduated as far as the Pennsylvania avenue.

The graduation of the first division was commenced, generally, about the 10th of October, 1833; that of the second and third, and 1st section of the fourth, about the 20th of January, 1834; that of the 2d and 3d sections of the fourth division, about the 1st of January, 1835—and that of the city division, about the 1st of May, 1835.

Three of the most difficult and expensive sections of the second division, viz: the 1st, 4th, and 8th, were placed under the management of agents of the Company. For my views on the subject of effecting the graduation by agents of the Company, the accompanying paper marked S. is respectfully referred to.

Table B No. 4, exhibits in detail the several sections, the names of the contractors and others by whom the work was performed, the prices, quantum of earth handled on each section, &c. From this table it appears that the whole quantum of earth removed and supplied on these several divisions, inclusive of 32,727 1-2 yards of rock, which occurred on the 1st section of the 1st division, and was the only rock met with in the excavations of the whole line, was 1,991,352 cubic yards, which was handled at a cost of $364,530.08; or at the average cost of 33 37-100 cents a yard, inclusive of the grubbing, clearing, and transportation.

The 1st section of the second division was placed under the management of that experienced and faithful agent, Mr. Jonathan Jessop, by whom it was most satisfactorily conducted to its completion.

To the management of the 4th section of the second division, Mr. John Watson was assigned. Mr. Watson had been long and advantageously known in this community as the efficient superintendent of the repairs upon the Frederick and Boonsboro' turnpike. He continued to manage this section in the most satisfactory manner, until his lamented death, which occurred late in the month of November, 1834, at which time the graduation was so nearly completed, that about two weeks more of his efficient services would have finished it.

It is due to the memory of Mr. Watson for me to state, that a more faithful and competent agent could not have been selected. After an intimate intercourse with him as a manager of public works for more than seventeen years, I am enabled to say that, during all that period he conducted himself in the most exemplary manner, both as a gentleman and public officer.—His industry, energy and unremitting attention to the duties confided to him were rarely equalled and could not be surpassed. His veracity and integrity were as unimpeachable as his fidelity was unquestionable. He was generous almost to a fault, and as brave as he was generous. The loss of such a man under any circumstances is a public calamity, and when we call to mind the sudden and shocking manner by which he fell, his death must always be remembered with feelings of unfeigned regret and sorrow.

The management of the graduation of the 8th section of the 2d division was confided to Mr. Trueman Belt. Mr. Belt conducted it in a satisfactory manner until it was nearly completed, only about 4000 yards of excavation remaining, when he discontinued his operations.

Table B No. 5, exhibits the names of the contractors by whom the masonry was built, their respective prices, the character and cost of the several structures, &c. With the exception of the "Thomas Viaduct," across the Patapsco river, the masonry was generally commenced, simultaneously, with the graduation of the divisions. That stupendous structure was begun on the 4th of July, 1833, and completed by its energetic contractor, Mr. John Mc Cartney, of the State of Ohio, on the 4th of July, 1835. The beautiful and imposing design of that viaduct, was furnished by B. H. Latrobe, Esq., Civil Engineer, and the designs of all the other structures on this road were prepared by my assistant Mr. Robert Wilson, who superintended the construction of all the masonry. The whole quantum built, is shown by the last table referred to, to have been 46,906 3-4 perches, of 25 cubic feet to the perch, at a cost of $275,167.21, or an average cost per perch, of $5.86 62-100.

These 46,906 3-4 perches of masonry are contained in many culverts, one very heavy wall connected with the "Thomas Viaduct" and in the following described fifteen bridges, viz:

The "Thomas Viaduct" over the Patapsco river of 8 arches of 58 chord, each.

One, of one arch of 60 feet chord across the Greater Patuxent river.

Two, of 1 arch each, of 50 feet chord, across the Lesser Patuxent river, and the north-west branch, the latter near Bladensburg.

One, of five spans, of 25 feet each, over the Paint Branch, superstructure of wood.

One, of one arch, of 20 feet chord, across Hammond's branch.

One, of one arch of 18 feet, over Deep run.

One, of 2 arches of 14 1-2 feet chord each, across the Tiber creek in 1st street west, in the city of Washington.

One, of 1 arch, of 15 feet chord, across Budd's run.

One, of 1 arch, of 14 feet chord, across the east Branch of Tiber creek, in the Delaware Avenue, Washington.

One, of 1 arch, of 11 feet chord, over Hopkin's road.

Three, of one arch each, of 10 feet chord, viz: over Piney run near Vansville, Duel run, near Bladensburg, and Pierson's Branch near the north line of Washington; and

One, of 8 feet chord, in the District of Columbia.

Table B No. 6, presents a full view of the cost of the graduation and masonry separately, and aggregately, on each section and on the whole line, and shows the whole length of the line from the point of deflection from the Baltimore and Ohio Railroad, to its present terminus at the Pennsylvania Avenue in the city of Washington, to be, 30 miles and 112 poles, and the aggregate cost to have been $939,697.29, or at the average rate per pole lineal of $96.75 63-100, orp er mile $30,962.01 9-10. The superintendence and all other contingent expenses amounted to the sum of $19, 475.93, which added to the above sum of $939,697.29, produces the sum of $959,-173.22 as the entire cost of the graduation, masonry, superintendence, and all contingent expenses of this road, which is at the rate of $98.76 16-100 per lineal pole, or of $31,603.73 12-100 per mile.

The estimate of the graduation, masonry and contingent expenses as far as the New Jersey Avenue, a point about 1-4 of a mile short of the present terminus of the road, was $1027,116.33, being $67,943.11 cents more than the actual cost, although about 1-4 of a mile more distance, has been graduated, than was included in the estimate.

Construction of the Lateral Rrailroad to Washington City.

The length of single or first track of Railway which has been laid is 30 miles and 107 57-100 poles. There has also been laid of second track, a distance of 5 miles and 130 43-100 poles. The aggregate length of 1st and 2d track is then 35 miles and 238 poles. These Railways were partly formed of scantling and partly of longs—for a particular description of each kind, reference is made to the accompanying paper marked Y.—Of the first track, or continuous Railway, 17 miles and 175 poles were constructed with scantling, and 12 miles and 252 57-100 poles were laid with logs; and of the 2d track, 4 miles and 245 97-100 poles were formed of scantling and only 204 46-100 poles of logs. The scantling track is a little more costly than that made of logs, but is greatly preferable and believed to be more durable. It can, in the first instance, be more accurately constructed, and when out of repair, is more easily adjusted, than the log track. Besides it does not so frequently get out of adjustment, because of the greater perfection of its system. With the exception of a short piece in Washington, the 2d track is only laid through the several deep cuts, where it answers the purposes of passing places for the cars, and at the same time affords great facilities in keeping the road clear of the avalanches to which the deep cuts are liable.

The entire first track is laid with the deep or edge rail, except that part extending from North Capitol street to Pennsylvania Avenue in Washington. Of the 2d track 300 6-10 poles on the 2d Division and 248 7-10 poles on the 4th Division, are laid with flat rails, such as are used on the Baltimore and Ohio Railroad; all the remainder of the 2d track was laid with the deep or edge rail. Where the flat rail was used, (and it was only used because there was not a sufficient supply of the edge rail) small strips of scantling 4 × 2 inches, were first spiked to the scantling which had been laid for the reception of the edge rail. These strips were necessary to allow the rail to be laid over the centre of the scantling beneath them, and also to make up the disparity in depth or thickness, between the two kinds of rail. It is found to make a very good Railway. They can be easily removed when a further supply of the deep rail is obtained, if it should be then thought expedient to do so.

The whole cost of these 35 miles and 238 poles of Railway thus laid, and of 12 1-2 turnouts, including the cost of lumber, chairs, screw bolts, spikes, and the cost of ail other material (except the prime cost of the rails) inspection, trasportation, distribution, workmanship, superintendence and all other contingent expenditures, has been $156,627.86,—being at the rate of $13,69 1-3 a pole lineal, or of $4,381.96 1-2 a mile. In the above amount the sum of $5,707.43 expended for suitable implements, sheds, and workmanship, necessary to straighten the rails and dress their ends, is included. The prime cost of the edge rail is assumed at $50 a ton, and 63 tons are estimated to the mile, which makes $3,150 a mile as the prime cost of the rails of a single track. This sum being added to the above, gives $7,531.96 1-2 as the entire cost of a mile of single railway on this road, inclusive of the cost of 12 1-2 turnouts, or for the whole distance which has been laid, viz: 35 miles and 238 poles the gross sum of $269,220.67.

On the remainder of the second track, fewer turnouts will be required, than have been inserted; the transportation of the materials will be done chiefly on the Railroad, and of course cheaper; the graduation which the contractors of the 1st track were required to perform, will be dispensed with altogether; it may be therefore assumed that the construction of it will not cost as much as the first, by at least the sum of $531.96 1-2 a mile, leaving as its actual cost, the sum of $7,000. The remainder of the 2d, track is in length 24 miles and 297 14-100 poles, which at $7,000 a mile, will cost $174,499.93 3-4. This sum being added to the cost of that already constructed, viz: 269,220.67, gives the gross sum of $443,720.60, as the total cost of two continuous tracks of Railway, from the Baltimore and Ohio Railroad, to the Pennsylvania avenue, in Washington, a distance of 30 miles 107 57-100 poles.

The estimate for two tracks as far as the New-Jersey avenue, about 1-4 of a mile short of the distance to the Pennsylvania avenue, was $432,780.05. The actual cost will therefore probably exceed the estimate, about the sum of $10,940 67. From this excess it would be proper to deduct the cost of straightening the rails, and dressing their ends, an expense not contemplated when the estimate was made. Without, however, subtracting any thing on this account, it will be found, that when the excess of cost in this case, viz: $10,-940.67, be subtrated from the excess of estimate over the actual cost of the graduation and masonry before shown to be $67,943.11 the actual cost of all the work, has fallen short of the gross estimated cost, the sum of $57,002 44: and if but a very moderate allowance be made for the excess of distance actually constructed over that estimated, it may very reasonably be assumed, that the whole actual cost of the road will be less than the whole estimated cost, by the sum of at least $60,000.

The rails where laid on the 1st division—on the 2d, and 3d, sections of the 4th division, and on the city division, by Mr. Benjamin Cornelius,—Mr. James Giddings, laid them on the 2d, division, and Mr. John P. Cowman, laid the 3d division, and the 1st section of the 4th division. All the turnouts were inserted by Messrs. Reuben Aler, and Jesse Hay.

Expenditures.

The whole amount expended by me in the service of the Company up to this date, and which has been regularly and duly accounted for, has been two millions, four hundred and ninty-one thousand, six hundred and thirty-eight dollars and thirteen cents. This large sum has been applied as follows, viz:

To the graduation of the Balt. & O. R. R.	$863,140.74
To the masonry on ditto,	372,497.01
To the payment of the contingent expenses incurred on account of the graduation and masonry, viz: superintendence, instruments, advertising, &c. &c.	40,396.44½
	$1,276,034,19½
To the payment of the right of way, and damages generally on that road.	$26,417.02½
To the construction of the 6th division of said road, viz:	
Materials, distribution, &c.	$21,043.56

Workmanship,	14,531.10
Horse path,	10,413.03
Contingent expenses,	1,365.80
	$47,353.49
To the repairs of that road for the 6 months, that that branch of the service was under my superintendency,	$11,647.66
Total expenpiture on the B. & O. R. R.	$1,361,452.37¼
To the graduation of the Lateral Railroad to Washington City.	664,530.08
To the masonry on do.	275,167.21
To the contingent expenses, incurred on account of the graduation and masonry, viz: superintendence, instruments, advertising, &c. &c. &c.	19,475.93
	$959,173.22
To the consrruction of said road, viz: materials, distribution, &c.	109,183.43
Workmanship,	37,108.99
To contingent expenses, viz: superintendence, advertising, &c. &c. &c.	10,335.44
	$156,627.86
To repairs whilst under my superintendency,	3,502.98
Total expenditure on the Lateral R. R. to Washington,	$1,119,304.06
Total expended on the graduation, masonry, construction, and repairs of both roads,	$2,480,756.43¼
Expended in the purchase of sundry tools, lumber, &c. &c. which was afterwards delivered to other officers of the Company,	10,881.69¾
Total expenditure in the service of the Company,	$2,491,638.13

An examination of the preceding statement, will show that the contingent expenditures on the whole work, which has been executed under my direction, have not amounted to three per cent. on my other disbursements.

It is very gratifying to me to be able to state that, although the operations of my department have been very extensive for the last two years, no loss, to my knowledge, has occurred to any of the mechanics or laborers employed on the different works, except in a single instance, where a few laborers in the employment of a subcontractor, lost a small portion of their wages.

The following extract from my report of 1832 may, with great propriety, form a part of this. The subject is a very important one.

"The regulation prohibiting the use of ardent spirits, first adopted with your sanction in 1829, has been steadily and rigidly adhered to, and has had, I am confident, a very beneficial influence upon the work. The contractors so generally acquiesced in this regulation, and complied with this stipulation of their contract so faithfully, that I had, only in a single instance, to perform the unpleasant duty of dismissing one of them from the service for an infraction of it. I cannot, however, refrain from again calling your attention to the fact, that licenses are so cheaply and so easily obtained in this State, where the sale of them appears to be only for the purposes of revenue, that grog shops became very numerous in the immediate vicinity of the line, and were highly prejudicial to the laborers, to the contractors, and to the progress of the work; and my opinion remains unchanged, that a legislative enactment, preventing the vending of ardent spirits within a specified distance of public works, could not fail of producing good effects, or rather of preventing much evil."

In conclusion, it is proper for me to present to your favorable notice the names of such assistants as have aided me in the superintendency of the heavy and arduous operations of the last two years. Mr. Robert Wilson not only superintended the construction of the masonry during that period, but also from the commencement of the road. As before remarked, he drew the designs of many of the numerous structures which have been erected, and their permanency affords ample testimony of the attention he bestowed on their construction. They will remain lasting monuments of his ability and fidelity. Mr. John D. Steele entered the service about two years ago, as principal assistant superintendent of Graduation and Construction, and to his talents, exertions, and unceasing industry, the work is mainly indebted, both for the fidelity of its execution and rapid completion. I have learned, with great pleasure, that the President and Directors have testified their approbation of his services, by appointing him to a trust of great responsibility. Messrs. John Miller, Paul H. Borland, Thomas C. Atkinson, William Matthews, John Patterson, Hopewell Dorsey, George McLeod, J. C. Price, Oliver C. Morris, George Holtzbecher, D. A. Watterston, Caleb B. Moore, Wm. K. Coulter, Wm. P. Elliott, and C. H. Matthews, rendered, at various times, and for periods of different durations, very valuable services, on the graduation and construction, as did also Mr. Christian Slemmer, in his office of Inspector of Lumber, and Wm. S. Woodside, as clerk.

It is with great regret, that I have to state, that Jonathan C. Price, a young man of most amiable deportment and of high promise in his profession, died whilst in the service of the Company, and not long after he entered it, much lamented by those who enjoyed the pleasure of his acquaintance.

Respectfully submitted.

CASPER W. WEVER.

The following letter is from a friend now on a tour through the West, from whom we hope to receive many others. Should he not forget us amidst the numerous objects of interest within which he will meet on his way, our readers will hear from him again.

For the New-York Farmer.

LETTER I.

QUESTION—Where you bound, stranger?
ANSWER—I am going to the Far West, sir.

Lancaster, Penn., Nov. 10, 1835.

Dear Sir,—I feel inclined to scribble a little this evening, and if in your judgment, any of your readers will take the trouble to read this letter, publish it; if not, burn it. After leaving Philadelphia and arriving at the Schuylkill, a distance of 4 miles, the railroad is carried over a neat bridge, and the cars drawn up an inclined plane by a stationary engine, one hundred and eighty-four feet; although few accidents have happened, travellers seldom ride up, as, should the rope break, certain death, and that of the most awful kind, would be the result. It is contemplated to carry the entrance into the city by some other direction, which will, 'tis said, avoid the necessity of a plane, and which will add exceedingly to the transportation; after ascending the plane locomotives are attached to the cars, and passengers and merchandise are hurled along with the usual rapidity that these *"terrible criters"* (as my Kentucky friend calls them,) travel. The road belongs to the State, and also the engines, for which a regular charge is made to proprietors of cars and merchandise. They have not as yet given much attention to transporting animals, except hogs, and *they* are brought down in great numbers, and with profit to the drovers, as they accomplish but a few miles per day when driven, and loose considerable in weight—this road already reaches to Columbia on the Susquehannah, passing directly through the flourishing town of Lancaster. It has however reduced the price of lands in the vicinity of Philadelphia, and increased the price in the interior; a farm which 3 years since cost $130 per acre, 6 miles from Philadelphia, and which has been much improved, sold a few days since at $94. Many anecdotes are related of some of the Dutch farmers that opposed the road. One was asked for his reason, when he was at the same time told it would pass through his farm, and enhance the value very much. "Vy when dey brake one of dere rails dey will go and tak one from my fense." Another said chestnut timber was then scarce, but to build a road to Pittsburgh of rails it would take all that was in the country. But with all that is said in ridicule of them, they show many evident good results from their cautious system of farming. Nature has done much for those located in the valleys of Cheshire, Lancaster and York counties, as to the quality of their soil. The landscape also through those counties is not equalled in this country, and if they had hedges where they had post and rail fence, it would exceed any that I ever saw, even in old England. Their barns surpass those of any other country on

earth, and the free use of whitewash on the outbuildings and fences have a beautiful contrast with the luxuriant clover fields.—I regretted being hurled along so rapidly when there was so much to see, but after staying a day at this place, I shall proceed more at my leisure. I will close this letter by giving you a description of one of these Dutch farms, by a quotation from Washington Irving's description of one on the North River, for when you see one Dutch farm you see them all. "A great elm tree spread its branches over his residence, and near which bubbled a spring of the softest and sweetest water passing through the milkhouse, and then stealing away through the grass to a neighboring brook, that bubbled away through the alders and dwarf willows. Hard by the house was a vast barn, that might have served for a church, every window and crevice of which seemed bursting forth with the treasure of the farm; the flail was busily resounding within from morning till night, swallows and martins skimmed twittering about the eaves, and rows of pigeons, some with one eye turned up, as if watching the weather, some with their heads under their wings or buried in their bosoms, and others swelling and cooing and bowing about their dames, were enjoying the sunshine upon the roof. Sleek and unwieldly porkers were grunting in the repose and abundance of their pens, from whence sallied forth now and then troops of sucking pigs, as if to snuff the air—a stately squadron of snowy geese were riding in an adjacent pond, convoying whole fleets of ducks—regiments of turkeys were gobbling through the farm yard, and Guinea fowls fretting about it like illtempered housewives with their peevish discontented cry. Before the barn door strutted the gallant cock, that pattern of a husband, warrior, and a fine gentleman, clapped his burnished wings, and crowing in the pride and gladness of his heart, sometimes tearing up the earth with his feet, and then generously calling his ever hungry family of wives and children to enjoy the rich morsel he has discovered."

Yours, &c. B. P.

For the New-York Farmer.

MANAGEMENT OF PUMPS IN SEVERE FROSTY WEATHER.

By W. R.

Mr. Minor: As many of your readers, like myself, may have experienced much inconvenience from the freezing up of their pumps in winter, and incurred an additional expense in the purchase of water for domestic purposes, I shall state for your and their information the simple plan I have hitherto adopted with my pump to prevent its freezing: which, with a very little extra trouble of twice drawing the boxes yearly, insurest he use of the pump, and consequently of the water, in the severest weather.

First, I take out the spear with the upper box, then draw out the lower box, or get some one to do it: at or near the centre of the clapper of the lower box I bore a hole with a gimblet, about the size of a 12 penny nail, (this hole is to suffer the pump to *lose the water* in 5 or 6 minutes after each using,) this done, I place the boxes in the pump as before; and by turning into it about two gallons of water* (all at once) the pump may be *fetched*, as it is called, by a common well known operation of working the handle half a minute, with very *short* and *quick* strokes. When a supply of water is obtained for present purposes, an additional two or three gallons must be saved and kept from freezing to *fetch* the pump with, whenever a fresh supply of water is again wanted. The hole through the clapper of the lower box, as before observed, allowing the pump to *lose the water* in 5 or 6 minutes after each using, leaves all that part of the pump above the surface of the water in the well empty; consequently there will be no water left above the box *to* freeze.

The foregoing has been the practice with my pump, and I derive great benefit from it. I last winter neglected the precaution till too late, and had to buy water about five months in consequence. The little trouble here pointed out, has no proportion to the inconvenience arising out of the pump's freezing up; incurring the expense of having to buy wa er, or to send for it a great distance. The pump best suited for winter use, and indeed for all domestic purposes, is the common ship pump, which admits of easily putting the water in at the top, at each operation.

In the spring of the year, when there is nothing further to fear from the frost, draw the boxes again, and screw a short iron screw into the hole of the lower box clapper, which will cause the pump to *keep* water, until the precaution against freezing again becomes necessary on the approach of winter. If the upper box should work rather tight, the clapper of that may be perforated also.

Street pumps, however exposed, may also be made equally useful, without housing in, or stuffing around with straw, (which is more frequently inefficient than otherwise) by adopting the plan of having the nozzle or exit spout to consist of a stop-cock; and to have a stuffing box or air-tight valve fitted on the pump rod, above the stop-cock, which being put in motion to exhaust the air, will cause the water to rise up into the vacuum, and become subservient to the water boxes. The lower, and if necessary the upper box clappers, to be perforated as in the common out house or yard pump, as before recommended.

If you think these hints worth your notice, please insert them in the Mechanic's Magazine, and you may perhaps hear again from

W. Reynolds.

St. John's, New-Brunswick, Dec 14, 1835.

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* Or as much as may be necessary to cover the spear box.

For the New-York Farmer.

ON THE TEAZLE PLANT.

By W. P.

I observe, Sir, in your last number, it is said, "A farmer in Williamsburgh, Massachusetts, sold his crop of teazles for one thousand dollars." The writer of the article goes on to say, "the farm is an ordinary one; but this is a very extraordinary case. It may be done in a century. One swallow does not make a summer. The demand is very limited, and they had become scarce. A few acres of ground would, under good cultivation, produce enough for all the manufactories in the country; and the market would soon be glutted."

The whole of this article is evidently the product of a person who knows nothing of the subject on which he has treated. It is an extraordinary portion of human imbecility, that man should be more confident in giving his opinion on subjects with which he is totally unacquainted, than on those he thoroughly understands.

The cardacus fullonus, or teazle plant, is an important bur to the woollen manufacturer, nor is it an article of small consumption, to be raised on a few acres well cultivated. The crop of last year was about forty-two millions, thirty in the States east of New-York, and twelve in the middle and western States; and the land under cultivation for this plant exceeded one thousand acres. The price this year is by no means extraordinary, for it has been as high four cropping seasons out of twelve. Once during that time, they have been three times as high, and last spring they sold at more than double the price of the late crop. The crop was short this year, but the market has been fully supplied by importation. Twenty-two millions have been imported this year, and eight more are expected. The importations are principally from France and England, and the demand for this country has advanced the price in both those markets.

I will quote a few facts to prove that the teazle crop is not so very uncertain with regard to a remunerating price, as represented by your correspondent.

A farmer at Rahway, New-Jersey, has sold his crop in New-York for many years. He plants less than two acres of ground. The last crop he sold for four hundred and six dollars; and, I believe, has never more than once obtained a less sum for the crop of a season than three hundred dollars.

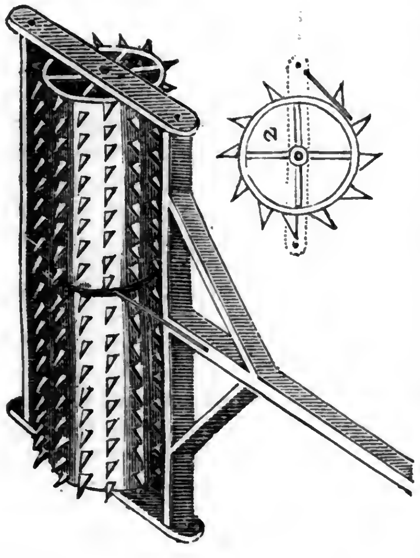
A farmer in Dutchess county, off little more than five acres, sold his last crop for one thousand dollars; and being contracted for before any advance took place, he only obtained the average price.

Another farmer, in Orange county, sold his crop this year for rising three thousand dollars, product of thirteen acres.

The teazle is a very uncertain crop, subject to be injured by spring frosts and thaws. The average crops do not probably exceed

forty thousand, and a full crop will reach to one hundred and twenty thousand. If it requires seventeen hundred acres of land to raise a supply for consumption by average crops, it will be easy to account for the great depression resulting from two or three successive years of full crops. W. P.

[We are obliged to W. P. for the above communication, and will thank him to furnish us with an account of the mode of cultivation.]



Revolving Press Harrow.—We have had an opportunity to examine the model of a new agricultural implement, invented by Mr. John C. Conecklin, of Peekskill, Westchester county, which he calls the "*Revolving Press Harrow.*" One great object of this implement appears to be to prepare for planting, or other cultivation, by loosening the soil of green sward recently turned over, without the liability of disarranging the turf, and of exposing the grass again to view, which attends the common harrow or drag. Its operation is, first, to press more closely the furrow or sod, by acting as a roller, while the teeth, in leaving the earth, act as levers, lightening up the soil behind the roller without disturbing the sod—thus leaving the surface, and to some depth, light and ready for the seed.

Another important use to which the inventor considers it applicable, is, to scarify and lighten up meadow, or grass land, which has become sward-bound, where it is desirable to continue to use the scythe instead of the plough.

It may also be used as, and answer every purpose of, a roller alone, by first removing the teeth, which may be readily done.

From the explanations of Mr. Conecklin, and the appearance of the model, we are inclined to think very favorably of the implement, and would therefore call the attention of our readers to the following drawing and description of it.

Mr. Concklin was the pantentee of a beautiful portable forge for silversmiths, and other purposes, which we saw at the shop of a friend last summer, and to which we alluded in the August number of the Mechanics' Magazine, p. 57, but of which we then knew not the inventor. We considered that a useful invention, and it has, as we are informed, proved so,—and the one now under consideration will, we trust, prove equally so, both to the public and the inventor.

John C. Concklin's Patent Revolving Press Harrow, for Improving Sward and Arable Land.—Fig. 2 represents the end of one of the cylinders, showing in particular the manner in which the teeth, which are attached to the frame behind, operates in cleaning the teeth of the rollers.

This machine consists of two cylinders, each 20 inches in diameter and 3 feet long, formed of cast-iron staves, which are bolted to end pieces or heads, in the centre of which are boxes similar to those of a cart wheel, and revolves on an axle in the same manner. The two cylinders are placed on one axle, which is made of wood, in a straight line, the two inner ends coming nearly in contact with each other. A wooden frame is then made, which encircles the whole, and is framed to the axle at each end. To the centre of the frame in front the tongue is placed, and made sufficiently strong by means of braces.

In the surface of the cylinders a sufficient number of holes are made, which receive the teeth made of wrought or cast-iron, of any convenient length or size, so that by the revolving of the cylinders or rollers upon sward or other land, it will become sufficiently scarified or loosened to answer the required purpose. The teeth are fastened into the cylinders by means of keys or nuts upon the inside, and may be removed by taking off one or more of the staves, when a roller only is wanting.

On the under side of the frame that passes directly behind the cylinders or rollers, teeth are also placed, extending downwards, with the points coming nearly in contact with the cylinders, and passing between the rows of teeth thereon, by means of which all turf, stones, or other substance, which might have a tendency to clog them, are removed.

This harrow is constructed like the cast-iron roller, except that it has teeth, and the cylinder is in two parts, which enables it to turn on its centre.

Important to Farmers.—Just published, by Willard, Gray & Co., Boston, a work, entitled **Chemistry Applied to the Arts.** By John Anthony Chaptal, Count of Chanteloup, Peer of France, Member of the Institute, &c. First American edition, translated from the second French edition.

To every person who is, or ever intends to be, an agriculturist, we would not only recommend, but earnestly entreat, to purchase a copy of the above work. If he has but one acre of ground, and is unable to purchase but one book on any earthly subject, we would advise him to let this be the one, as he will find it of more value than any other, or even than all others put together. It has been remarked by a writer on chemistry, and we believe by the author of the above book, 'The chemist has the same advantage over the man who is ignorant of that science, as the man who can see has over a blind man. The blind man may walk with a degree of safety in a beaten and familiar track, and even with a handsomer gate than the man who can see. But if he gets ever so little out of that track, or meets with any new interruption in it, he stumbles over every thing in his way, without knowing how he got out of the track, or how to get in again, or how to remove the obstacle; while the man who can see, is equally safe in a new path, as in an old one.'

As we remarked above, if a man has but one acre of land, and can obtain one dollar and fifty cents to purchase one of those books, and can read and understand it, it will enable him to double the product of that acre.

To those who are opposed to book farming, and who boast that they know how to plant and hoe their corn without consulting a book, we would only remark, that facts are stubborn things; and there is not a man of that description, who cannot, if he searches, find a man whose acre of corn, perhaps with the same as his labor of planting and hoeing, yields twice as many bushels as his; and seeing this, if he is capable of reflection, he will discover that success in agriculture does not depend altogether on skill in planting, hoeing, or sowing, but even in a much greater degree upon the knowledge and practice of fertilizing his ground. He will consider that if he planted an acre of barren sand, and his neighbor planted an adjoining acre of a deep rich soil, his neighbor would receive an ample crop, while he would lose his labor. If he reflects a little farther on the subject, he will find out, that by proper management, his acre of sand may be brought to any degree of fertility, and that his neighbor's rich acre may, by a contrary course, be reduced to barrenness. If he is at a loss to know how this change is to be effected, let him purchase Chaptal's Agricultural Chemistry, and it will unfold the whole mystery in plain and easy language, which if he can read it, he cannot fail to understand. S. B.

AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, JANUARY 23, 1836. [VOLUME V.—No. 3.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 23, 1836.

☞ Should any of our subscribers have a surplus copy of No. 6, vol. 4, 1835, of this Journal, they will confer a favor by sending it to this office; six copies only of that number having been saved from the flames.

We desire to express our thanks to the patrons and friends of the JOURNAL, and our other publications, for their very general expression of sympathy on account of the destruction of our property by the late conflagration; and also for the patience with which they have awaited their re-appearance after several weeks' delay.

It is our intention to issue them hereafter regularly, and as soon as we possibly can, on their *proper day* of publication. It will, however, be some time before that can be conveniently done.

It is much to be regretted that the Canal Company should try to throw obstacles in the way of the liquidation of this claim. They should, by all means, release the trade of the Canal from its present vexatious embrrassments, by an honorable settlement with Mr. Randel.

From the New-Castle Gazette.

John Randel, jr.
vs.
The Chesapeake and Delaware Canal Company.

TO THE PEOPLE.—The Attachment Causes decided in the State of Delaware, in which I was plaintiff, and the Garnishees of the Chesapeake and Delaware Canal Company were defendants, have been decided in my favor by the Supreme Court of the United States, by dismissing those cases for want of jurisdiction, with costs—thus leaving the decision in Delaware, that I have the right to attach the tolls of this Corporation in the hands of the persons having the direction of vessels passing through the Canal, *final and conclusive*.

After a law suit of *more than ten years*, in which every decision on the merits of my cause, whether in Delaware or Maryland, or in the Supreme Court of the United States, has been in my favor,—after expending a large amount of money in legal controversy to vindicate my rights, and protect my reputation againt this Company, I have *at last* reached the Court in the last resort; and having obtained the last decision, of the last Court which *can be* applied to, I now give public notice of the fact;—and I invoke the judgment of the public, against the further continuance of the means which have been adopted to ruin me.

This Company now stands, by the judgment of the Courts, convicted of the charge of compelling captains of vessels to pay *double toll*,—the very charge which they endeavored to make against me, when *they themselves* were the extortioners!

I have, according to the decision of the Courts, a right to the tolls to pay my judgment, which, as it now amounts, with interest and costs unpaid, *to more than two hundred and fifty thousand dollars*, it will take me some years to collect; and I hereby forewarn all persons having the direction of vessels passing through this Canal, that I will enforce my claim, to the end, that such as pay tolls to the Company or their toll gatherers, in violation of the charter, may never hereafter plead in excuse for their act, their ignorance of my rights.

JOHN RANDEL, jr.

New-Castle, Del., January 30, 1836.

☞ Editors in places interested in the trade of this Canal, are respectfully requested to insert the above notice in their respective papers. JOHN RANDEL, jr.

TRUE SYMPATHY.—Should a corresponding feeling pervade every friend to our different periodicals, *to the same extent*, it will go very far towards replacing what they have lost.

J——, Dec. 25, —35.

DEAR SIR,—I cannot manifest my sympathy with the citizens of New-York generally, and you particularly, for the immense loss of property by the late conflagration more convincingly, and perhaps not more satisfactorily to you, than by rewarding the industrious for their toils. At present, however, this appears to me one of the proper steps to be taken, and I accordingly forward you \$5 for the fifth volume of the Railroad Journal.

I hope the late disaster will not dishearten the citizens in the attempt to renew the charter of the New-York and Albany Railroad. If the charter should be obtained by the friends of the Road at the approaching session of the Legislature, by the time the stock could be put in market the loss would be measureably retrieved. The inhabitants along the route in this vicinity are ready to co-operate with the citizens in such measures as may be thought necessary to secure success to the enterprize.

Yours sincerely,
J—— A——.

We also hope, with the writer of the foregoing letter, that renewed efforts will be made to accomplish this important work.—It is unquestionably of immense importance to this city—of which we should suppose no more conclusive evidence would be required than is now *realized* in the very high price of provisions and fuel, and the difficulty of travelling between here and Albany.

BEST WIDTH OF RAILROAD TRACKS.

To the Editor of the Railroad Journal:

Sir—In a late number of the Railroad Journal, I observe a communication from the President of the New-Orleans and Nashville Railroad Company, in which it is stated that engineer H. J. Ranney, Esq., of that road, proposes an increase in the width of the Railway track, viz. 5½ feet, instead of 4 feet 8½ inches, the width generally adopted, and requesting the opinion of professional men on the propriety of the change. It has long appeared to me that our engineers were laboring under a mistake, in restricting the width of track upon our Railroads to 4¾ ft. My reasons for this belief, I will briefly state as follows:

1st. By increasing the width of track, the maximum speed for safe travelling may be increased. This is owing to the fact, that with wheels of a given size, the breadth of base compared with the height or elevation of the centre of gravity of the load is increased—the carriage, when under an equal motion, possesses therefore greater stability, and will bear a greater speed without increasing the danger of "flying the track."

2d. The diameter of the wheels may be enlarged, and the carriage possess equal stability, and under the same rate of speed the engine would make fewer strokes. The advantage of this is evident. In high motions, it would result in a saving of power. The movement of the piston being slower, the expansive force of the steam would have greater effect. There would be less friction, less wear and tear of the parts of the engine, more steadiness of motion, and less frequent occasions for packing the piston plate, and repairing and tightening the joints.

3d. The narrowness of the tracks upon our Railroads, has been the cause of great inconvenience in the construction of engines, the space being insufficient for the requisite size, and proper arrangement of its parts. This is a consideration of great importance in a practical point of view, and is entitled to great weight.

4th. By increasing the width of the track, the motion of the carriages will not be as much affected by any slight depression or irregularity in the rails. This is likewise a consideration of importance, particularly in a country where, from the powerful action of the frost, it is so difficult to preserve a level and even surface to the road. The irregularities which may exist in the surface, will be less liable to be increased by the working and pitching motion of the engine and cars, and as the motion will be less unsteady, more uniform and regular, a favorable effect will be experienced, in contributing somewhat to the efficiency of the motive power.

5th. Adding to the width of the track, secures a more equal bearing of the load upon each wheel, and upon the rails—the carriages are rendered more commodious for passengers, and better adapted for the conveyance of various kinds of freight, and are in all respects more safe,—the capacity of the road for business is at the same time increased,—more space is allowed for forming the horse track, and the dust and broken materials from the track, are less liable to be thrown upon the rails.

The above are the principal *advantages*; now for the *disadvantages*.

1st. By widening the track, the difference in curvature between the inner and outer rails on the curved portion of the track is increased, and as it is customary to make the wheels fast to the axles, the resistance from the sliding of the wheels, &c., in passing the curves, will be increased. This is, undoubtedly, the most serious objection that can be urged. By increasing the width from 4 feet 8½ inches to 5½ feet, the sliding will only be increased the one-sixth part.—The extent of the minimum radius of curvature in most roads, is about 400 feet.—The resistance on a curve of this radius for a level road of the usual width, has been found to be about 4½ or 5 pounds for each ton weight, over and above what it is upon a straight and level road. Assuming that the increased resistance is in proportion to the sliding of the wheels, which is probably as great an allowance, as the circumstances of the case will warrant; and we find the resistance augmented in consequence of widening the track to 5½ feet upon the same curve only 12 or 14 ounces, for each ton weight, and if estimated for the average curvature of the curved portions of different Railroads, will be found not to exceed one or two ounces for each ton weight, an amount too small to be put in competition with the important advantages to be derived from the greater width.

2d. Another objection is the increased length which must be given to the turnsout. This again is an item of minor importance, the addition to the length not exceeding in each case more than 8 or 10 feet.

3d. By widening the track, the cost of forming the road-bed and the superstructure will be somewhat increased. On a road-bed 25 feet wide, an ordinary width, this expense need not be increased for the wider track of 5½ feet more than the fortieth or fiftieth part on the average; and as it regards the superstructure, the additional expense is simply the cost of adding 9½ inches to the cross-ties, if there are any, which, if they are of wood or iron, will not much exceed $100 per mile, for a single track.

4th. The remaining objections are scarcely deserving of notice—they are the extra cost of carriages, and the cost of 19 inches additional width of ground. These, like the preceding which I have noticed, can have but little weight, when placed in competition with the very great and important advantages to be derived from an increased width of track. We are, therefore, fully of the opinion that Mr. Ranney has done well in recommending the greater width on the New-Orleans and Nashville Railroad, and as that road must ultimately be continued north, and unite with the New-York and Erie Road continued west, forming a great inland communication between the two leading commercial emporiums of the United States, and traversing nearly the full extent of the Mississippi Valley; we would recommend to those interested in the latter road, to adopt the same width, which in the present incipient state of affairs, they can do without a sacrifice. As it regards the route from Albany to Buffalo, it is perhaps too late to make the improvement, but we understand the subject has been presented in its proper light to the Directors of the Auburn and Syracuse Railroad Company, by their engineer, E. F. Johnson, Esq., and that but one sentiment of approval is entertained in relation to it. The Auburn and Syracuse Road, being a link in the same chain with the Mohawk and Hudson and the Utica and Schenectady Roads, and as the less width has been unfortunately adopted on those roads, Mr. Johnson, to whose discretion, we understand, the subject has been left, may feel it incumbent on him to conform to the standard which has been established on the roads mentioned. We hope, however, that he will deliberate fully before he decides. For on our part, we are of opinion that the 95 miles of temporary railway from Albany to Utica, should have but little influence in preventing so essential an improvement being made on the 250 miles which remains to be constructed from the latter place to Buffalo, besides an equal extent of lateral branches, which at no distant period will be constructed west of Utica. SMEATON.

Utica, Jan. 2, 1836.

We are truly obliged to "SMEATON" for the preceding communication. It relates to a subject of vastly greater importance, as we are induced to believe, than it has been generally allowed. We recollect to have conversed with Mr. Ranney upon this subject, when he passed through the city last fall on his way to Europe; and were much pleased with the bold views which he expressed upon the subject.

Mr. Ranney *was*, and we *are*, fully of the opinion expressed by "Smeaton," that the *New-Orleans and Nashville* and the *New York and Erie Railroads* are destined to form parts of one and the same road—and therefore, a corresponding width of track should be adopted. It is a subject well worthy of the serious attention of this community; and especially of those who are interested as stockholders—we therefore respectfully ask the attention of engineers to the subject, and offe[illegible] columns of the Journal for its discussion.

No. I.

To the Editor of the Railroad Journal:

Sir,—I ask leave, through the columns of your valuable Journal, to address the citizens of New-York on a subject of very great importance to their interests.

Hear! O Wall-street! and give ear! Broadway!

Have you a map of New-York, Pennsylvania, and New-Jersey? It is before you.—Very well. Place one point of your dividers at Pittston, the mouth of the Lackawana, (20 miles below Carbondale,) in Luzerne county; place the other point at the city of New-York. Now measure the distance on your scale. Behold! the distance is only one hundred and six miles! And what of that? Why, gentlemen, Pittston is one of the finest deposits of Anthracite Coal there is in the world. Numerous mines are already open. There are none richer, purer, or *easier* to be wrought in earth. It is true, the city of New-York is within 105 miles of the very best anthracite coal mines. How important coal is to your city, for fuel or commerce, I need not say. What quantity you use, or ship abroad, I cannot tell. This I know, the number of tons is very great, and annually increasing. Where does it come from? First, from Mauch Chunk, by Railroad, Canal, and tide-water transportation, one hundred and sixty miles. Second, a part comes from Carbondale, one hundred and twenty-four miles, to the Hudson, and then down the river near ninety miles more, making 214 miles. Thirdly, from Schuylkill, and perhaps the largest quantity.—The distance by Raritan Canal:

Railroad to Pottsville,	5 miles
Canal to West Philadelphia,	106
Road to East Philadelphia,	15
To Bordentown,	28
Canal to Brunswick,	43
Tide to New-York,	40
	237 miles

Being an average distance of two hundred and five miles. And yet the richest coal mines in the country are within one hundred and six miles of your city.

Is not this a matter of interest to you? May it not be turned to very great account? May not a Railroad be made from your city to those mines, on which cars of coal can come easily in a day? Even supposing, to avoid mountains, the Railroad must wind its way so as to add 20 miles, still the distance would be little more than half that your coal now travels which comes from the Schuylkill. Vastly important as I regard this, it is but one view of a subject that wears another aspect of deep interest to your whole community, which I shall treat of in my next. CLINTON.

We are indebted to a friend for the following interesting letter in relation to the proposed works of Internal Improvement in the youthful yet giant State of Illinois. The true spirit of Internal Improvement is abroad in the *West*, and will, beyond all question, make it the garden of the world.

Greenville, Bond Co., Illinois, Jan. 20, 1836.

Dear Sir,—The Legislature of this State have just adjourned, after passing several acts of incorporation, for the purposes of Internal Improvement. The most important of these are, the Central Railroad bill, and the Wabash and Mississippi Railroad bill. The last commences at the termination of the Maumee and Wabash Canal, and is to end at Alton, on the Mississippi, completing the line from the city of New-York to the Mississippi River, by the New-York and Erie Railroad.

The Central Railroad is to strike through the heart of the State, from the Illinois and Michigan Canal to the Ohio River, running midway between the Wabash and the Mississippi Rivers, through one of the most fertile and delightful regions of the West. The work will commence at or near Ottawa, and pass through the counties of La Salle, McLane, Macon, Shelby, Fayette, Marion, Jefferson, Franklin, and Johnson, to the best point on the Ohio River. These counties lay in the most direct route, but the Commissioners may vary it as the interests of the public require. The southern termination is to be at or near the mouth of the Ohio River, and the northern at or near the termination of the Illinois and Michigan Canal. From the northern point, a branch is contemplated, to strike the Upper Mississippi at Galena. From the southern extremity, or near it, a branch from the main stem, to cross the Ohio above the mouth of the Cumberland, would communicate with the Nashville and New-Orleans Railroad. The distance from the Ohio River at that point, to Nashville, being *less than one hundred and thirty miles.* It would cross Kentucky through Princeton and Hopkinsville. The route through Kentucky and Tennessee would intersect a fine tract of country, where the inhabitants are enterprising and intelligent, and alive to the subject of Internal Improvement.

This splendid undertaking, therefore, will complete a grand line of internal communication from the great Lakes through the whole length of Illinois, across Kentucky, Tennessee, Alabama, Mississippi and Louisiana, to the Gulf of Mexico, running nearly parallel to the Mississippi River, at the medium distance of a hundred miles.

The names embraced in the act of incorporation include a large portion of the most intelligent and influential men in the State. The name of the Hon. SYDNEY BREESE should be remembered among the earliest projectors of this undertaking. He was the first man who recommended it to public notice; and we are indebted to his persevering efforts for the early maturity of the scheme.

I cannot close my letter without expressing my satisfaction at the acceptable manner with which your Journal is conducted. You are rendering the public an important service, by giving energy and character to the progress of Internal Improvement. You have my hearty concurrence in the measure of raising the subscription to five dollars. Inclosed you have five dollars, U. S. Bank note, for my next year's subscription. Please send to Judge Breese, by mail, to Carlyle, Illinois, the whole of your Railroad Journal from the commencement, and he will remit the amount of your bill.

With the best wishes for the success of your valuable publication,

I remain your friend,

W. S. W.

D. K. MINOR, Esq.

Buffalo, Jan 12, 1836.

MR. MINOR,—A friend has just loaned me your December No. of the Mechanics' Magazine, in which I find the communication I sent you last September, for the Railroad Journal, upon the plan of constructing Railroads. I regret the necessity of troubling you farther upon this subject, but as I have been so unfortunate as to be wholly misunderstood by you, I have little hopes of better fortune with your readers, without farther explanation.

In your prefatory note to the article, you say my plan of constructing Railroads "will be found useful in many parts of the country, *for passing soft or marshy ground.*" Now, so far from this, the plan *will never answer for such ground, under any circumstances*, nor was it ever intended it should. The present method of building, upon such ground, wants no improvement; and if it did, this structure could never be sustained upon it.

Again, you say it may be useful "for the construction of cheap roads." If the plan has any merit, it is that of giving, *at a medium price, a better road than any of the plans now in use*—whatever their cost of construction.

In specifying the proper kinds of timber, you have printed "beach, cedar, and locust." I wrote "*red* beach," &c., as some varieties of that wood will not survive a single year's exposure, without marks of decay. Respectfully, yours,

R. W. HASKINS.

Note.—I requested that two or three copies of the article might be sent me, when published, but none have come to hand. I should still be glad of them, as also, of such remarks, if any, as you may publish thereon, from other pens. Did the article appear in the Railroad Journal, for which work it was sent you? It was for the readers of *that* work, more particularly, that I designed it, &c. R. W. H.

We feel grateful to those who contribute descriptions of useful inventions, in relation to Railroads, and therefore give the above explanation, as a matter of justice to our correspondent—with the remark that, from a single perusal of his first article, we formed the opinion expressed. If it was erroneous, our readers would surely not be led astray by it, as they usually form their own opinion from the facts, without regard to ours. We regret exceedingly that he did not see the number of the Journal in which it was published, and can apologise for the omission only by saying to all who require extra copies of the Journal, that we are too

poor to pay for the *engraving*, and then send duplicate copies of it to gentlemen who think enough of the work to desire their plans and inventions to appear in its columns, yet not enough to aid in sustaining it by subscribing for it. When they shall, as we, have devoted all their leisure hours for *four years*, and expended *three thousand dollars*, over and above the *entire receipts* in return, to establish a work which shall aid and promote the works of Internal Improvement of the country, without receiving a penny for their pains, then, perhaps, a community of feeling may exist, which will induce us to procure engravings, publish their descriptions, and then send the work, gratis.;

It may be said, and perhaps with truth, that the investment was injudicious. We *believed* it perfectly good—and do not now doubt but that it would eventually have proved so, if we had not had the misfortune to lose almost our entire stock of back volumes and printing materials, worth over *five thousand dollars*, by the late conflagration. *Now it is an entire loss*, and therefore every person interested *in*, or connected *with*, Railroads, is solicited to aid in sustaining the work, not only by his own subscription, but also by inducing others to *be alike*—wise. Its Editor, like old "*England expects every man to do his duty*," by forwarding a few *additional* subscribers as early as possible, with the *advance* subscription.

We publish in our columns to-day, extracts from a very interesting letter addressed to the Committee of the Alabama Legislature, on the subject of Railroads, by Mr. J. F. SCHERMERHORN. The large and liberal views developed in that letter, and the intimate acquaintance with the localities of the vast regions of the west, acquired by Mr. Schermerhorn, in the discharge of his official duties as Indian Commissioner, entitle his remarks to an attentive consideration. It will be perceived that the Legislature of Alabama has granted a charter on the plan recommended by Mr. Schermerhorn.

Tuscaloosa, November 21, 1835.

Sir,—I find, in travelling through the western States the past season, that there is a great movement among the people on the subject of Internal Improvement, especially by the construction of Railroads; and as the people of Alabama are at present assembled in a convention on this subject, and your Legislature will soon be called to act upon applications of this kind; I take the liberty to address to you some considerations in reference to them, which will be found worthy the serious consideration of every statesman and friend of his country.

The experiments that have already been made, have sufficiently developed the practicability and utility of Railroads, to transmit commodities and facilitate intercourse between different sections of the country. If Internal Improvements could be extended through the States generally, so as to connect the trade and intercourse between the several principal commercial places and cities in the valley of the Mississippi, with those on the Atlantic coast, a great national object would be effected, the advantages of which, as respeects personal convenience and comfort in travelling, the advancement of private property, the general circulation of intelligence and useful knowledge, and its political bearings and influence to bind together the several States of this Union by indissoluble bonds, that of self-interest, the means of security and safety, they would afford each other in times of difficulty and danger, whether of a foreign or domestic nature, it is utterly impossible to calculate. There are certain great leading routes which are necessary to be established through the different States for the accomplishment of these great designs, and which the natural face of the country points out as the most eligible. I will take the liberty to point out some of those which the general interest of the country requires to be constructed; but I shall notice only such as pass through more than one State.

1. *The Northern Atlantic and Mississippi Railroad.*—This, it is proposed, should commence at Boston, and pass by the most convenient route to Albany, New-York, from thence, by Utica, Rochester and Buffalo, to Erie in Pennsylvania; from thence to Cleveland and Maumee, Ohio, through Michigan and Indiana, by Michigan City and Lake to the Mississippi and Jefferson City, Missouri. The distance of this Road will be about 1500 miles.

2. *The Southern Atlantic and Mississippi Railroad.*—This will extend from Charleston, S. C., to Augusta, Eatonton and Forsyth, to West Point, on the Chatahoochee; from thence to Montgomery and Woodville, Alabama, by Jackson, Mississippi, to Vicksburgh, a distance of about 712 miles.

3. *The Atlantic Coast and New-Orleans or Union Railroad.*—This road, it is proposed, should extend from Augusta, in the State of Maine, by Portsmouth, N. H., Boston, Mass., Providence, R. I., New-Haven, Conn., to New-York city; and from thence by Newark, New-Brunswick, and Trenton, N. J., to Philadelphia; thence by Port Deposit and Baltimore to Washington City; thence by Richmond and Fredericksburg, Virginia, Raleigh, N. C., Columbia, S. C.; thence to Augusta, Georgia, until it intersects the Southern Atlantic and Mississippi Railroads, and thence with the line of said road by Eatonton and Montgomery to Woodville, and thence to Mobile and New-Orleans, a distance of about 2000 miles.

4. *The Baltimore and Mobile and New-Orleans Railroad.*—This will extend from Baltimore to Harper's ferry, which is already constructed, then by Winchester, Staunton, and Abbingdon, Virginia, to Knoxville and Kingston to the Tennessee River at Brown's ferry, near Look-out Mountain; thence by Wills Creek Valley and Woodville to Mobile, a distance of about 1050 miles, and from thence to New-Orleans.

5. *The New-Orleans, Mobile, and Michigan Railroad.*—This, it is contemplated, shall run from New-Orleans, by Jackson, Mississippi, to Columbia, Tennessee; and from Mobile by Tuscaloosa and Courtland, Alabama, also to Columbia; thence by Nashville to Louisville, Kentucky, and Indianapolis to Michigan City and Lake where it will also intersect the Northern Atlantic and Mississippi Railroad; and in passing the Wabash river, it will also intersect the Lake Erie and Wabash Canal.—The distance from Mobile is about 900 miles and from New-Orleans about 1000 miles.—The whole length of these five Railroads, i. completed, would not exceed 6000.

In designating the above proposed routes of Railroads, I have endeavored to divest myself of all sectional partialities, prejudices, and interest, and to have my eye fixed only to promote the general interest of every section of the Union; and therefore you will find they pass through almost every State in the Union; and should these works ever be constructed, they can be so located as to do so. It can admit of no doubt, if these improvements were made, the public interest would be greatly promoted, and it is an object, therefore, which the citizens of every section of our Union must desire to see accomplished. It must, however, be evident to all, that to effect this, a spirit of accommodation and compromise, which alone can produce harmony, and unity of design and action is indispensably necessary, as well as a vast amount of cash capital, far beyond the abilty of those most concerned in it, can at present command. The following plan is therefore submitted for obviating the objections that have been stated, and for completing the works designed.

I am well apprised that a considerable portion of Railroads have already been constructed in the lines of these routes by private corporations, and that some difficulties may arise on that account in establishing them. It is, however, believed, that these may be combined and connected with one great company for the constructing and completing any of these entire routes on just and equitable principles; which shall equalize the profits arising from the whole, and secure a general system of operations, by which the benefit and interest of all will be promoted.

The plan which I would propose is the following: Let five great companies be organized to construct and complete these five great national works of internal improvements, to be incorporated by all the States through which they may pass, and with a capital sufficient to finish them in the best and most substantial manner. If, however, this cannot be done, let each State incorporate a company or companies for the construction of these works and other similar works in their own States. The stock to be divided into shares of one hundred dollars. Each State shall have the right to take one-fourth of the stock necessary to construct roads within the same; and the U. States shall have the privilege to take one-fourth of the entire stocks in all the Railroads, and the balance to be taken by citizens of the United States only; but the citizens in each State, in the first place to have the right to take the whole amount of stocks created for the building of the roads within the same, and which shall not have been taken by the State or the United States.—The amount of stock subscribed and finally apportioned to the several citizens, by the Commissioners and Directors appointed by the act of incorporation, shall be secured by mortgage on real estate, with interest payable semi-annually, and the principal payable in twenty years; the same to be appraised by Commissioners appointed for that purpose by the Legislature or Governor of the State. When these mortgages and the Railroad and income of the same shall be pledged to the State, the State shall make a loan for the benefit of the Railroad company, either from the U. States, from her surplus revenue, if any; and if this cannot be done consistently with the principles of the constitution, then from the citizens of the United States, or the citizens of any foreign nation, to be redeemable in twenty years, or any time thereafter, at the pleasure of the States. The whole details, as

it respects the number of Directors in each State, the manner the monies shall be drawn and expended, and the division of the profits so is to equalise the same among all the stockholders in the different States; the manner in which the stock may be transferred, and the mortgages cancelled and others substituted for them, can and must all be adjusted, and satisfactorily secured in the several charters; in which, however, there should be an express provision, that the rates on the road shall be so adjusted from time to time, that the nett income of the roads shall not yield the stockholders more than fifteen per cent. or the first construction of the road after the loan has been paid off and redeemed.

It is believed that if this plan is adopted in any State, there will be no difficulty in having the whole amount of stock taken and adequately secured, for making every possible improvement, in each State that will warrant the undertaking. The advantage to the stockholders must be manifest to every one, for by paying the interest only on their stocks, while the roads are constructing, without depriving themselves of the use and occupation of their plantations, or jeopardizing their property in the least, or diminishing the value of them; but instead of this, actually advance it one hundred per cent. the moment these works are completed; and ultimately, when the loans are paid off from the profits of these roads, which may be the case even in 10 instead of 20 years, they will have the whole amount of their stock free, and for what has comparatively cost them nothing. So that it must be evident to all, there can and will be no difficulty in disposing of their stock to complete the roads, if the States will lend their aid to their own citizens in this matter. And here let me ask, why should not every State in the Union do this, for the benefit of the commonwealth generally? She can sustain no possible loss or risk in doing it, for she is triply secured for the responsibility she assumes in making the loan—first, on the real estate mortgaged at its present value—second, in the increased value of the property mortgaged, by making the improvements contemplated—and thirdly, by the road and entire nett income thereof, until the loan is paid. But from this the States may receive other benefits: by investing her public stocks for common schools and university funds, if she has any, and if she has none, she may now create them by taking a portion of the stocks of these companies, and finally, pledging the income of them after the loan is redeemed, for such purposes, which will enable the States to extend the blessings of education, and the diffusion of benefits of common schools to their entire population. But the State of Alabama will have another peculiar advantage in making such loans for the purpose of making the contemplated improvements within her State. Her loans will be deposited as an additional banking capital of several millions of dollars for twenty years, which costs them nothing, and the advantage of which alone will enable her to take one-fourth of the entire stocks of these roads, which is self-evident in the end can cost them nothing. And with such a fund devoted to the benefit of common schools and the advancement of science, what an immense benefit will she confer upon her population, and what a glorious example will she set for her sister States.

The general diffusion of these stocks among our own citizens, especially the planters or farmers and mechanics, will greatly stop the stock-jobbing system, and prevent them in a great degree from ever going out of the country; and this certainly is an object of great public importance. There is no doubt that foreign capital is now very extensively employed in banking institutions and in making our internal improvements; and as long as it is done in the way of loans to States, and they do not own the stocks of these companies, there can be no objection to it, because there is a security the loans will be redeemed; but if foreigners once become stockholders of our works of internal improvements, which of necessity are corporations of perpetuity, the country never can be relieved from this incubus; and we must become tributary to foreigners, and every step which leads to such an event ought to be deprecated and avoided. And, under all these circumstances, who can doubt for a moment whether the Legislatures of the several States will not readily accommodate their people in this respect, and thus promote the general welfare.

The General Government of these States is also greatly interested in having these improvements made both as respects public utility, and in the economy and facilities which will be thus afforded for carrying on the operations of the government. This will be seen in strengthening and increasing the bonds which cement our Union, by the social relations of life, which will be increased and extended—by equalizing the advantages to be enjoyed—by furnishing markets for the productions of every part of the country—by the commercial relations which will thus be extended and increased, and by the means that will thus be afforded in times of war and insurrections, of concentrating the whole force of the country at any given point, in a very short time. The saving also will be great to the nation in the transportation of the munitions of war, subsistence and transportation of troops, and in dispensing with the necessity of making several military works for defence, but especially in the transportation of the United States mail. For the time has already come when the Post-Office department will require the action of the government on this subject, in order to prevent impositions from Railroad corporations. The Congress of the United States will be constrained either to make post roads of this kind, for the conveyance of the mail, or else encourage the construction of Railroads, by making loans or taking a portion of the stocks, and entering at the same time into some special arrangement for carrying the mails at certain rates on said roads, for the patronage she thus extends to these improvements. If the United States were to take one-fourth of the stocks in the Railroads before mentioned, it is believed the nett annual income from them to the Government would be sufficient of itself to pay the entire expense of the Post-Office department. This would enable Congress to reduce to a mere nominal sum the postage on letters, and to make free entirely the postage on all newspapers and journals of science and magazines of useful knowledge, which would have a great tendency to diffuse very generally useful information on the subjects of politics, science, and religion, throughout the whole of these United States. But this is not all: unless mails can be conveyed in some other way than they are now conveyed, there must be a limit to our accommodations by mails, or else we must have them at an increased expense, for they are now frequently overburdened; and what must they be in a short time, with the increased population and business of our country. The public domain through which they may pass will also be greatly enhanced in value by these improvements, and it is a question whether the Railroad companies should not receive from Congress a portion of these lands or a certain per centage on these within a certain distance of the road, the minimum price of which should be immediately advanced one hundred per cent.

I trust, sir, that although I have only alluded to many important advantages which would result from the construction of these Railroads, to the private stockholders, to the public generally, to the several States interested in them, and to the United States; still sufficient, I think, has been said to show that the plan for raising funds to execute the works proposed, is safe, practicable, and important; and if the few ideas which have been suggested shall have a tendency to promote the general welfare and prosperity of our common country, I shall feel myself highly honored and rewarded.

I am, with great respect,
Your obedient servant,
JOHN F. SCHERMERHORN.

Col. J. W. LANE, Chairman
of the Com. Internal Improvement of the Senate
of the Legislature of Ala.

ENLARGEMENT OF THE ERIE CANAL.—The subject of enlarging the Erie Canal is one of such vital importance to this community, that we shall deem it our duty to devote considerable space to it.

The annexed article from the Albany Argus, and another from the Commercial Advertiser, in relation to the enlargement and termination of that work, should be read with attention.

INTERNAL IMPROVEMENT.

ENLARGEMENT OF THE ERIE CANAL, AND COMPARATIVE VIEW OF A SEPARATE WORK.

The N. Y. Legislature, at the last session, with a liberality for which no example can be found in the annals of American Legislation, placed at the disposal of the Canal Board the revenues of the Erie and Champlain canals, to an indefinite amount, and for an unlimited period—the amount estimated by the Governor to be twelve millions at the lowest, and the period twelve years at the shortest: And this, too, without the aid of science to enlighten their deliberations; for not a single survey or estimate was required, as a preliminary to this vast appropriation.

The object sought, and which demanded such unwonted confiding to subordinate public agents, and such bold, precipitate action, was "*the great and growing trade of the far west!*"—not the interior trade of western N. York. In this we were sufficiently secure, and that section of our State had been sufficiently accommodated by an expenditure of 9 or 10 millions. For *this* trade and for the accommodation of *this* section of our State, therefore, no appropriation could be thought of while so many parts of the State remained unimproved, and so many projects were yet untouched. But the prize which impelled the Legislature to immediate action was the trade of the "*far west*"—a prize for which we are to contend with Canada, as well as Pennsylvania, Maryland and Virginia. With this unbounded grant of money and power, the Canal Board seemed to imbibe the ardor and haste of the Legislature, having *settled* and *revised* their plan of operations, although the Governor inform us that they have not yet acquired the in-

formation necessary to an estimate of expenditure approaching to accuracy. These circumstances are detailed to palliate the presumption of questioning either the discretion of the grantors or the prudence of the grantees of this ample power.

What is the project, and what are its bearings? Twelve millions at least are to be expended to convert a small boat canal into a large one; and *as the trade has become too important to tolerate interruption* this expenditure is to be made principally in the winter months, say from the 30th November to the middle of April. A more lavish expenditure of money than this contemplates, cannot be imagined. Indeed, how the various labors of earth excavation, lock-pits, coffer-dams, culverts, masonry, grouting, &c., in short almost any portion except rock excavation, can be achieved in the winter months in this high latitude, is not easily conceived. Practical men pronounce it impracticable, and the best engineers say, that an *entire new work*, by the side of the old, constructed in the proper season, *would cost less* than the contemplated alteration

As twelve years must be devoted to this enterprise, little benefit can result to us until that period shall have expired, so far as the trade we seek is concerned, for as long as a portion of the canal is contracted in dimensions, small boats once loaded, would proceed through the whole line, instead of transferring their lading to a single large boat, at an intermediate point.

Interest compounded at 5 per cent. while the work is in progress, would swell its cost to about 16 millions of dollars. Our rivals would have the field for 12 years to come, with nothing more formidable than our present work to contend against; and when that distant period arrives at which we are to demand three times the amount of western trade that our present canal can accommodate; when we are to challenge our rivals on the north, and on the south, and combat for the prize, it is greatly to be feared that our *enlarged canal* will be burthened with tolls in proportion to its magnitude; unless our exhausted treasury can be replenished and our unproductive canals sustained from other sources than the Erie, and projected improvements in other parts of the State, be *postponed for 12 years.* Unless this can be compassed, we shall have enlarged our work without attaining our object.

As it would be both unjust and ungenerous to find fault with our Legislature, and condemn the projects of their agents, the Canal Board, without proposing substitutes, I will venture to submit one for public consideration, which promises to accomplish the same object, for less than half the expenditure of *time and money*, and one that can earn in the remaining half of the period, at a resonable estimate enough to reimburse *all the cost*—that is at the end of 12 years. When the enlarged Erie Canal would begin to refund the 16 millions expended upon it, my canal will have earned enough to reimburse its cost, leaving the Erie Canal and its present revenues untouched. This State will have placed itself in a condition to compete with the western trade within six years, and in 12 years will have saved 15 millions, which, if expended in other works, would go far to satisfy the demands of other sections of the State, numerous as they are. Startling as this proposition is, it is nevertheless made with confidence, and with the hope of provoking discussion and examination.

To the project:—Construct a canal of the dimensions proposed by the Canal Board, (*unless better can be devised*) from Albany to Lake Erie, by the route of Oneida Lake and River, Lake Ontario and the Niagara—[see Assembly documents, last session, No 195.] The distance by this route to be canalled will be about 150 miles: 127 miles from Albany to the Oneida Lake, 13 miles round the rapids of the Oneida and Oswego rivers, 9 to 10 miles round the Falls of Niagara—in all 150 miles of *artificial navigation.* The whole distance from the Hudson to Buffalo by the Lake route is 378 miles, which may be reduced to 363½ miles, should the *direct* route from Schenectady to Albany be adopted; giving 223 miles of *natural navigation,* instead of 365 miles by the Erie Canal. The natural navigation is both cheaper and more useful than artificial, even though the latter were not encumbered with tolls.

For the cost of these 150 miles, *better data are furnished* by *former surveys* than are yet afforded fo the enlarged route. Mr. Roberts, an engineer of acknowledged talents and established reputation, estimates the Niagara Falls portion, in a detailed report, *at less than a million* of dollars, for sloop or "ship navigation." As a work of less magnitude at his place would not be useful, that portion of the work should be set down at this sum, say one million. Mr. E. F. Johnson, has estimated the cost of a still larger work, viz: 8 feet deep, 90 feet broad at the surface, with stone locks 130 feet long by 30 feet broad, for *steamboats,* from Oswego to Utica, at a little more than a million, [$1,131,989, see his report, Ass. doc. No. 195, page 47.] As this portion of the work may be made to correspond with that of the Mohawk section, viz: a large boat 7 feet by 70 and 16 feet locks; one million *would be ample.*—That engineer Johnson is good authority, will be conceded by those of the canal engineers at least, who have measured arms and tried their prowess with him; four millions will remain to complete a boat canal from Utica to Albany, *distinct and separate from the present canal,* 7 feet by 70, and 16 feet locks! *If this sum is adequate to this portion of the work, expended in the summer, it follows pretty clearly, that twelve millions are not enough for the whole work on the Erie Canal route expended in the winter.* Now I ask any one to doubt, if they can, that six millions in money and six years in time, (I may say four,) are not as liberal an estimate for these 150 miles of canal, as twelve millions and twelve years are for the 365 miles? If so, this work being achieved six years before the other could be, and having three times the capacity of the old canal, and being able to bear the same toll (if required to do so) as the Erie, it would not be unreasonable to expect from it *thus* charged, an addition of one million in toll per year, on the entire cost of the work in these six years. If this work could accomplish so much, there would indeed still remain about one million, upon the principle adopted with the Erie Canal for interest on the disbursements, while the work was in progress. The amount at the end of twelve years would stand thus:

Erie Canal *enlargement* would have cost sixteen millions, and nothing refunded.

The *Lake route* canal seven millions, of which six would have been reimbursed, leaving one million against sixteen; or an advantage in favor of the *Lake route* of fifteen millions. ☞ Six years earlier competition for the western trade would be achieved, and *a better canal for all time to come.*

J. E. B.

ENLARGING THE ERIE CANAL.—The enlargement of the canal has, during the last season, been determined upon, at an expense somewhat exceeding its original cost. In carrying this resolution of the legislature into effect, we understand that the canal board intends to rectify the course of the canal in those places where from the inexperienced and hasty decisions of the engineers originally employed, the line of the canal was improperly located. At this determination we rejoice.

Every person who has travelled the Erie Canal must have observed many places where the route could be judiciously altered. In one part of the canal to which public attention has of late been particularly directed, its length is doubled, besides crossing a river twice in the space of 15 miles. We refer to the eastern section between Schenectady and Albany. The distance across the country is but 75 miles, and by the canal it is 30 miles. In the present route, too, the canal is twice taken across the Mohawk, and when the aqueducts are lowered three feet on account of the increased depth of the canal, it may well be doubted whether they can be constructed to withstand the spring freshets of that rapid river. It has been proposed to bring the canal direct to Albany as a mode of avoiding this difficulty, and at the same time shortening this section of the canal.

The ground between Schenectady and Albany is a high table land, intersected by deep dry ravines and creeks, which empty into the Mohawk to the north and the Hudson on *the east.* The descent from the Mohawk at Schenectady to the Hudson at Albany, is 220 feet. The height of the table land at Schenectady, is 115 feet above the Mohawk, and at Albany, 185 feet above the Hudson. If this table land should be cut through at Schenectady down to the level of the Mohawk, inasmuch as the table land descends toward Albany, upon an average, 15 feet in the mile, the deep cutting would diminish as the canal advanced from the Mohawk, and in eight miles a line from the level of the Mohawk would strike the top of the table land.

From that point there would be a continual descent to the Hudson. Even if the table land be cut through, the work is not formidable; but if a proper ravine be chosen, the labor will be much diminished. The object to be obtained is of the highest importance to the west. A saving of 15 miles upon the eastern section of the canal, is a saving of not less than $5 in tolls on every boat entering the Hudson, and the same on the return, making $12 saving in tolls alone on each boat. The saving in time will be five hours each way, making ten hours on each boat, which, estimating wages and expenses of each boat at $1.50 for one day of ten hours, will make a total saving of $13.50 on each boat.

In 1834 there were 32,428 boats arrived and cleared at the Hudson, which, at $6.75 on each boat, would make an annual saving to those navigating the canal of $218 956. Taking the present year as a basis, the saving would not fall short of $250,000, and each year it will probably increase. Should we not, then, earnestly inquire whether this great and annually increasing expense cannot be saved?

The route proposed for this section of the canal by Mr. Randal, who fully examined the ground, was to leave the present canal 600 yards west of Schenectady, and go up the valley of the Sandkill until you arrive at a point one and three quarter miles east of Schenectady, where the deep cutting begins and continues 165 chains at an ave-

rage depth of 52½ feet to Lyshe's kill, and thence 100 chains, with the same average depth of cutting. Including the ravine of Lyshe's kill, the average of deep cutting for the whole 3 5 chains, or 4 miles and 20 rods, will be reduced to 48 feet. From this point there is another excavation for 96 chains, of an average depth of 15 feet, along the valley of the Flykill, and thence another through the table land, 150 chains long, and an average depth of 22 feet, to the head of Mill Creek, which flows toward the Hudson, and empties itself into that river between the Manor House and the State Arsenal.

The estimate of the cost of excavating and constructing the canal at the deep cuttings, has also been made by Mr. Randal, and is as follows:

For excavating, &c.,	No. 1,	$488,464
do.	No. 2,	278,488
do.	No. 3,	40,678
do.	No. 4,	148,172

So that the total cost amounts to $955,802

The residue of the route is all sand and common cutting for s x and one-eighth miles to the Hudson River, which is estimated at $30,000. So that the direct route would cost less than $1,000,000, independent of the locks, which are the same on the new as the old route.

Now is the time for investigation, before the State has expended a dollar on the enlargement of the canal. Let the route be fully explored, and let it be ascertained whether the canal cannot come direct to the Hudson, instead of going round by the Cohoes.

[S.]

Baltimore, 26th Sept., 1833.

Sir,—In compliance with your instructions, I have taken into consideration the propriety of causing the graduation of the heavy sec ion (*8th) of the first division of the Washing on Railroad, to be executed under the immediate direction of agents of the Company, instead of the customary mode by con ract, and recommend it as the most proper course.

It is believed that the graduation of this section, under the most judicious management, and in the absence of the occurrence of extraordinary difficulties, such as iron ore, quicksands, landslips, &c., cannot be effected at a cost less than from eighty to ninety thousand dollars. Very few of such persons as are disposed to become contractors, or such as now are contractors on public works, are in the possession of such amount of funds as are indispensably necessary for the advantageous commencement and prosecution of a work of this magnitude, and the insufficiency of means is not unfrequently the cause of failure, even where the price is ample and the management good. But this section is, from appearances, so very liable to the occurrence of extraordinary difficulties, such as are above alluded to, that no prudent contractor will undertake its graduation without adding to his price such sum as will, in his opinion, indemnify him for the risk. If he does not do this, and any or all of those apprehended difficulties should be met with, his price will, of course, prove greatly inadequate to the completion of the work, and he must abandon it. The Company, by placing this work under contract, cannot gain, under any circumstances, but most probably will lose. They cannot gain by having the work done with the funds of contractors, (and in this way I am sure it is not their wish to gain,) because, if the contractor has an inadequate price, and although he may be in possession of the requisite funds, he will not, most probably, expend them for the benefit of the Company and to the ruin of himself; and if his price is based upon the expectation of great difficulties, and those difficulties should not occur at all, or only in part, then his price will be too high, and the Company will be the loser. And again, if his price is adequate and his funds inadequate, he will most likely fail: or if his price and funds are both adequate, and greater difficulties should occur than he expected, a failure must be the consequence.

Failures are greatly to be deprecated, especially in the commencement of a great work, and every possible precaution ought to be taken to prevent them. Their occurrence is highly prejudicial to the interests of the Company and of every one employed by them, because they occasion distrust, riot, and consequent embarrassment, if not great injury to other contractors. The uncertainty of payment causes an advance in the price of every article of value, and in none perhaps more than in that of labor. And if the credit of the line sustains, in its commencement, such a shock, as would be produced by a failure on this section, it can scarcely be expected to recover from it before the work shall have been finished, and the Company must, in the mean time, pay the premium or advance in the price of labor occasioned by it. It will then be perceived that the baneful consequences of a failure on this section, may not be confined to it alone, but will pervade the whole line of Road. And in the event of failure the Company will be compelled either to undertake the section themselves, or again place it under contract, most likely at an advanced price, and with very little certainty that the succeeding contractor will finish it. And finally, after encountering all the moral disadvantages of several failures, to pay vastly more than the original value of the work. For these reasons and others which might be named, I would respectfully recommend to the consideration of the President and Directors the propriety of conducting the graduation of this section, by agents of the Company. For this purpose, a principal agent or manager, to be selected by the President and Directors, and to be under the direction of the Superintendent of Graduation and Masonry, will be necessary. This agent should be a man of integrity, fidelity, capacity, and of great energy. The minute details of the work, as well as the selection of the necessary subordinate agents, should be confided to him, as he alone will be held responsible for the judicious and economical execution of the work. The general outlines of the operations and system of accountability will be prescribed by the Superintendent of Graduation and Masonry, whose duty it will also be to see that the principal agent or manager conducts the work, in all its parts, advantageously.

If the President and Directors should concur with me in the opinion that the 8th section of the first division should be placed under the direct management of agents of the Company, I would then respectfully but earnestly, further recommend, for the same reasons, that two other sections be also graduated by the Company. Indeed, there will be additional reasons for undertaking the other two difficult and expensive sections. At any time that an increased force might be temporarily required on any one section, it could be applied from one or both of the other sections. Besides the correct management by the Company, of sections, on different parts of the line, would exert a powerful moral influence upon the conduct of those employed on the whole line, very highly beneficial both to the interests of the Company, and the contractors and laborers.

In the event of those sections being conducted as recommended, I would very respectfully suggest that if the provisions of the charter justify the measure, and the President and Directors approve it, that the establishment of stores by the Company, at those sections respectively, would prove beneficial both to the interests of the Company and those employed by it. The Company would, of course, sell to their operatives at very moderate profits, and whilst they would thus advance their own interests, would also subserve the interests of those in their employment, by selling to them necessary articles at fair prices and at convenient places, by which they would be saved from loss of time and perhaps from imposition. The superintendency of these establishments would, of course, devolve upon some other officer of the Company than the Superintendent of Graduation and Masonry, whose time would be too much otherwise occupied to attend to them. The establishment of stores which will be conducted on correct principles, and which will save both time and money to the laborers and others in the service of the Company, is considered of so much importance, that I would recommend that the President and Directors should, in the event of their declining to establish them by the Company, afford every practicable facility to such persons as will establish them and conduct them on correct principles.

To such men as are suitable for agents,—men of character,—of long tried integrity, of capacity and great industry, adequate compensation must be given, or their services cannot be commanded: and unless such can be obtained, it would be more advisable to encounter all the hazards, perplexities and difficulties likely to grow out of contracts for such expensive jobs.

From the preceding remarks I do not wish it to be inferred that I am against contracting altogether. I am decidedly in favor of contracting in general, and would only make exceptions in cases of very large extent, or in such as it is beyond the capacity of man to form a correct estimate of the value of the work to be done, because of threatened or expected difficulties that may or may not occur.

NOTE.—This section was subsequently joined to the 1st section of the second division, and both then called the 1st section of the 2d division.

In conclusion, I would respectfully remark, that I conceive it to be highly important, that those sections should be in progress of construction as early as practicable.

I am, sir, yours very respectfully,

CASPER W. WEVER.

To PHILLIP E. THOMAS, Esq.,
President of the Baltimore and Ohio Railroad Company.

Letter from JAMES SEYMOUR, *Division Engineer of the New-York and Erie Railroad, in respect to the curvature and graduation on that and sundry other roads.*

New-York, January 11, 1836.

SIR,—Having recently, in pursuance of your directions, visited and examined the several Railroads between this city and Washington, I beg leave to submit the following account thereof for the consideration of the Board of Directors.

1st. The Paterson and Jersey City Railroad, length 16 miles. The train of cars was drawn by one locomotive engine, from Paterson to the Bergen Ridge, with forty passengers, at the rate of 12 miles per hour, passing over curved lines varying from 400 to 600 feet radius, and ascending a grade for a distance of half a mile, at the rate of 45 feet per mile upon a straight line. The engine ascended this grade with a velocity of 11 miles per hour; over the remainder of the distance, not yet completely finished, the cars and passengers were drawn by horse power.

2d. The Amboy and Camden Railroad, length 65 miles. Over this road the daily trains of cars, containing from 50 to 150 passengers, are drawn by an engine weighing seven and a half tons, at from 12 to 15 miles per hour, ascending a grade of from 40 to 50 feet per mile, for a distance of about 3 miles, upon a part of which ascent there is a curved line of 750 feet radius; the remainder of the road slightly undulating.

3d. The Philadelphia and Trenton Railroad, length 30 miles. This road is nearly level. A train of cars, containing 60 passengers, was drawn over this road at the rate of 14 miles per hour, by a locomotive engine weighing 8 tons.

4th. The Philadelphia and Columbia Railroad, length 82 miles. Upon this road there are two inclined planes located for stationary steam power. The firs is located immediately west of the Schuylkill river, near Philadelphia. One train of the cars was drawn up this plane by the stationary steam engine, another by horses, and the delay in passing was half an hour. Its length 3300 feet, vertical height 165 feet. Trains containing forty passengers (20 in each,) are drawn from the head of this plane by a locomotive engine of eight and a half tons gravity. The road presents acclivities of 30 feet, and in one instance of 45 feet to the mile, and numerous curves, many of which are from 600 to 800 feet radius. An inclined plane of 1800 feet long, and 90 feet vertical height, descends to the Susquehanna River at Columbia. Arrangements are in progress to supersede one or both of these planes, by a new location, presenting grades of about 80 feet to the mile, to be traversed by locomotive engines.—Vexatious delays are experienced on this road, owing to the fact that the State of Pennsylvania provides the motive power managed by State agents, and gives to transportation companies only the privilege of attaching cars. This destroys that systematic arrangement throughout the line which is necessary on a work of this kind, and which uniformity can only be adequately secured by subjecting the whole business of transportation to the sole management of one set of agents.

5th. The Newcastle and Frenchtown Railroad, length 16 miles, and no ascent over 25 feet per mile. The train of cars containing 60 passengers, was taken at the rate of 18 miles per hour. The greater portion of this road is either straight line or curved upon a large radius.

6th. The Baltimore and Ohio Railroad, which is in operation only as far as Harper's Ferry, length 82 miles. In travelling over this road I was favored with the company of P. E. Thomas, Esq., President of said road, to whom I am indebted for the following information. Between Baltimore and Ellicott's Mills, a distance of 15 miles. the road is level from 7 to 8 miles, and the remainder ascends at the rate of from 13 to 21 feet per mile. From this point 23 miles west, the line ascends from 18 to 38 feet per mile.—This part of the line presents generally a succession of curves to the right and left, varying from 318 to 700 feet radius, and many of them as small as 400 feet. The grade in the next 4 miles rises from 38 to 45 feet per mile. A part of this is straight, and the remainder curved from 600 to 1000 feet radius, with the exception of a few of the curves, which are larger, making the distance 42 miles to the foot of plane No. 1, on the east side of Parr's Ridge. An engine of 7 and a half tons gravity, took two passenger cars 30 feet long, containing 50 passengers, from Baltimore to this point, at the rate of 14 miles per hour, and passed over the ascents and curved lines with the same velocity as upon the straight line and levels, and upon the last mile, which has an ascent of 45 feet, at the rate of 16 miles per hour.

We could have travelled over the 42 miles with a greater velocity, had not the general regulations of the company limited the speed to 14 miles per hour.

The principal ridge encountered between Baltimore and Harper's Ferry is called Parr's Ridge, the summit of which is distant 44 miles from that city, and presents an elevation of 817 feet above the tide level. At the time when this road was located over this ridge, about the year 1829, it had not been supposed to be practicable to ascend with locomotive engines with loaded trains, upon grades exceeding 30 feet to the mile, and therefore, in order to pass this ridge, four inclined planes arranged for stationary engines, were adopted at grades respectively of 76, 87, 176, and 253 feet per mile. Since the recent improvements, however, in the Baltimore locomotives, much exceeding in power the comparatively feeble engines imported from England, the Baltimore and Ohio Railroad Company have resolved to locate anew this section of their road so as to dispense with these planes, and to adopt a more circuitous route over the ridge, upon which the grades will be reduced to 80 and 100 feet per mile, and will be passed exclusively by locomotive engines. The planes, as now located, are passed by applying auxiliary horse power, but they have been lately surmounted with one of the Baltimore locomotive engines, drawing 33 passengers and other freight. The lengths of these planes are respectively as follows: 2150, 3100, 3400, and 1900 feet, and the aggregate distance from the foot of the most easterly to the foot of the most westerly plane about four miles.

I was informed by Jonathan Knight, Esq., Chief Engineer of that road, that it is proposed to pass the ridges of the Alleghany mountains lying west of Cumberland, exclusively with locomotive power, encountering grades from 50 to 100 feet to the mile, and containing an aggregate length of about 55 miles. That company estimate the actual cost of traction on those heavy grades at *two* cents per ton per mile, and on the grades less than 30 feet to the mile, at less than *one* cent per ton. The road with the planes as now located, is very extensively used for the transportation not only of passengers and merchandise, but also of flour, lumber, tobacco, and the general agricultural products of the country. The nett revenue for the year 1835, arising from the section of 82 miles of this road now finished, after deducting all expenses of transportation and repairs of the road and machinery, amounted to $107,163 71, being an advance of about 35 per cent. on the nett revenue of the preceding year, which was $72,574 14.

7th. The Baltimore and Washington Railroad, which diverges as a branch from the Baltimore and Ohio Railroad, at a point 9 miles west from Baltimore. The length of this road from Baltimore to Washington is 40 miles, and is traversed by a locomotive engine of 7 and a half tons, drawing passenger cars which are 34 feet long, and unusually commodious, containing 70 passengers, together with the baggage car, at a velocity varying from 16 to 20 miles per hour.

On my return from Washington to Baltimore, the same engine drew three of these large passenger cars containing 140 passengers, together with the baggage and baggage car, at the same speed before mentioned.

The locomotive engines are able however to travel much faster upon this road, having passed a number of times from Baltimore to Washington in one hour and a half, conveying from 75 to 100 passengers, passing over a part of the road at the rate of 40 miles per hour upon a straight line. An agreement was made to deliver the presidents' message in Baltimore in 40 minutes, or at the rate of 60 miles per hour, and it would have been accomplished but for the circumstance that after the engineer had started and obtained the velocity pro-

posed, the fireman became alarmed at the speed, and put out his fire. The engines upon the different Railroads above mentioned, have horizontal boilers, and generally burn wood. Those upon the Baltimore and Ohio Railroad, and the Baltimore and Washington Railroad use anthracite coal, and have vertical boilers. This plan of engines I consider preferable to those with the horizontal boiler, particularly upon steep grades, as it prevents the water from varying from its place. The use of coal is also preferable as well on account of bulk, as in maintaining a more uniform and regular amount of steam; and in avoiding the smoke and sparks, which are found exceedingly inconvenient, unpleasant, and even dangerous, on the roads where wood is used.

Notwithstanding the very great improvements which the locomotive engine has experienced within the last seven years, I have no doubt that it is destined to undergo alterations which will still further augment its power and usefulness, and enable it to travel with safety at the rate of 30 miles per hour, with passengers, over grades varying from 10 to 30 feet per mile, where the curves are of not too small a radius.

I consider the engines made at Baltimore better than those that are imported from abroad. An English engine arrived at Baltimore a few days since, which was destined for a Railroad in Virginia; but being tried upon the Baltimore Road, ran off the track once or twice. The foreign engines appear much better calculated for very straight and level roads, than those which must be constructed in this country.

The State of Pennsylvania has expended $100,000 for English engines, but has recently concluded to abandon the use of them, and hereafter to order their engines made in this country.

It has been ascertained by actual experiment upon the Baltimore and Ohio, and the Baltimore and Washington Railroads, that one of the American locomotives, weighing 8 and a half tons, will draw upon a level road, 200 tons of freight, at the rate of 10 miles per hour: that the same engine will draw upon an ascent of 25 feet per mile 100 tons, and 50 tons on a grade of 50 feet, a the same rate of speed; and that by adding another auxiliary engine of the same power, the same weight may be propelled with the same velocity on a grade of at least 90 feet to the mile.

By a comparison of the facts above ascertained, with the table of grades and curvatures on the New-York and Erie Railroad, the advantage will be found much in favor of the latter. There is no grade on the New-York and Erie Railroad which will exceed 90 feet per mile, and that only for one and a half miles in distance, upon the western slope of the Shawangunk Ridge. There are a few places where a grade from 60 to 80 feet per mile for a short distance will be required; but on much the greatest portion of the road the grade will be reduced within 30 feet per mile. There will be no curves on any part of the road less than 700 feet radius, and but one as small as that, and we have fortunatly been able in all cases where we have been compelled to adopt curves which would have otherwise diminished the usefulness of the engine, to regain the portion of power thus lost, by reducing the grade in that part of the road, and thereby to equalize the loss by curvature by a corresponding gain in acclivity. The loss of power on a curve of 700 feet radius, at a speed of 12 miles to the hour, is found in actual practice, to be about equal to an increase of acclivity of 18 feet to the mile, so that it is only necessary to flatten the grade to that extent, wherever we have been obliged to submit to a curvature as sharp as that presented by a radius of 700 feet,—and in that proportion for curves more gentle. It is by pursuing this plan, and thereby avoiding the excessive and useless expense incurred in attempting, as it were, to *force a line* to a course which shall be absolutely straight and level, that we have been able to avoid the mistakes in that respect of the English engineers, and to reduce within so moderate an amount the estimated cost of the New-York and Erie Railroad. You will perceive that the curves upon the Baltimore and Ohio Railroad, are much more severe than those upon the New-York and Erie Railroad, being frequently on a radius of 400 feet, and once as high as 318 feet; and nevertheless their locomotives pass over these curves without difficulty, at the rate of from 14 to 16 miles per hour.

The rail used on that road is the flat plate rail, laid in part on wood and in part on stone. The different modes of superstructure presented by the roads above mentioned, together with the plan which will be most expedient for the New-York and Erie Railroad, I propose to make the subject of a future communication, and I beg leave to conclude by stating, that an examination of the difficulties overcome on the roads above mentioned, compared with the facilities as to graduation and curvature presented by the New-York and Erie Railroad, cannot but remove any doubts as to the feasibility or usefulness of the latter work.

All which is respectfully submitted
by your obedient servant,
JAMES SEYMOUR.

To JAMES G. KING, Esq., *President of the New-York and Erie Railroad Company.*

ILLINOIS CANAL.

We find in the Chicago American, of Jan. 2nd, the following extract from a letter in relation to the Canal from Lake Michigan to the Illinois River. It appears that the bill had been lost in the house, but reconsidered. We sincerely hope the prediction of the writer will be realized, as we consider that work one of great importance in the general system of Internal Improvement of the country.

"The house, this afternoon, *reconsidered* the vote on the third reading by a vote of 31 to 24. An attempt was then made to strike out the amendment, authorising the election of Commissioners by the Legislature, but failed. The question being put on the passage of the bill, the vote stood, 29 to 26, so it passed!!

There is a bill in the Senate on the same subject, though somewhat different in its features. It has passed the first and second reading. Both houses adjourned till Saturday. Do not despair of the Canal; compromise and concession *will* carry it through, *and the money will be raised* on the FAITH *of the State.*"

Yours, R.

UPTON'S ROTATORY LEVER ENGINE AND BOILER.—The advantages of the engine are: —1. It occupies only a seventh part of the space of the common reciprocating beam engine of equal power. 2. It has neither engine-beam, crank, connecting-rod, parallel motion, governor, air-pump, hot-water cistern, nor any of the attendant expenses. 3. It is so constructed that, whether single or double, the steam operates upon the extremity of a lever, the fulcrum of which is the axis of the engine, as well as of the resisting force, as in the case of paddlew-heels fixed at each end thereof, or of coach-wheels for locomotion on land. 4. It costs less in the first purchase, and does not require a tenth part of the expense in fixing or repairs, as compared with a beam-engine. 5. It can be made to operate alternately in opposite directions, by reversing the motion of the steam. 6. It is perfectly controllable, and may be set to work or stopped instantly by any person whatsoever, if necessary.—7. It has not half the friction of common beam-engines, and, consisting of only about a dozen parts, will prove infinitely less liable to derangement, and thereby greatly increase the demand for them. 8. It can be entirely put together in the manufactory, and will require only a few days' fixing, instead of weeks, as beam-engines always occupy. 9. It is admirably adapted for team cultivation, being the best constructed engine for steam-ploughing, grist-mills, and other agricultural operations. 10. It is the best application of steam power for canal, river, and sea navigation; can be fixed to the kelson of a ship, and the axis protruded through the sides by means of perfectly secure stuffing boxes, so that the paddles may be always under water, and more out of the way of the enemy's shot. 11. It will weigh the anchor, pump the ship, and discharge and take in the cargo. 12. It requires less fuel than beam-engines of equal power, and, by occupying less space, leaves more stowage-room for goods. 13. It will be found, from its simplicity and compactness, the best application of steam-power for railways or common roads, and the most profitable engine for manufactories and mining operations. 14. It will propel a carriage at the rate of fourteen miles the hour, including stoppages for water and fuel. 15. It will not weigh,—including boiler-carriage, 16 passengers, half a ton of luggage, 75 gallons of water, and 3 sacks of coke in reserve,—more than 5 tons.

The advantages of the boiler are:—1. Its decided superiority over all other boilers yet made, consists in its being founded on the well known principle of an air-furnace, which of all others is the best adapted for the purposes of combustion, and generating the most intense heat with the least possible expense. 2. It weighs less than any other boiler yet made, generating the same quantity of steam. 3. It is safer than any other boiler, as it carries its fuel and water in separate compartments, the giving way of any one of which does not interfere with the others. 4. It is stronger than any other boiler, from the peculiarity of its construction. 5. It consumes less fuel than any other boiler yet made. 6. It works either as a high or low pressure boiler. 7. It raises steam in less time than any other boiler, and is fed from the top, but may be con-

structed to be fed otherwise if required. 8. It is more durable than any other boiler, and any one of the compartments for generating steam may be taken on and repaired, or replaced by duplicates, in a few hours. 9. It is the best adapted boiler for shipping ever discovered, being lighter, more compact, fed from the deck, and perfectly safe by not carrying its water in bulk; nor can any danger result, even should one of the steam chambers give way after long wear and tear; besides which, it stands on its own legs, and requires no fixing or brick work. Notwithstanding which, its heat is prevented from being acted upon by the surrounding atmosphere, and the steam is collected and preserved in one of its chambers, placed in the midst of the fire and boiling water. 10. It is the best boiler ever made, whether for stationary or locomotive purposes, on land or water. [John Upton, Agricultural and Locomotive Steam-Engine Manufactory, 7 New Street, Southwark Bridge, London.]

From the same.

Description of a successful Experiment, with the Heated Air Blast, made at the Oxford Iron Furnace, New-Jersey.

During a recent visit to Oxford Furnace, in Warren county, New-Jersey, on some observations connected with the mineralogy of that neighborhood, my attention was drawn to an arrangement for applying the *hot blast*, which much interested me, on account of the economical simplicity of its construction, and the encouraging results obtained through it.

Upon expressing a wish to make public through the Journal of the Franklin Institute, this first successful experiment of the kind in our country, I was furnished by Mr. Henry, the enterprising conductor of the furnace, with a detailed description of the whole attempt. In a spirit of liberality worthy of all praise and imitation, he placed in my hands all his memoranda, exposing the history of the comparative efficacy of the hot and cold blast at this furnace, and, furthermore, gave me possession of drawings of a new and improved form of the apparatus for heating, which he is now constructing, to be put into operation when the furnace again goes into blast.

In the hope that the brief account which I have to offer, may prove of some service in promoting the introduction of that which is confessedly the greatest of modern improvements in the important art of smelting iron, I beg leave to state the comparative trials of the two species of blast at this furnace, in the order in which the furnace was worked, the better to make their relative effects understood.

It should be borne in mind that this experiment, as far as it has yet proceeded, professes to be merely a preliminary attempt, introductory to a more permanent arrangement, hereafter to be adopted; and it is felt to be defective, therefore, in several points. For example, the *temperature* of the air used in the blast was found to be quite too low to insure that full result which the mode of apparatus employed is supposed capable of yielding. The experiment was imperfect, moreover, from the absence of any precise instrumental observations to ascertain exactly what the temperature of the air was.

To make more intelligible the amount of benefit derived from the heated blast, it seems proper to furnish a brief statement of the capacity of the furnace, and its operation when under the cold blast.

Oxford Furnace passed into the hands of its present enterprising masters, Henry Jordan & Co., in 1832, and was worked during that and the two succeeding years, on the ordinary plan, with cold air. The partial experiment with heated air was made during the months of June and July, of the present year, 1835.

The height of the furnace stack, from the tunnel head to the bottom stone, was, at first, 33^1 feet, but was afterwards, in 1834, reduced to $31\frac{1}{3}$ feet; the height of the hearth to the boshes is five feet; the inclination of the boshes was at first eleven inches to the foot, and was subsequently changed to ten and a quarter inches to the foot, at which it stood during the employment of the heated air.

In the more complete arrangement for applying the hot blast, about to be introduced, the inclination of the boshes is to be altered to nine and a half inches. This is in consequence of the increased temperature within the furnace making it necessary to give more support to the burden. The width on the boshes is six feet six inches, and in the tunnel sixteen inches.

With these dimensions, the rate of working, or yield, of the furnace, was,—

In 1832, for nineteen weeks and four days, $327\frac{1}{3}$ tons, or an average of 16.7 tons per week.

In 1833, the product of thirty-two and a half weeks, 638.1 tons, or 19.6 tons of iron per week.

During this year, the quantity of charcoal consumed in making one ton of iron was 243 bushels, of eighteen pounds to the bushel.

In 1834, still using the cold blast, but em-

Fig. 1.

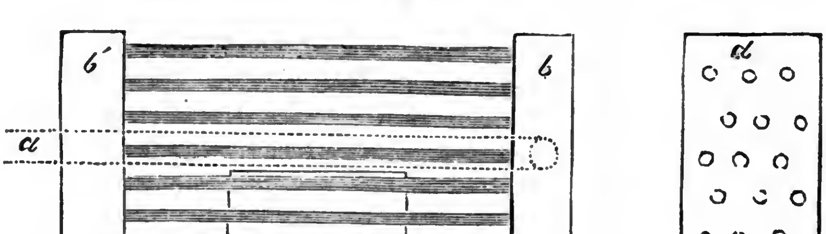
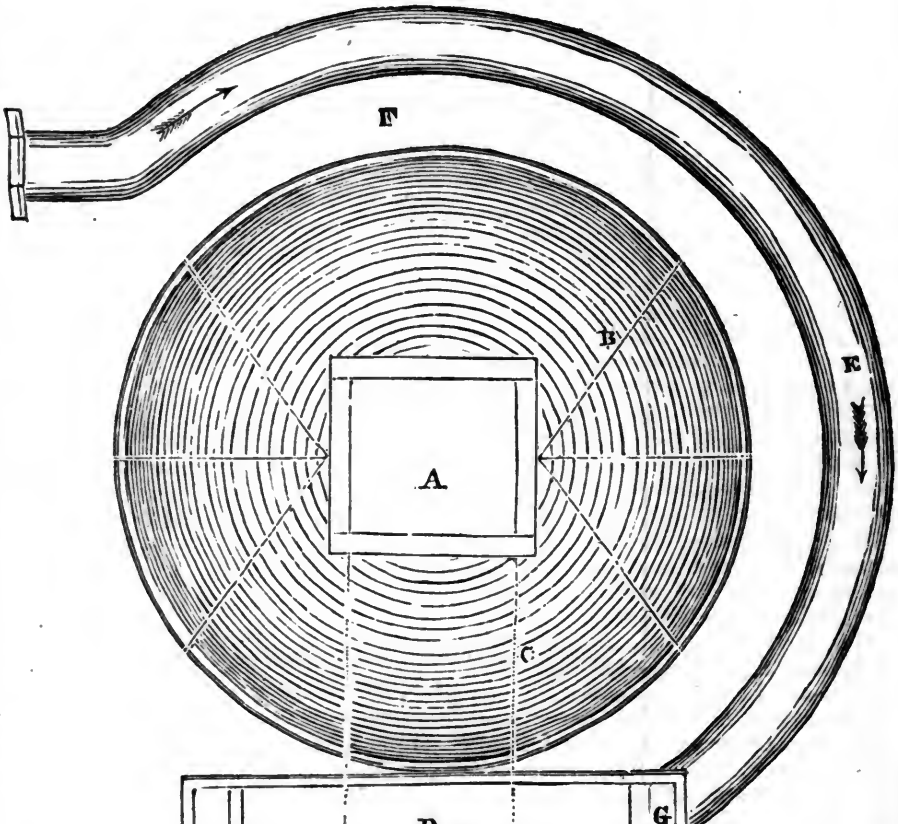


Fig. 2.



A, Oxford Furnace—hearth 20 by 22 inches; B, incline of boshes—9 inches to the foot; C, hearth line; D, position of the heating apparatus; E, hot air pipe; F, inwall; G, exit; d, line dam stone.

ploying an improved quantity of charcoal, the product, for twenty weeks and five days, was 240.4 tons, or, 11.6 tons per week.

So low a product was due to the hard and refractory character of the ore then used.—It was taken from a considerable depth, was very compact, and a portion of it yielded iron having the quality called red short. This year, the consumption of coal to the ton of iron, was 225 bushels of a coal weighing twenty two pounds to the bushel.

In 1835, the coal being similar to that of the previous year, and the ore of its ordinary much better quality, the product of the iron was at the rate of 18.9 tons per week.

While the smelting with heated air was in progress, the consumption of coal to the ton of iron was only 165 bushels, being a saving, compared with the previous year, of sixty-one bushels per ton.

It should be mentioned, moreover, that the new blast was applied in the months of June and July, a season when the product of a furnace is well known to be less than its average rate for the whole year.

The charcoal employed in the Oxford Furnace, is a mixture of oak and chestnut, about two-thirds oak. Much commendable care is employed in its manufacture, so that a cord of 128 cubic feet is required to yield at least forty bushels, of a capacity of 2355 cubic inches to the bushel.

The flux used is the blue limestone of the vicinity of Scott's mountain, where the furnace is situated.

The ore smelted at this furnace is the magnetic oxide of iron. It is mixed with but little foreign matter, and occurs in veins, several feet wide, in Scott's mountain; it makes an excellent, tough, bar iron, and is also well adapted, and extensively used, for making castings, and pig iron.

Description of the Apparatus for Heating the Blast

This plan of supplying the furnace with air at an elevated temperature, is upon a principle said to be in use in Germany. It consists in urging the cold air from the bellows, through tubes laid adjacent to the most highly heated part of the furnace, in place of heating it by separate fuel, in an apparatus detached from the furnace. The contrivance is this: Two hollow cast-iron boxes, 2 feet 9 inches high, 15 inches deep, and 8 inches wide, are set into the masonry, on each side of the false tymp, and placed directly in contact with the main tymp, and with their broadest sides facing each other. A series of tubes, eighteen in number, pass from one box across to the other, and are so arranged immediately above the top of the false tymp, that the flame which plays in front of the main tymp, and under the sow, may pass around them as freely as possible. The interior diameter of the tubes is two inches. Their position in front of the hottest part of the furnace is such as to enable them to be highly heated, as well by the external flame, as by the heat radiated from the main tymp.

The air, in being urged through thees tubes is, therefore, made to acquire a very considerable elevation of temperature.

In the diagram before us, fig. 1, *a* represents the large pipe which brings the blast from the bellows to the heating apparatus. It is curved, in order to pass round from the side of the furnace where the tuyere is, to the front. It passes close to the main tymp, and enters the remote box, *b*. From this the air escapes through the tubes into the opposite box, *b'*, and finds its exit thence through the curved pipe, *c*, which leads it in a heated state to the tuyere; *d* represents a side view of the boxes, *b*, *b'*.

No arrangement was made for measuring the temperature of the air, as it issued from the second box, farther than adapting a valve in the side of the pipe, *c*. The temperature, estimated there by the sensation on the hand, was judged to have been about 200° of Fahrenheit.

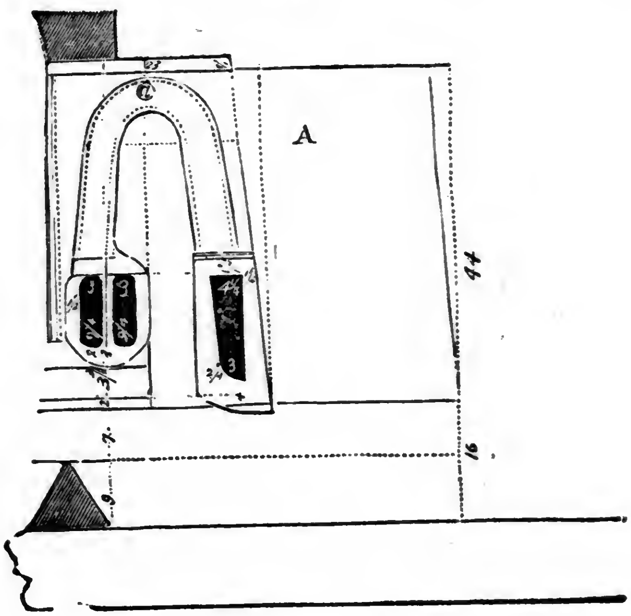
In the improved mechanism for heating the air, which is intended to take the place of this, there will be a thermometer to indicate the temperature of the passing air precisely.

At the same time that the apparatus here described was erected, a modification in the false tymp was made, to keep it cool, and thus prevent that rapid destruction of it, to which it is liable, under the high heat of the front of the furnace. It was designed to achieve this by making it a hollow cast-iron box, and transmitting through the interior a current of cold water, to enter below, and to issue at top.

The thickness of the iron in the bottom of this hollow false tymp, was two inches at bottom; at the back, it was one and a half inches; and in front it was one inch. It was found, however, not to be stout enough beneath, for it soon gave way under the action of the fire.

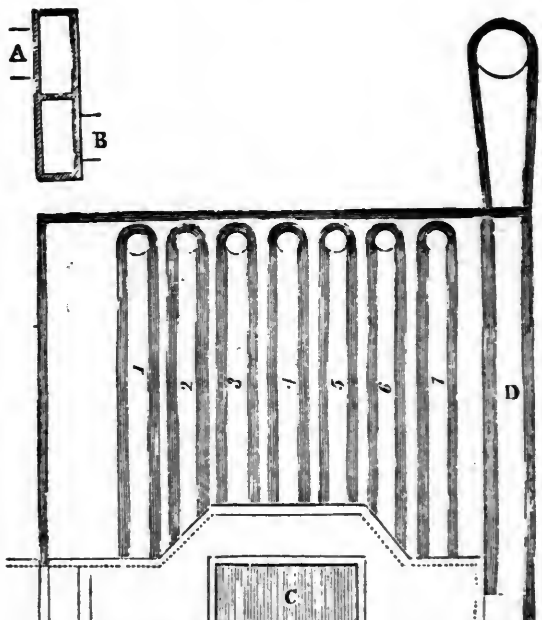
Imperfect as Mr. Henry admits the above arrangement to have been, he was fully convinced, during the trial, of the useful results to be procured from such a form of apparatus.

Fig. 3.



A, main tempayne; *a*, 24.

Fig. 4.



A, exit; B, entrance; C, false tempayne; D, air pipe.

Independently of the very considerable saving of sixty-one bushels of the best charcoal to each ton of iron, there was a steadiness in the working of the furnace, and, therefore, a uniformity in the quality of the iron, of no small object in every extensive establishment.

As a consequence of this regularity in the action of the furnace, it was found that the superintendence of the man who managed the tuyere could almost be dispensed with; so much so, that even after casting, during which the blast is usually taken off, no scraping of the tuyere was necessary to detach the congealed cinder which commonly adheres, proving how much higher the temperature of the furnace remains when the heated air is employed. It would seem, indeed, that weather and season have little or no effect in deranging the working of a furnace driven by the hot blast.

It remains to describe concisely the other form of the apparatus for heating the air, which Mr. Henry is now constructing.

The object of this, which is upon the same principle as the first, but considerably modified and improved, is to procure a higher temperature in the blast, and, at the same time, to preserve the desired coolness in the false tymp, by passing the *blast* through it, in substitution of the water before employed. The false tymp is, therefore, hollow, and forms a part of the chain of connection through which the air from the bellows is made to circulate.

Fig. 2 shows the position of the semicircular pipe, which leads the cold air from the bellows, round the stack, to the side of the main tymp; here the pipe descends to enter the side of the false tymp, an end view of which is seen in fig. 3.

In fig. 3, a profile, or side view, is presented, of the manner in which the air is conveyed, from the interior of the false tymp, through a series of cyphon-shaped pipes, into the front chamber of a box, which lies in front of, and parallel to, the false tymp.

This box is divided by a partition into two chambers, an opening at one end of the partition permitting the air received into the front chamber from the pipes, to pass behind into the other; from this it issues through a large pipe, which curves round the angle of the furnace, and conveys the air to the tuyere.

Fig. 4 represents a front view of the anterior box, and the air pipes, seven in number, which connect it with the false tymp in the rear. The doorway in the middle of this front box is designed to permit the flame and heated air which play up near the dam stone, to pass between and envelope the pipes, previous to escaping under the sow.

The whole is of cast-iron, the lower part of the walls of the hollow false tymp being at least four inches thick.

In the pipe which leads the air, heated by traversing the tymp, the tubes, and the two chambers of the front box, from the latter to the tuyere of the furnace, there will be a contrivance placed to receive a mercurial thermometer. It will consist of a tube of copper, of about one inch diameter, and six inches length, closed at one end, and the closed end inserted three or four inches through the side of the pipe, so as to expose it to the current of heated air which passes along the pipe, and which will impart its own temperature to it. This tube will be filled to a small height with quicksilver, and the thermometer bulb made to dip into the mercury. The scale of the thermometer will, of course, project out of the tube, that the temperature recorded upon it may be seen.

Mr. Henry intends keeping a daily register of temperature of the blast, and the state of the furnace. Such a register will be highly interesting, and we wish every success to the ingenuity of the liberal and enterprising masters of the Oxford Furnace.

AGRICULTURE, &c.

For the New-York Farmer.

ON CUTTING AND PREPARING FEED FOR HORSES AND CATTLE.

By Henry Colman.

Economy of food is a matter of great importance to farmers; and this applies not only to the saving from waste by gathering up the fragments so that nothing be lost, but likewise to the mode of dispensing or applying it, that the smallest amount may be given required for the nourishment and health of the animals who are to be sustained. It is impossible to go much among farmers, without being struck by the prodigality and wastefulness with which, especially in abundant seasons, the food of our brute animals is managed; and I have often been led to the conclusion that not a third of the number is supported on most farms which might be advantageously kept; and those, likewise, from injudicious management or culpable neglect, in an inferior condition. As much discretion and care are required in the disposal of our produce, as in raising and harvesting it; and, to farmers properly regardful of their own interest, there are equal motives for the one as the other. Indeed, it is less mortifying to fail in obtaining our crops, than, after having obtained and stored them, to see them wasted through ignorance, carelessness, extravagance, or improvidence. Regularity in feeding, to the health and thrift of the animal, is almost of equal importance with abundance; and the mode or form in which the feed is given is not of less moment both in regard to the animal himself and the uses and advantages of the feed.

This is a subject which has much occupied the attention of intelligent and inquisitive farmers; and the present general scarcity of hay and fodder throughout the country, so much increased by the early and most extraordinary severity of the first month of winter, and the consequent high prices of every kind of agricultural produce, renders the subject, at this time, of peculiar importance. I have made such experiments myself as fully to satisfy me of the great economy and advantage of cutting all long feed, hay, straw, and corn fodder, for horses and neat cattle; and am convinced that the saving may at least be put down as one third of the expense; and in some cases, where the price of hay has been very high, fully one half; and these trials have not been merely occasional and accidental, but the experience of many years. I have ample details on this subject in my own journals, but I prefer to give the experiments and opinions of others. Into these I shall go pretty largely, as far as I may deem them interesting and important.

Parkinson, in his Treatise on the Management of Live Stock, thus speaks of "feeding horses in America." Vol. ii. p. 156. "The Dutchmen have introduced a method of feeding horses in America, which I consider superior to any mode I ever saw practised. I tried it when I resided in that country, and found it both good and cheap. The method pursued is, they chop rye straw, about an inch or an inch and a half long, and put it into the manger, two or three inches thick; they then sprinkle some water over it, making it all wet alike as nearly as possible, care being taken that there is no superfluous water, as that would destroy the intention of the process; that done, they carefully mix some rye meal, finely ground, the finer the better, among the chopped straw; a very small quantity of rye meal will be sufficient for a bushel of the cut straw. This causes the horse to use his teeth much, thereby thoroughly masticating the straw, which is all tinged with the rye meal, for, being more gluey and tenacious than the meal of any other kind of corn, it will not separate or fall off by the horse moving the food about with his nose, which is one reason why it is preferred; and the straw being so long is much better than if it were cut shorter, for if it were not longer than a barley corn, the horse would swallow much of it without chewing. Walking along the streets of Philadelphia, I saw those men putting a quantity of rye straw, chopped in the manner described, to their horses. At that time, I thought it a bad way to chop straw long, as the horses I had fed with straw in that state, shuffled it about the manger, and threw much of it out, wasting some of the corn likewise. These horses stood in the streets night and day, during the most severe weather, tied to the pole of the wagon, with a trough fixed upon it, so narrow and shallow that I supposed the horses must toss a great deal of it out, but seeing they did not, I stopped to look at them. As I had not then particularly noticed their food, they told me that there was rye meal mixed with it, which, when I examined, I found cleaved to the straw like glue, it being so nicely incorporated that every straw had its portion of meal, and thus the horses did not commit any waste."

The horses to which Parkinson here refers, were the fine team horses, which, in teams of four and frequently eight horses, finely caparisoned, with wagons bearing some resemblance to a canal boat for size and tonnage, and with their jingling bells, were so frequently seen in Makret street, in their journies to and from Pittsburgh across the Alleghany mountains. I have often admired them as much as Mr. Parkinson; their large stature; their fine athletic frames; their healthy condition; and have equally admired the economical mode of feeding them.

The next authority I quote is that of Richard Peters, Esq., of Philadelphia, a name always to be in the highest measure revered by the friends of an improved agriculture. A more enlightened, active, disinterested, devoted friend to the cause, has never appeared among us. In a letter dated April 8, 1817, he says, "I find a wonderful saving of provender by chaffing it. I account for the utility of chaffing, by its exposing more points for the extraction of nutriment, to the maceration of the liquids in, and the action of the stomach, or stomachs, of animals. And no provender is wasted, as it is by feeding it entire, either by negligence in servants, or uselessly passing through the viscera. I have strong hopes that the practice of chaffing will be a great relief in this season of comparative scarcity. We are so much accustomed to abundance, that we have never studied or practised the economy which necessity enforces. Three bushels of my chaffed hay weigh a stone, fourteen pounds, and this is enough for a horse, with a common allowance of oats or chopped grain, for twenty-four hours. Very little more will be sufficient for a horse standing idle, without other food. Mr. Jones saves more than the wages of a man in a year, viz. more than seven tons of hay in

the keep of his four horses; for I allow five hundred pounds of hay, including waste, to keep a horse for a month. In the common and careless manner of feeding, this quantity will not do it. So that in an extensive concern, a farmer will be well paid by keeping a hand exclusively for chaffing his long provender. Yet, I believe on common farms his time would not be half occupied in this employment."

I subjoin to this an extract of a letter from Mr. Jones, the gentleman above referred to, addressed to Judge Peters, about the same time. "My attention to feeding my horses, four in number, with cut hay, by measure, commenced in the fall of last year, in consequence of a publication I saw in one of our city newspapers, in which were detailed great advantages that had been derived from adopting that practice. Experimenting on that mode of distributing hay to the number of horses above mentioned, I found, or as nearly as I could calculate, a saving of thirteen hundred pounds per month. I have since extended the practice to the whole of my farm stock of cattle, and believe the saving to be in the same ratio as stated relative to the horses. In addition to this saving, may be added the advantage of an intermixture of cut corn stalks and other descriptions of food that would not be eaten separately, and without being chaffed. My horses and cattle are all healthy, and look well."

The next statement which I shall give, is that of Thomas Williamson, from the Balt. (Eng.) Society's papers, bearing date November, 1812.

"My horses, five in number, have been regularly worked at the plough in pairs. The oxen, four in number, have worked in collars, drawing generally a stout Beaverstone plough, or a large drag and scuffler. Their labor has been constant, and rather severe. As our meadows began to fail us towards the end of September, owing to the quantity of stock upon them, it became necessary to allow the oxen more and better hay. The increased expenditure alarmed me, as the four oxen and five horses consumed no less than four tons within one month. This caused me to prohibit the use of hay in the racks, and to feed all the cattle with chaff, of which a boy can cut sufficient for daily use in two hours. My servants not only ridiculed the change, but, as far as they dared, opposed it in an underhand manner, by various pretexts and evasions. Aided by the care and vigilance of the young gentleman with me, the system of chaff feeding was fully established; and the quantity needed for the horses, and for the oxen, separately, ascertained.

"One hundred weight of hay was found to yield 20 bushels of chaff pressed into the measure, and piled as high as it could safely be carried; consequently each bushel weighed about 5½ lbs. It was found that the five horses would eat twelve bushels of chaff during the twenty-four hours; and that the four oxen would consume an equal quantity in the same time. Ever since the oxen have been fed with chaff only, they have very evidently improved in condition, as have also the horses, although their work has latterly been on heavier soil, and of course more severe than formerly. Twenty-four bushels of chaff, at 20 bushels to the cwt., amount to about 21½ tons yearly; which, deducted from 48 tons, (the quantity we were consuming within the year,) gives a saving of about 26 tons, or more than half.

"I have, however, carried the retrenchment further, by cutting in bean stalks to the extent of about a quarter of the chaff. These being laid uppermost in the cutting trough, keep the hay well pressed, and cause it to be cut more regularly. Thus we now use about 25 cwt. of hay monthly, instead of four tons."

The next statement which I shall give, is Benjamin Hale's account of the saving made by the use of Hotchkiss' Straw Cutter, employed to cut hay and straw as fodder for horses, as given in the Mass. Ag. Reports, vol. iv. p. 400.

Mr. Hale is proprietor of a line of stages running between Newburyport and Boston

The whole amount of hay purchased from April 1, to October 1, 1816, (six months,) and used at the stage stable, was,

tons.	cwt.	qrs.	lbs.
32	4	0	10

At 25 dollars per ton, (the lowest price at which hay was purchased in 1816,) amounted to		$800 00
From October 1st, 1816, to April 1st, 1817, whole amount of hay and straw purchased for, and consumed by, the same number of horses, viz.		

	tons	cwt.	qrs.	lbs.		
Straw,	16	13	3	10	160.23	510 23
Hay,	13	14	1	00	350 00	

Deduct on hand, April 1st, 1817, by estimation, four tons more than there was Oct. 1st, 1816, at $25 per ton,	100 00
Saving by the use of straw cutter, 4 months of the last 6 months, or the difference in expense in feeding with cut fodder and that which is uncut,	389 77
Whole amount of hay used for the horses of the Salem stage, 25 in number, from April 1st, to October 1st, 1816, viz.	

tons.	cwt.	qrs.	lbs.
22	0	0	0

At $30 per ton, (lowest price in Salem,)	660 00
Whole amount consumed by the same number of horses from Oct. 1st, 1816, to April 1st, 1817:	

	tons	cwt.	qrs.	lbs.		
Straw,	15	13	0	0	187.80	268 80
Hay,	2	15	0	0	81.00	

Saving in using chopped fodder five months,		391 20
Total saving in using the straw cutter nine months, viz.		
At Newburyport, 4 mon.	389.77	
At Salem, 5 months,	391.20	
Total,		780 97

The member of the Board of Trustees of the Mass. Ag. Society, to whom the above account was communicated by Mr. Hale. was informed by that gentleman, that he used no more grain from October, 1816, to April, 1817, than was used from April, 1816, to October, 1816."

I shall quote next from the "Complete Grazier."

"Steamed chaff (meaning the refuse of wheat, &c.) may be given to milch cows, with great advantage. For this important fact in rural economy, the Grazier is indebted to the ingenious and persevering experiments of T. C. Curwen, Esq., whose judicious zeal for the improvement of agriculture is too well known to require any eulogy. In giving the steamed chaff to the cattle, 2 lbs. of oil cake are mixed with one stone of chaff, and the milch cows and oxen are fed with it morning and evening, having an allowance of one stone at each time. One great advantage attending this method was, that most, if not all, the milch cows were in such a condition, that, with a few weeks feeding after they were dry, they became fit for the shambles, with very little loss from the first cost. As a substitute for chaff and oil cake, Mr. C. recommends cut hay, which, when steamed, would make a much superior food; and, he entertains no doubt, would greatly augment the milk, as well as benefit the health and condition of the animals. Of this there can be little question; for straw, or even the corn (wheat) husk, which is said to contain more nutriment, can add but little to the product of milk; it may keep some animals from starving, but it will never improve their flesh; and it may be received as an axiom, in feeding all animals, that the value of the food is in proportion to the quantity of nutritive matter contained in its component parts. Bulk is also necessary to sustain the action of the stomach; but it serves no other purpose."

In another place, after referring to Parkinson's account of his horse keeping, before mentioned, the writer goes on to say, "but to have occasioned this great expense, the straw must have been chopped very fine, which is not merely unnecessary, but even objectionable; for mastication will be better effected if the cut rather long; and that operation is of the first necessity as regards the digestion, and consequently the nutriment of the animal. In the south of Europe, more particularly in Spain, where many fine horses are bred, hay is generally unknown; and the straw, upon which, with barley, they are wholly kept, is always given only partially cut as rack meat, and never as chaff. In Kent, however, but more especially in the eastern part of that county, the teams are kept entirely upon short-cut straw and unthrashed oats, given in the manger; the oat sheaves being estimated to produce above seven bushels of grain weekly for a team of four horses; or if clear corn be given, the common allowance is four bushels of oats and two of beans; and some farmers, it appears, neither allow corn nor hay, but give about two hundred weight of beans, with an unlimited quantity of straw, and perhaps a small portion of sanfoin hay cut into chaff."

My next reference will be to some experiments detailed by Sir John Lindain: for though the mode of feeding adopted in England differs materially from that used in this country, they knowing nothing of our Indian corn, and we as little of their horse bean, yet the experiments are, on every account, valuable and instructive.

"Mr. Willan, who is interested in so many stage coaches to and from London, formerly used to consume every year about 10,000 quarters of oats from the port of London, and about 2,000 quarters were bought at country markets, for the horses he kept two or three stages distant from London. Prior to the high prices of last year he allowed his horses as much corn and hay as they would eat; and on an average they consumed 2 pecks or 16 quarts of oats per day, and every 20 horses had a load of 18 cwt. of hay per week. For the last twenty years, with the exception of the two last, the best hay (which it was always necessary to purchase for stage coach horses) might, on an average, be about £5 per load; but last year it rose from £6 to even £10 per load; and oats this year (1812) rose from 20s. to £4 and upwards, per quarter; at which price, if oats had been given in the usual quantity, it would have been impossible to carry on the business of stage coaches. It became necessary, therefore, either to give up that concern, or to hit upon some new mode of feeding horses.

"Beans had formerly been purchased

before the new harvest began, at from £3 to £3 10s. per quarter. In the expectation of beans continuing at nearly this rate, Mr. Willan was led to erect a machine to be worked by two horses, for crushing beans and cutting chaff at the same time; and for some time, he found considerable advantage from the practice; but beans gradually rose in price, until they reached £6 per quarter. Even at that price, however, he finds it of advantage to use *old* beans, mixed with new oats and chaff, in the following manner Having harvested well a considerable quantity of oats, it occurred to him that it would be of use, instead of threshing the corn, (i. e. the oats, H. C.) to cut the straw and oats together into chaff; and now to each horse he gives per day, the following quantities of food, namely: 1 Half a bushel of cut chaff, amongst which there is probably about a quarter peck of oats, but which must vary according to the season, whether favorable to the production of straw or corn, (oats.) 2 Half a peck of crushed old beans; and, 3. Half a peck of new oats. This mode of feeding Mr. Willan considers as healthful for the horse, and enables him to go through the severest labor. The public advantages to be derived from this mode of feeding horses, are of the greatest importance. The expense of feeding horses may thus be considerably reduced, the benefit of which is obvious. Even the hardest working horses may thus be fed either altogether without hay, or with a less proportion of it, which will render it unnecessary to keep such extensive and most valuable tracts of land in a state of permanent grass, when the produce can be so much increased by the use of the plough."

* * * * * * *

"An eminent coach-master in Lancashire, (Mr. Brotherton, of Rainhill,) has likewise favored me with some important information regarding his improved mode of feeding horses. He had been accustomed, from 1802 to 1811, to allow 8 horses, every 24 hours, three Winchester bushels of oats and one bushel of beans, but no hay or chaff. During that period, he lost a great number of horses every year, to the amount of from 14 to 17 on an average, which he attributes to his having given them too much corn, and more than the stomach could digest. This led him to try a small proportion of hay; and he afterwards adopted the following plan:

To every 8 horses he allows one bushel of oats, one bushel of beans, and three bushels of cut hay, and straw or clover mixed, of the best sort that can be purchased, the expense of which he thus estimates:—

One bushel beans,	£0	12s.	0l.
One bushel oats,	0	7	0
Three bushels cut hay, straw and clover,		1	
Expense per day for 8 horses,	£1	0	0

That is 17s. 6l. for each horse per week, besides 5s. worth of hay per week, making the expense of each horse per week, 22s. 6d. A considerable saving thus arises, compared to the feeding wholly with oats, besides a great reduction on the quantity of oats consumed. Mr. Brotherton never crushes his beans or oats, thinking it unnecessary, when the horses get cut clover, hay and straw, mixed with their corn. But he admits before they got that mixture, that the beans and oats often passed whole; and it would certainly be advisable to adopt the crushing plan, more especially with very young or very aged horses, as the necessary machinery can easily be had, attached to a threshing mill. He cuts the hay and straw very short, and gives it a preference to clover, if it has been cut before it has been seeded, and is well harvested. He never threshes his oats, if well harvested, but cuts them in the machine altogether. This, however, renders it impossible exactly to ascertain the difference of expense between the two systems. His horses are now as healthy and able to do their work as ever he knew them; and he has lost only one horse since he adopted the new plan. If he had fed his horses according to the former plan, at the price which corn now fetches, it would have cost him, at best, 1l. 16s. 2d. for each horse per week, but according to the new plan, they only cost, as has been already stated, 1l. 2s. 6d., making a difference of no less a sum than 13s. 8d. on each horse per week, or 35l. 10s. 8l. per annum. Such experiments as these, conducted on a great scale, cannot be too generally known and practised."

"It is well known (continues Lindain) that a bushel of corn, when boiled or bruised, or a hundred weight of hay or straw when cut, will go much farther than when entire. If a horse is compelled to grind or cut these articles with his teeth, the labor occasions a diminution of strength, and the additional time it requires lessens that which might be devoted to repose. It is now generally admitted that the saliva is of less use in promoting digestion, than was formerly believed to be the case; and that this important operation is performed chiefly by the gastric juices of the stomach.—If therefore the nourishment is put into the stomach in a state fit for the gastric juice to act upon it, whether that is performed by machinery from without, or by the teeth within, is of little consequence."

My next statement will be that of William Phillips, Esq. dated Philadelphia. June 10, 1821, and addressed to John Hose Powell, Esq.

"In reply to your inquiry respecting my experiments in the use of corn fodder, and opinion of Eastman's Chaff Cutter, which I have had in operation for some time, I with pleasure communicate the entire satisfaction which both have afforded me. It is hardly necessary to say that the corn is cut before the sap is dry, stacked in the field, the fodder bound in bundles after it is husked, and preserved in as dry a state as possible.

* * * * * * *

Since I have used fodder thus prepared, I have kept from twenty-six to thirty-five head of cattle, besides horses and sheep during the winter, and have used at least ten loads of hay less than when I kept only spring my cattle were in better order than twelve. This usual."

The next statement which I shall quote, is that of Amos Sheldon, Esq., of Beverly Mass., a gentleman with whose character as an intelligent, excellent, and successful farmer, I have the pleasure to be well acquainted.

Beverly, Jan. 25, 1834.

Mr. J. R. Newell,

Dear Sir: It is with pleasure that I comply with your request, asking the result of my experience on the subject of feeding stock. My stock consists of fifty-one head, namely: 8 horses, 4 oxen, 35 cows, and 2 yearlings. This stock was fed in the usual way, with English salt and fresh meadow hay, with meal and potatoes, as their case required, until the 1st of December last, at which time I commenced chopping my hay. In giving my experience, I must in some measure, ask the privilege of a Yankee, viz. that of guessing; but in this case I think I can guess pretty correctly, as much of the hay has been loaded in consequence of having to remove it from one barn to another, and calculating the number of days a load would last, the result is as follows:

700 lbs. of English hay, at $16 per ton,		$5	60
200 " fresh, do.	at $4 do.		40
100 " salt do.	at 8 do.		40
3 bushels corn meal,		2	25
3 bushels long red potatoes,		1	60
Per day,		$10	25
400 lbs. English hay chopped,	at $16 per ton,	$3	20
100 " fresh do.	4 do.		20
100 " salt do.	8 do.		40
3 bushels corn meal,		2	25
1 " long red potatoes chopped,			80
140 gallons pure water,		0	00
1 man at 8 dollars per month,			31
Board of man at $1 50 per week,			23
Per day,		$7	39

Balance in favor of straw cutter, $2.86 cts. per day.

In addition to the above balance may be added an increase of six gallons of milk, and likewise something for the improvement of the condition of my whole stock."

The above statement being in some respects deficient, and especially wanting the exactness which is extremely desirable in such cases, I took the liberty through the columns of the N. E. Farmer, of addressing some inquiries to Mr. Sheldon; and some extracts from his reply, which I here subjoin, will be read with interest.—

"As it respects the queries of H. C., concerning the potatoes, &c., I will here give an account of the whole process. In a central part of my barn, I have a room 18 by 12 feet; this is ceiled with boards, which make it tight and warm. In this room is a pump and a pen 10 by 10 feet, which is made water tight; the hay being chopped and thrown into a heap, outside this room, early in the morning a sufficient quantity is put into the pen to feed the whole stock once, to which is added water enough to moisten it, then meal and potatoes, when the whole is mixed with a four tined fork, until every part of the hay receives its proportion of the meal and potatoes, then it is given to the cattle in baskets. This process is followed three times each day, morning, noon, and sunset. The whole of which is performed, excepting giving it to the cattle, by a man whom I hire for eight dollars per month. In regard to chopping the potatoes, I do not think it is of much consequence, excepting they are more easily and uniformly distributed among the hay, which is of some consequence, as when not chopped the cattle will devour the potatoes first, when I think it is better that the whole should be eaten together."

I subjoin, in the last place, the experiment of a friend, which came under my own observation; a gentleman whose skill and good management in all the departments of his husbandry, entitle him to great respect. I take it from my note book of March last.

Mr. M. R. Clapp, of Westminster, Vt., has now for three weeks kept two horses, two colts, two cows, and five young cattle, from 2 to 3 years old, upon feed prepared thus: 12 bushels of rye or oat straw cut fine and mixed wet with 24 quarts of cob meal. (Indian corn ground on the cob) furnishes the supply for a day. The horses have had a little hay, but two thirds of their living has been from this supply. The cows, since calving, have had a little

hay. The colts had a little hay at first, as this food scoured them too severely; but this, with these small exceptions, constitutes the feed of the stock. The cows were rather thin—the horses, colts, and young cattle, in excellent condition. Three men, in half a day, cut enough to last one week—12 bushels of cut straw weigh about 100 lbs., or 8 lbs. per bushel basket full.

I submit the above statements to the reader, without further comment, being unwilling to extend this long communication. The intelligent farmer will at least find in them strong and encouraging motives for farther experiments. H. COLMAN.

Meadowbanks, January, 1836.

For the New-York Farmer.

AGRICULTURAL CONVENTION—ALBANY.

By H. C.

Agricultural Convention.—We see by the public papers that it is proposed to hold a Convention of Farmers in the State of New-York on Monday, 8th February. Though not resident in the State, we trust we may be allowed to express an earnest hope that it may be fully attended. Our only regret is, that it is appointed for the first, instead of the middle of the week, for which undoubtedly there are good reasons unknown to us; but this circumstance will prevent many persons from being present, whose engagements do not permit their being absent from home on Sunday, ourselves among the number, who would have been glad to have been present as a spectator on the occasion; and have been happy to have seen in person many of the distinguished farmers of this magnificent State, now known to us only by reputation and occasional correspondence. We may be allowed on every account to feel the strongest interest in the agriculture of New-York. The agricultural community is a universal fraternity, and so ought every where to consider itself.—What concerns the agriculture of New-York, equally concerns that of the neighboring States; and the light of her inquiries and improvements pours its beneficent influences upon them. We can only desire that it may be reflected from them with undiminished brightness. The competition of agricultural rivalry is free from all low and corroding passions. It stimulates only a manly and generous emulation, whose effects can be no otherwise than good; and all selfish monopolies are necessarily excluded from it.

What are the particular objects of the Convention, we are not apprized. It must do good, if it be a mere interchange of kind congratulations and sympathies. It will lead to inquiries; it will be likely to elicit and diffuse much important information; it will give to the public mind a higher and juster sense of the importance and respectability of the profession of agriculture; and it will apply new stimulants to enterprise and improvement.

What is to be expected from the Legislature in the way of aid or encouragement, is not for us to conjecture, far less to prescribe. The State, we may say, we trust without giving offence, owes it to itself to foster and encourage its agriculture, as beyond all comparison its most important interest.—In former years it has done much; and the whole agricultural community are largely in debt to New-York for the publication and gratuitous distribution of three large octavo volumes on the subject of agriculture, whose value, in relation to the subjects upon which they treat, is exceeded by no publications of the kind before or since, which have fallen under our notice.

It deserves, however, the serious consideration of the Legislature and the Convention, how much good might be done, by the distribution of premiums for agricultural objects; the invention of labor-saving machines; the introduction of improved foreign stock, and the improvement of our native stock; the increase of crops, and the introduction of new objects of cultivation; and the general cultivation and management of farms. Agricultural enterprise and improvements are in no way so likely to be advanced, and agricultural associations and fairs will fall very far short of their wishes without the aid and stimulus of liberal premiums; and it is obvious and reasonable, where the money is to be expended in the State, and all the advantages are to be realized by the State, that the State should supply the means. With a view, however, of securing as far as possible the proper and judicious management of such premiums, which we consider a sacred and responsible trust, such measures as are adopted in Massachusetts seem highly expedient; where the amount, which each Agricultural Society obtains from the State Treasury, to be bestowed in premiums, depends upon the amount of contribution, which each Society collects from its own members; as for example, where a Society by its private contributions raises a fund of one thousand dollars, the income of which is annually applied in agricultural premiums, there the State bestows two hundred dollars to be applied in the same way, and so on for every thousand dollars contributed. The advantages which have arisen in Massachusetts from the bestowment of liberal premiums have been and continue to be very great; and the return from it to the State has been many thousand fold. It is impossible to say in how many forms it operates, but its effects are constantly apparent.

Another object, which will doubtless occupy the attention of the Convention, is the establishment of an Agricultural School and a Pattern Farm. In the able report submitted to the State Society in 1833 by the Committee of the Society, of which J. Buel, Esq., was Chairman, the importance and utility of such establishment were fully illustrated. We shall not venture to criticise the plans particularly submitted in this report; but with the highest respect for the gentlemen who proposed it, we considered it at the time as too unwieldy an establishment to be brought out at once; and the expenditure required as much too great to expect from the Legislature, if they hold the purse strings of the commonwealth with as close a grasp as their brethren of Massachusetts. We have given much attention to this subject; and are perfectly satisfied that with a capital of from thirty to fifty thousand dollars, and one hundred pupils over twelve years of age, at one hundred and fifty dollars per year, the price of tuition there assumed, every desirable advantage for the most substantial *general* and the most extended *agricultural* education might be secured; after the first year legal interest upon the capital stock be annually paid; and in ten years, or fifteen at farthest, the capital stock itself be entirely paid off; and ample means then would of course remain with the institution itself to extend its advantages to a degree to meet the wishes of the most liberal and enthusiastic: and thus, without subtracting from the funds of the State one dollar, which would not be ultimately returned, if it were thought best to induce the State to become the patron and founder of the institution, an establishment would grow up, which would prove one of its highest ornaments and blessings. At the same time, we should not be willing to expend more than ten thousand dollars in any way that would not be immediately available, so that in case, after an experiment of three or four years, the institution should not be likely to succeed, no great loss would in any event be incurred. We utter these as our deliberate and matured convictions; but we should deem it in these circumstances, with reference to the Convention, an act of indecorum to go farther into detail.

In their unlimited and magnificent resources, the States of New-York, Pensylvania, and Ohio, have the strongest motives to give the most patriotic, generous, and devoted encouragement, to their agricultural enterprise and improvement. May their respective governments, influenced by enlarged and just views of public policy, deal with this great interest with a liberal hand. The labors and successes of their brethren in New-England, on their sterile soil, and under an inclement sky, must be humble indeed; but however much they may distance them in a competition in which it is rashness and presumption for New-England even to enter, yet will their brethren of New-England cheer them onwards in the race of unbounded prosperity, which opens before them; under the delightful persuasion that what is done for their brethren is done for them; that national honor, improvement, and prosperity, are a common stock, in whose dividends all ultimately must share, and that the signal blessings which seem in any case to fall to the lot of any one member, must in the end be enjoyed in a greater or less measure by the whole united confederacy. H. C.

January, 1836.

For the New-York Farmer.

ON THE RHUS COTINUS.

By W. PARTRIDGE.

So rapidly have the arts and manufactures advanced in this country since the year 1811, that our agriculturists have not kept pace with them in raising new articles to supply their creative demands.—This may mostly arise from the want of having such new articles as can be profitably raised by them brought fairly to their notice. I shall, therefore, avail myself of the columns of your paper, to remind them of such materials within their power to raise, as I esteem it their interest to produce.

In such an extensive country as ours, possessing so varied a climate, and every quality of soil, it is highly important we should raise every article that can be profitable to the cultivator.

There are two species of sumach, admirably adapted to our soil and climate, the consumption of one of them, now imported, being more than three thousand tons per annum, and the other never used, for the simple reason that it has never been brought here. The latter is the one I shall now bring to the notice of our farmers, and the other at some future period, when I have time to spare from other active employments. I am induced to give preference to the latter, because being a light and bulky article, it cannot be brought here without paying more freight per ton than the original cost in the countries now supplying it. The expense of transit is probably the cause of its non importation

The Rhus Cotinus, or Venice Sumach, a perennial, deciduous shrub, is an important article in dying. It is known, by workmen in England, as young fustic; the stem and trunk of the shrub, and the root, are bought and employed for dying an orange yellow. The leaves and stalk, when bruised, have an aromatic but acid scent. It bears no berries, and the cultivation will have to be extend d by suckers. It is now used solely as an ornamental shrub, and there is none more beautiful when in blossom, the flower being a bright pearly drab, large and flossy, beautifully contrasting with the deep green leaf. It bears a small black seed, which I am informed will not re-produce. It thrives well in all parts of this country where I have seen it planted, and I have observed it in Massachusetts, Rhode Island, Connecticut, New-York, New-Jersey, Pennsylvania, Delaware, and Kentucky; therefore there can be no doubt of its succeeding, if common care is taken in cultivating it. The trunk and limbs may be cut for use when they are one and a quarter inch diameter, or any larger size, if sound. They should be cut early in the spring, when the bark will easily strip off. When the bark is off and the wood dried, they are ready for market. When cut the inside will show rings of a golden color, and darker, from the heart to the sap; the sap being thick and white.

I would recommend those who are disposed to cultivate this shrub, to plant at first only three or four of them, and extend the cultivation from their suckers. It would be best to plant them round their fields, or near their wood land, where they would not interfere with any of their grain crops. I have seen some of these shrubs in the nursery of Messrs. Downings, near Newburgh, Orange co., and have brought it to their notice as a valuable dying drug.—Those who are disposed to cultivate them should inquire, of the nurserymen from whom they purchase, every particular relative to planting and extending the cultivation.

I have no doubt the consumption would be very large, so large as to keep pace with the supply for many years to come. I believe, from the numerous inquiries made for it, that I could now sell one hundred tons annually, and would be willing to give a liberal price for the first two or three tons brought to market.

Wm. Partridge,
34 Cliff Street, New-York.

We hope the preceding communication will attract the attention of some of our readers who can make an experiment. It is well worth an effort; as it is true, as the writer observes, that the agriculturists of this country have not kept pace in the increase in number of profitable articles of cultivation, with the arts and manufactures.—[Ed. N. Y. F.]

Yield of Carrots.—Mr. Wilson, of the Albany Nursery, sowed last spring a piece of ground 111 feet in length, and 39 broad with carrots, in drills 18 inches apart. The product was 6,321 pounds, topped and freed from dirt. This is at the rate of about 31 tons, or 1,030 bushels, of 60 pounds each bushel, per acre. The ground was first trench ploughed, then well dunged, and ploughed again; unleached ashes were then spread upon the ground at the rate of fifty bushels the acre, the ground well harrowed and the seed sown. The plants were thinned to six inches. Mr. Wilson thinks it would increase the crop, to sow in drills at two feet, and that in this case the crop might be cleaned principally with the cultivator, particularly with Van Burgen's.

Carrots are fine food for all farm stock, and are particularly beneficial to horses, and are considered to be worth for this purpose as much per bushel as oats. At three shillings per bushel, a thousand bushels would be worth $375 00. They are worth at least half this for any kind of farm stock, which would make them still a *very* valuable crop.

The Sap of Plants.—It is a received opinion among the unlearned, and even some of the learned, that all the sap of trees descends to the roots in autumn, and remains there till the genial influence of spring causes it again to ascend. This is disproved by numberless facts which come under our own observation. "Not only do plants," says Chaptal, "prepare all the juices which are essentail to vegetation, and to the formation of fruits; but after having fulfilled those functions, they continue to extract, from the earth and air, the principles of their nourishment; *these they elaborate and deposit between the bark and wood, to serve for their first aliment on the return of spring, till the development of the leaves, and the excitement of the roots by heat, can provide for their nourishment by the absorption of foreign substances.*" The volume and fluidity of this elaborated sap are diminished, in winter, by the absence of heat and by evaporation.

We gave in our last a communication from Mr. Burrows, detailing the uncommon fertility produced by the wool tags and other refuse of a woollen factory. We have another remarkable fact to narrate, in corroboration of Mr. B.'s statements. Mr. Hubbard, of Middletown, Conn., informs us, that he cut *fifteen tons* of hay from three acres of land, at one cropping, which had been brought to this state of fertility, from a low condition, by the sweepings of his woollen factory. Bets having been made by his neighbors on the amount of the crop, the whole was accurately weighed. Mr. H.'s profit at this time may be estimated at $100 per acre—a handsome return for Yankee industry. Chaptal pronounces this manure the most valuable that can be employed.

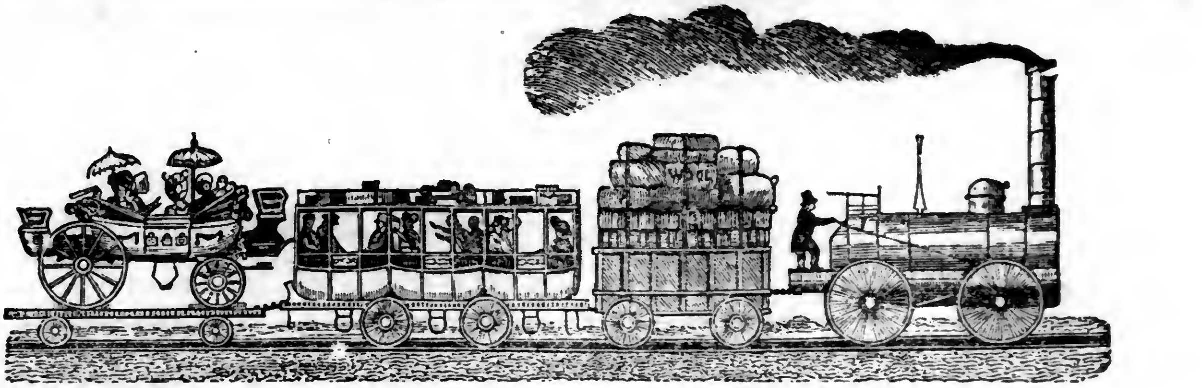
Apple Pomace.—On a late visit to the town of Marlborough, in Ulster county, we found that the Mess. Hallocks, very intelligent and extensive farmers, and withal great cider manufacturers, were husbanding their apple pomace with great care, and feeding it to their milch cows. They begin with small feeds of it, and find that it adds greatly to the quantum of milk. The Mess. Hallocks manufacture their refuse pippins into cider separately, and if the liquor does not retain the peculiar flavor of the fruit, it gives a rich and racy liquor, which commands the first price in market. When we practice making cider from a single species of fruit, and that species affording a rich must, we shall treble or quadruple the value of this product of the farm.

This town of Marlborough, by the bye, has undergone, and is undergoing important changes in the productiveness of her lands. Thirty years ago, when we first knew it, it was one of the poorest towns in the country; its agricultural products were trivial, and its wood-drawing population had much ado to make their ends and means meet. It now verifies the remark we have often made, that where nature has done least, industry and skill are the most active, and most successful, in maintaining good habits and good morals. There is no stimulant so salutary as the habit of depending on one's own exertions.

Cinnamon Fields of Ceylon.—August 31.—Our morning was, as usual on a first arrival, taken up by visits; in the afternoon we drove in Sir E. Barne's sociable, through the far famed cinnamon gardens, which covered upwards of 17,000 acres of land on the coast, the largest of which are near Colombo. The plant thrives best in a poor, sandy soil in a damp atmospher; it grows wild in the woods to the size of a large apple tree, but when cultivated, is never allowed to grow more than ten or twelve feet in height, each plant standing separate. The leaf is something like that of the laurel in shape, but of a lighter color; when it first shoots out, it is red, and changes gradually to green. It is now out of blossom, but I am told that the flower is white, and appears, when in full bloom, to cover the garden. After hearing so much of the spicy gales from this island, I was much disappointed at not being able to discover any scent, at least from the plants, in passing through the gardens. There is a very fragrant smelling flower growing under them, which at first led us into the belief that we smelt the cinnamon, but we were soon undeceived. On pulling off a leaf or twig you perceive the spicy odor very strong, but I was surprised to hear that the flower had little or none. As cinnamon forms the only considerable export of Ceylon, it is of course preserved with great care; by the old Dutch law, the penalty for cutting a branch was no less than the loss of a hand; at present a fine expiates the whole offence. The neighborhood of Colombo is particularly favorable to its growth, being well sheltered, with a high equable temperature; and as showers fell frequently, though a whole day's heavy rain is uncommon, the ground is never parched.—[Bishop Heber.]

The U. S. Government has millions of acres in Florida, which, there is little cause to doubt, would produce as good cinnamon as Ceylon, but which are of no use to any human creature. Would it not be good policy to give a small tract to any suitable person, who would undertake to try the experiment?—[Ed. N. Y. F.]

To Remove Spots of Grease or Pitch from Woolen Cloth.—In a pint of spring water dissolve an ounce of pure pearlash, adding to the solution a lemon cut in small slices. This being properly mixed, and kept in a warm state for two days, the whole must be strained and kept in a bottle for use. A little of this liquid poured on the stained part, is said instantaneously to remove all spots of grease, pitch or oils, and the moment they disappear, the cloth is to be washed in clear water.—[Glasgow Mec. Magazine.]



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, JANUARY 30, 1836. [VOLUME V.—No. 4.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 30, 1836.

☞ In reply to several inquiries in relation to complete sets of the Journal, we would state, that, by reprinting one number of volume 4, we shall be able to complete about thirty full sets—a part of which are sold. Gentlemen who desire a set will do well to apply soon. Price of the *four* volumes, in boards, $15,—including the current year, $20.

In our last, we gave, from the Baltimore and Ohio Railroad Report, a document marked S, from the Report of C. W. Wever, Esq., to which we intended to have called attention. It relates to a subject in which Railroad Companies are deeply interested.

We have received from our friends at Albany, the various reports from the Commissioners in relation to that important work, from which we shall make such extracts as may be of interest to our readers.

In this number will be found tabular statements, showing the amount and cost of the graduation and masonry on the sixth division of the Baltimore and Ohio Railroad.

☞ Should any of our subscribers have a surplus copy of No. 6, vol. 4, 1835, of this Journal, they will confer a favor by sending it to this office; six copies only of that number having been saved from the flames.

Extract of a letter from a gentleman proposing a new route for the termination of the Erie Canal, which we lay before those who are engaged upon the subject.

"I have seen something said of the Erie Canal, and its improvement between Schenectady and Albany, viz: to leave the Mohawk at the former place, and cut through the sand hills to Albany. Would it not be the interest of the State to keep the Canal on the north side of the Mohawk River, from the Lower Aqueduct—which is about three miles above Cohoes Falls—and drop from thence into the Champlain Canal near the city of Waterford? The Champlain Canal can easily be enlarged; the "*spruyts*" of the Mohawk can be dammed, and a slack water navigation made to the city of Troy, for a moderate expenditure in comparison to that it would require to cross from Schenectady to Albany.

"Very respectfully, yours."

TO CORRESPONDENTS.—In reply to our worthy correspondent E. W., we would say that it has been, and still is, our intention to adopt the course he suggests; to the correctness of which a few numbers of the Journal will bear witness—but *that*, with many other good intentions, were knocked so *far* into the month of February, by the late calamity, that we have not yet got a fair view of it. We hope, however, to give hereafter not only a column of CANAL, but of general RAILROAD intelligence also—and will commence with the next number.

From the Rochester Democrat.

RETRACTILE CANAL BRIDGE.—We were shown, this morning, at the office of J. Bassett, Architect, the model of a self-retracting bridge, invented by Mr. EDWIN AVERY, of this city. It is an ingenious application of the principle of the inclined plane in throwing the bridge back to its place, instead of bringing it back by weights and pulleys, as was proposed in a recent invention noticed in this paper. Nothing can exceed this invention of Mr. Avery's, in simplicity of construction, which is so necessary in every work of this kind. If such bridges can in any way be made available on our canals, we think this plan of construction the most feasible. To overcome the friction indispensable in working any such bridge, Mr. Avery has combined the mechanical powers of the *inclined plane* and the *wheel* and *axle*, and we have the opinion of scientific men that there are no difficulties in applying to practical uses this ingenious invention, which may not be easily obviated. We hope all mechanics, and those capable of judging wisely of such inventions, and all in the improvement and convenient use of our public Canals, will call and see the model in Child's Buildings, opposite the Rochester House. M.

A VALUABLE INVENTION.—Dr. McWilliams, of this city, has taken out a patent for a stove for heating carriages of all kinds, which is one of the most valuable inventions which have ever been made. It is remarkable in its structure, and may be sold for six or eight dollars; and it consumes the most inconsiderable quantity of coal. The advantages of such a stove are almost too obvious to be mentioned. Taking up very little room, they may be fitted to the bottom of gigs or chaises, and of every variety of carriage, and are particularly well adapted to Railroad cars. The expense of fuel is not above three cents for a hundred miles travelling, at an ordinary rate. It is only necessary to make this invention known, to secure its introduction very generally. For a trifling expense, a stage driver may now be as comfortably situated on his box, as by the bar-room fire; and the pleasures of sleigh-riding may be enhanced a hundred fold. This stove is now used in the cars of the Baltimore and Washington Railroad, and gives entire satisfaction. The passengers are kept warm during the whole journey, and are never annoyed by smoke—the stove being air-tight. We intend, next week, to publish a drawing and specification of this stove, for the advantage of all who may be disposed to benefit by it.—[Washington Mirror.]

(B—No. 1.)

A Statement, exhibiting the number and length of the sections of the Sixth Division of the Baltimore and Ohio Railroad—the names of the Contractors by whom they were graduated—the quantity of excavation and embankment on each section—the actual cost of each section—the total quantity of earth handled on the Division, and the total cost of the graduation of the Division—accompanying the Sixth Annual Report of Caspar W. Wever, Superintendent. 1st October, 1835.

No. of Sections.	Length of Sections in poles.	Total length of Division. Ms.	Poles.	NAMES OF CONTRACTORS.	Solids in cubic yards. Excavation.	Embankment.	Price, in cents, of the greater solid.	Cost of each Section. Dolls.	Cts.	Total quantum of earth actually handled on the Division.	Total cost of the Division. Dolls.	Cts.	LOCALITY.
1	7878	.	7878	Robert Williams,	3945	3960	36	.	.	.	.	.	
.	.	.	.	Do.	2148	.	100	3573	60	6108	3573	60	This section begins at a point 2 miles and 10 poles above or west of the "Point of Rocks," to which point the graduation was done by the Chesapeake and Ohio Canal Company.
2	19393	.	27271	Johnson Garrett,	11485	11104	30	3445	50	17593	7019	10	This section crosses Poplar and Sugar Tree Branches.
3	18224	1	13495	John Littlejohn,	30829	9818	53½	16493	51	48422	20512	61	This crosses the Greater Catoctin Creek.
4	30303	2	11798	P. Orville Littlejohn,	22740	22770	48½	11053	15	71192	34565	76	This crosses the Lesser Catoctin Creek.
5	31515	3	11313	Matthew Borland,	6613	10597	23	2437	31	81789	37003	07	
6	29700	4	9013	Alexander Stewart,	8854	8424	32	2833	28	90643	39836	35	
7	32715	5	9728	G. W. Higgins,	6548	15407	24	3697	68	106050	43534	03	This section runs through the town of Berlin.
8	30303	6	8031	Robert Kimble,	7598	6698	22	1671	56	113648	45205	59	
9	23030	7	31061	Thos. M. Macubbin,	12767	5686	29	3701	56	126415	48907	15	Passes Garrott's mill.
10	44921	8	11982	David Lemmon,	16893	20465	41	.	.	.	.	.	
.	.	.	.	Do.	.	2619	40	.	.	.	.	.	
.	.	.	.	Thos. M. Macubbin,	.	125	20	9463	25	149614	58370	40	This section crosses the divisional line between Frederick and Washington Counties, and also Israel's Creek, and terminates at a point 2 miles east or below the bridge at Harper's Ferry. From the end of this section to said bridge, the graduation was done by the Chesapeake and Ohio Canal Company.
.	.	.	.	* By sundry persons.	600	.	.	622	94	150224	58993	34	

* Several points of Rocks were removed by Messrs. Littlejohn, Higgins and Macubbin; for which $622.94 were paid—the cubic yards in these points are estimated—all the other work was measured.

NOTE.—If the 2 miles and 10 poles next above the "Point of Rocks," and the two miles next below the Bridge at Harper's Ferry, both of which distances were graduated by the Chesapeake and Ohio Canal Company, be added, then the length of the Division will be 12 miles and 129.82 poles. The total distance from Pratt street, Baltimore, was shown in a former report to be 67 miles 199.16 poles. If to the length of this Division be added the total distance from Pratt street to the "Point of Rocks," then the whole distance from Pratt street to the Bridge at Harper's Ferry, will be 80 miles and 8.82 poles. The graduation between Baltimore and the "Point of Rocks," cost $804,147.40, which, added to the amount shown above, makes the gross sum of $863,140.74.

From the Journal of the Franklin Institute.

On the Transport of Heavy Burthens upon Ice. By THOMAS JEFFERSON CRAM, Prin. Assist. Prof. of Nat. and Exp. Philos., U. S. Mil. Acad.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—Having seen an account of the following experiments on the resistance of ice, by Assistant Professor Cram, I deemed it of sufficient interest to your readers to request from him permission to publish it. He has kindly furnished the following abstract, which is transmitted for publication. Very respectfully, yours,

A. D. BACHE.

West Point, Oct. 7th, 1835.

Dear Sir,—For ordnance purposes, it became necessary, on the 13th of January, 1835, to transport a heavy piece of artillery (an iron 24 pounder) across the Hudson, from West Point to Cold Spring Foundry. To insure safety, two ox sleds were connected, one after the other, and upon which two timbers were longitudinally placed and secured; between these timbers, the gun, previously dismounted from its carriage, was swung, by resting its trunnions upon them, at such points that the whole pressure was distributed, as uniformly as possible, upon the ice which sustained it. A pair of horses were attached to another sled, which was connected with the foremost of those before named, by a rope about thirty feet in length.

The ice over which the gun was taken, had been chiefly formed during that intensely cold week, (in January, 1835,) when the mercury in Fahrenheit's thermometer ranged, here, between $-2\frac{1}{2}$ and -15. The effects of the pressure upon the ice were carefully observed, by myself, along the entire route, and were such as to induce the belief, that an idea of its strength could be formed with sufficient certainty to be of practical utility, in all cases where the safety of transporting any load upon ice might be jeoparded.

The ice was drilled through, and its thickness measured, to a tenth of an inch, at intervals of two hundred paces and less, along the whole extent of the track. From the place of departure, to the channel of the river, the thickness diminished from 16.5 in. down to 8 in., and no signs of cracking or bending were observed in the ice—the horses going at the rate of about four miles an hour. Across the channel, the thickness increased from eight inches to twelve inches, and no evidence of breaking or bending was exhibited,—the load moving with a speed of about eight miles an hour. From the west edge of Cold Spring flats, to the vicinity of the entrance of a creek, the thickness varied from 12 inches up to 15.5 inches, and no indications of yielding were perceived, the horses going at a gentle trot. Near the entrance of the creek, for an extent of fifty paces, the average thickness of the ice was only 5.56 in., and it was covered with a sheet of snow water, two inches in depth. This fifty paces of ice was observed to bend so much under the gun, that I was very apprehensive of its breaking; indeed, had the load been stopped for a few seconds only, it undoubtedly would have gone to the bottom. The depression along here was at least two inches, and the flexure of the ice under the foremost of the sleds, bearing the gun, was less than that under the hindmost, owing to its being weakened

by the former, ere the latter came upon it. On crossing this weak spot, the horses had become so much fatigued, and the resistance increasing, by being drawn up the inclined surface of the bending ice, that, with much whipping and shouting, they were barely urged to drag the gun safely over, at a velocity of about four miles an hour.

To determine the pressure sustained by a given superfices of the ice under consideration, it is to be remarked, first, that, from the dimensions of the bottom surfaces of the four sled runners under the gun, the whole surface of ice in contact with these bottom surfaces, at the same time, was 6.458 square feet. 2d, That the weight of the gun is marked 5579 lbs., and the sleds supporting it, together with the timbers, lashing chains, wedges, blocks, &c., weighed, in all, 1624 lbs., one sled weighing as much as the other. 3d. That the horses and their sled were so far in advance, the pressure arising from this cause may be neglected, inasmuch as it did not act at the same time, and upon the sane ice, with that arising from the gun.

Therefore, the whole pressure sustained by the 6.458 square feet of ice, at the same time, was equal to 5579 + 1624 lbs., or equal to 7203 lbs.; and admitting, what was very nearly the truth, that the pressure was distributed uniformly, and dividing 7203 by 6.458, we shall have 1115.361 lbs., for the pressure sustained by each square foot; at all events, 1115.361 lbs. will be the *average* pressure sustained by a square foot of the ice.

From the observed effects upon the fifty paces of ice at the entrance of the creek, one can form a pretty accurate estimate of the *least* thickness upon which we can *safely* bring a pressure (of 1115.361 + 10) equal to 1125.361 lbs., (the ten additional pounds being the allowance for the covering sheet of water.) It is evident that the ice will *not be safe*, if its thickness be not above 5.56 inches.

From the foregoing facts, which were obtained with the greatest care, it may be inferred, 1st, That a load may be transported with perfect safety over sound ice, eight inches in thickness, by distributing the entire weight of the system, so that each square foot (in contact with the bottom surfaces of the runners) shall experience a pressure of not more than about 1115 lbs. 2d. That a load *cannot be safely* transported over sound ice, 5.56 in. thick, when the weight is so distributed, that each square foot of surface (in contact with the bottoms of the runners) shall experience a pressure so great as about 1125 lbs.

PROGRESS OF THE IRON RAILROAD SYSTEM IN GERMANY.—The road from Nuremberg to Furth will be opened this month; and from Dresden to Leipsick is in construction; that from Cologneto the Belgian frontier will probably be commenced immediately after the next meeting of the shareholders, which is fixed for the 25th instant. For those from Elberfeld to Roer, and from Elberfeld to Dusseldorf, subscriptions are opened. That from Minden to the Rhine is under consideration. Its importance, in a military point of view, leaves no doubt of its being shortly undertaken. It will unite the Weser with the Lippe, and will join the Rhine in two places (Dusseldorf and Deutz) opposite Cologne. That from Berlin to Potsdam is decided upon, and will serve as a model for the other Rail-

(B—No. 2.)

An Exhibit of the Masonry on the Sixth Division of the Baltimore and Ohio Railroad, showing the names of the Contractors by whom it was constructed—its character—the quantum and cost on each section—and the total quantum and cost on the Division—accompanying the Sixth Annual Report of CASPAR W. WEVER, Superintendent. 1st October, 1835.

		CULVERTS AND DETACHED WALLS.							ARCHED OR BRIDGE MASONRY.									Total quantum and cost of all kinds of Masonry on the Division.				
No. of Section.	Names of Contractors.	No. of perches of 25 cubic feet.	Price per perch.	Cost on each Section. Dolls.	Cts.	Total No. of perches on the Division.	Total cost on the Division. Dolls.	Cts.	No. of Vents.	Size of each vent in feet.	No. of perches of 25 cubic feet.	Price per perch.	Cost on each Section. Dolls.	Cts.	Total No. of perches on the Division.	Total cost on the Division. Dolls.	Cts.	Quantum.	Cost. Dolls.	Cts.	Notes.	LOCALITY.
1	Robert Williams	3.128	1.50	4,692	.	3,128	4,692	.	.	.	.	.	.	.	.	.	.	3,128	4,692	00		
2	Do.	371½	2.75	1,036	74	3,499½	5,728	74	1	12	495¼	3.19	1,579	85	495¼	1,579	85	3,994¾	7,308	59	1	× Sugar Tiee Branch.
3	John Littlejohn	.	.	.	.	3,499½	5,728	74	2	50	3,651	7.75	28,295	25	4,146¼	29,875	10	7,645¾	35,603	84		
4	Charles Wilson	.	.	.	.	3,499½	5,728	74	1	15	525¼	4.00	}		}	}		}			2	× Claggett's Branch.
.	Do.	.	.	.	.	3,499½	5,728	74	1	20	1,431½	4.00	} 7,932	.	} 6,103	} 37,807	10	} 9,602½	43,535	84		× The Lesser Catoctin Creek.
.	P. Orville Littlejohn	146½	1.87½	289	69	3,646	6,118	43	.	.	.	.	.	.	6,103	37,807	10	9,749	43,825	53	3	
5	Do.	262	2.05	537	10	3,908	6,555	53	.	.	.	.	.	.	6,103	37,807	10	10,011	44,362	63		
6	Alexander Stewart	288½	3.00	865	50	4,196½	7,421	03	.	.	.	.	.	.	6,103	37,807	10	10,299½	45,228	13		
7	G. W. Higgins	401½	2.75	1,104	12	4,598	8,525	15	.	.	.	.	.	.	6,103	37,807	10	10,701	46,332	25		
8	W. B. Wheelock	212¾	2.45	521	24	4,810¾	9,046	39	.	.	.	.	.	.	6,103	37,807	10	10,913¾	46,853	49		
9	Do.	326¼	1.85	603	56	5,137	9,649	95	.	.	.	.	.	.	6,103	37,807	10	11,240	47,457	05		
10	Charles Wilson	798½	1.87½	} .	.	.	} .	.	1	25	1,161¼	4.00	4,645	.	7,264¼	42,452	10	} .	.	.	4	× Israel's Creek.
.	Thos. M. Macubbin	324	1.50	}			}		.	.	.	.	.	.	.	.	.	}				
.	David Lemmon	13	1.87½	} 2,027	19	6,272½	} 11,677	14	.	.	.	.	.	.	7,264¼	42,452	10	} 13,536¾	54,129	24		

NOTES—1. In the cost of the Culverts, the sum of $15.12 extra is included. 2. The Bridge of 15 feet span across Claggett's Branch, has a flat superstructure of wood, the cost of which, viz. $75, and also the sum of $30 paid P. O. LITTLEJOHN, for depositing stone around the abutments for the security of their foundations, are included in the sum of $7,932, stated as the aggregate cost of that Bridge, and of the one across the Lesser Catoctin Creek. 3. In the cost of the Culverts, $15 extra are included. 4. In the cost of the Culverts built by CHAS. WILSON, the sum of $19.62 extra are included.

ways in Germany. It will be laid by the best engineers of Berlin. For the Roads from Berlin to Leipsick, from Berlin to Magdebourg, and from Magdebourg to Leipsick, subscriptions of 14,844,400 francs have been received, and they will be encouraged by the Prussian government. The projected Railroad from Berlin to Stettin is favored by the hereditary Prince of Prussia. The following are under consideration:—From Hanover to the Elbe—from Bremen to Hanover—From Stuttgardt to Carmstadt—from Frankfort to Mentz—and from Mannheim to Basle. That from Neustadt, in Holstein, to Altona, has been decided upon by the Danish government. In Austria, two gigantic undertakings are in contemplation—a Road from Vienna to Lemberg, in Galicia, and another from Vienna to Trieste, in the Gulf of Venice. The first will have to run in a direct line, by the map, 100 Belgian leagues, of 20 to a degree, and the second, a distance of 60 leaguss.—[Paris Advertiser.]

For the Railroad Journal.

No. II.

Intelligent citizens of New-York, have you the map of New-York, New-Jersey, and Pennsylvania before you? Place one end of a piece of tape at Buffalo—extend it to New-York city—observe! The tape runs over, and nearly covers the whole line of the Susquehannah River from Bath down to Pittston. Do you see how exactly in a line from your city to Buffalo the Susquehannah lies? Does it not run as if nature had placed that stream in its actual position to cut through the chains of mountains that intervene, on purpose to enable your State to make a railroad along its banks to connect your city with the Lakes? From Bath, a railway, it is believed, might be made to Pittston so easy and regular in its descent that cars could come all the way by their own gravity, if this were desirable.

To some, what I am about to state is probably known: to others it may be news; and if they have a lively interest in the growth of New-York, it cannot fail to be interesting news. Already a charter had been obtained for making a railroad from Elizabethtown to the Pennsylvania line, pointing towards Pittston. [Without professing to understand the thing minutely—the ground, the obstacles, &c.—it would appear to me the route surveyed is too crooked; but this must be looked into.] From the Pennsylvania line another charter had been obtained for a railroad to Pittston. A railroad had been, for several years, authorized, from Pittston along the Susquehannah up to the New-York State line. Now for the interesting fact:—Last fall, gentlemen of honor, worth, and character, came forward by their agents, took up stock enough to secure the charter of the last named road, deposited ten thousand dollars, and got the charter. So that now the charters actually exist for a continuous line of railway from opposite your city, through the anthracite coal region of Luzerne, at Pittston, along the Susquehannah, to the New-York State line, in a direct course to Buffalo. I suppose I need not say that when you reach New-York State at Newtown, you may go on northerly to Buffalo, or westerly to Portland, or both. I need hardly tell you that this route, besides passing through the anthracite coal region at Pittston, from whence coal will be sent both ways, is about SIXTY MILES nearer than any other practicable, between your city and Lake Erie.

My purpose has been, in the briefest space possible, in two short numbers—so short that every intelligent man, however hurried, might take time to read—to place the subject in a general view before you.

Now, Mr. Minor, we want from some writer who has leisure and ability, this subject taken up in a course of numbers, and fully set forth in all its details and ramifications:

1st. The extent and importance of the trade between New-York and Lake Erie, and the intervening country, in which the growth of the country around the upper Lakes, Erie, Huron, Michigan, Superior, and those vast inland seas, should be fairly considered.

2d. The railroad—its directness; the rapidity of passenger cars; the expedition of burthen cars; the time required for merchandise to pass from New-York to Buffalo or Portland by this route; and the circumstance that the railroad would be open the whole, or nearly the whole year.

3d. The coal trade, both ways, always and every where profitable, reducing therefore the cost on the carriage of merchandise, and giving to your city great advantages in the trade of the north-western Mediterranean.

4th. The cost of construction; the necessity for immediate action; how much the State ought to subscribe—how much the City Councils—how much the citizens of the city—how much the inhabitants on the route—and whether the United States any thing.

Together with such other considerations as should present themselves.

CLINTON.

The following charter appears to have been framed in accordance with the recommendation of Mr. Schermerhorn, whose letter we published in our last. It is worth a careful perusal.

Extract of a letter received by the Ivanhoe, dated

"TUSCALOOSA, Jan. 7th, 1836.

"The bill creating a Bank, to be located in Mobile, with a capital of five millions of dollars, (two fifths of which is reserved for the State,) as passed by the House, was passed in the Senate to-day. It only requires the signature of the Governor to become a law. The 'Life Insurance and Trust Company' bill has passed the House of Representatives, and will, this evening, no doubt, pass the Senate. The Capital is one million of dollars. A bill has passed, finally, increasing the capital of the Branch of the Bank of the State at Huntsville five hundred thousand dollars. A bill has also passed the Senate, to increase the capital of the Branch at Mobile one million nine hundred thousand dollars, and the Branch at Montgomery, seven hundred thousand dollars, which will be passed by the House, no doubt, this evening. *Three millions more to be placed in our Banks,* for the purpose of making a Railroad. A bill has passed the House of Rrepresentatives, almost entirely abolishing taxation."

The vote in the Senate upon the passage of the Mobile Bank bill was 18 to 11.

Section 2. And be it further enacted, That the Capital Stock of said Company shall be three millions of dollars, in thirty thousand shares of one hundred dollars each, to be subscribed for by citizens of the State of Alabama, and by them only.

Sec. 3. And be it further enacted, That the above named Commissioners, or a majority of them, as soon as practicable, after the passage of this act, shall cause books to be opened at the Court House in each county in this State, for the purpose of receiving subscriptions to the capital stock of said company, after having given notice thereof, in all the principal newspapers published in this State, at least thirty days: and upon the opening of said books, they shall be kept open for twenty successive days, (Sundays excepted) from 10 o'clock A. M. until 2 o'clock P. M., upon the expiration of which time, the books shall be closed, and on closing the books should the subscriptions amount to ten thousand shares, or upwards, the above named Commissioners shall constitute and form a Board of Directors, to manage and conduct the affairs of said Company, for and during the space of one year, and until the arrival of the period of the annual election by the Stockholders, and a new board be duly elected; that the said Directors, together with the subscribers and those who may hereafter become associated with them, their successors and assigns, shall constitute a body corporate, and they are hereby incorporated, under the name of the Mobile and Tennessee Railroad Company. * *

Sec. 4. And be it further enacted, That the subscribers for the stock shall, at the time of subscribing, or as soon thereafter as may be thereto required by the Commissioners or Directors, present to them the titles of the property upon which they have subscribed for Stock, and which they propose to mortgage for that purpose, in order that the same may be examined by the Counsel of the Company, and reported upon, previous to the distribution of the Stock.

Sec. 5. Be it further enacted, That the Governor shall appoint three Appraisers in each county in the State, who shall be resident freeholders, whose duty it shall be, on application of any person interested, who may have subscribed for Stock, to repair to the place within their respective counties, and make a fair cash estimate of the property of such subscriber, reduce the same to writing, specifying the kind and descrip-

tion of the property clearly; and the said appraisers, or a majority of them, shall assign the same, and shall append thereto their oath, that the same is a just estimate according to their best judgment; which appraisement shall be delivered to the party interested, to be by him transmitted to the Commissioners or Directors, (as the case may be) and each appraiser shall be entitled to receive from every such applicant, for whom they shall make such appraisement, the sum of one dollar each, and the additional sum of three dollars for every twenty miles they may travel in going to and returning from such appraisements, and should any appraiser resign, die, or refuse to act at any time before the duties assigned him by this act shall have been completed, his place shall be forthwith filled by the Governor.

Sec. 6. And be it further enacted, That upon closing of the books of subscription, should the amount subscribed be sufficient to organize the Board of Directors, they may proceed to distribute the stock, and receive the mortgages from subscribers, and issue their stock certificates. Provided, that such mortgages shall not be taken on any other than real estate. The mortgages shall be taken for double the amount of the stock taken by each subscriber, and shall be given to secure the payment of the principal and interest of the bonds which may be received by the Company from the State under their charter. And the mortgages shall be in such form as the Governor of the State and Attorney General shall prescribe, and shall be made to the Governor for the time being and his successors in office. Upon the first opening of the Books as aforesaid, should the amount subscribed exceed the amount of the capital stock or thirty thousand shares, the same shall be reduced to that number by striking off from the largest number of shares in any one subscription until the reduction is effected. Provided, that five thousand shares of the capital stock of this Company shall be reserved to the corporate authorities of the city of Mobile, and for which the State shall not issue their bonds.

Sec. 8. And be it further enacted, that upon the stocks being taken and justly distributed, and the mortgages given and duly recorded, and the certificate deposited in the State Bank, the Governor shall, upon the application of the Directors, or a majority of them, issue the bonds of the State for the amount of said capital stock, in sums not less than one thousand dollars each, payable to the Company twenty years from date, drawing interest at five per cent. per annum, payable semi-annually, in the following form:

"To wit:"

"One Thousand Dollars."

"Know all men by these presents, that the State of Alabama acknowledges to be indebted to the Mobile and Tennessee Railroad Company in the sum of One Thousand Dollars, which sum the said State promises to pay in current money of the United States of America, to the President and Directors of said Company, on the in the year with interest at the rate of five per cent. per annum, payable half yearly at the place named in the endorsement hereon. To wit: on the of every year until the payment of said principal sum.

"In testimony whereof, the Governor of the State of Alabama has signed, and the Treasurer has countersigned these presents, and caused the seal of the State to be affixed thereto, at Tuscaloosa, the Seat of Government, this in the year of our Lord

Governor.

Countersigned, Treasurer."

The said bonds shall be transferable by the endorsement of the President of said Company to the order of any person, or to bearer; and the said endorsement shall fix the place the said interest and principal of said bonds shall be paid by said Company as the same shall become due and payable.

Sec. 9. And be it further enacted, that in order to secure the State in the payment of the interest and principal of the bonds, by the Company according to the provisions of this charter, all the mortgages given by the stockholders, amounting to double the amount of the bonds aforesaid; and also the road constructed by the Company, with all its fixtures, shall remain pledged to the State until the entire extinguishment of the bonds shall have been effected, or satisfactorily provided for, and no transfer or release of said mortgages by the Company shall be valid, except such as are herein provided for.

Sec. 10. And be it further enacted, that in order, farther to insure the payment of said bonds, interest and principal, as the same shall become due on the part of the said Company, the entire nett profits of said roads, as the same shall accrue, shall be deposited in the State Bank of Alabama as a sinking fund, to be applied exclusively to the payment of the bonds aforesaid. And no distribution of dividends shall be made among the stockholders until said funds shall reach the amount of the aforesaid bonds. That the said Bank and Branches shall allow the said Railroad Company an interest upon such deposits of five per cent. per annum, which shall be payable semi-annually, and if not drawn for, shall become principal as the same accrues. The funds also arising from the sale of the State bonds shall also be deposited with said Bank and Branches, to be drawn for, however, by the Company as the same to be required in the construction of the road and works thereto appertaining. And whenever the said Company shall deposit money specially for six months or upwards, the Bank and Branches shall pay like interest thereon as is provided for in regard to the sinking fund.

Sec. 12. And be it further enacted, that no mortgages shall be received upon any buildings situated upon city or town lots, unless such buildings be insured by the owners and the policies be transferred to the Governor of the State of Alabama and his successors in office, and should the policies not be regularly renewed and transferred as aforesaid, the stock taken upon such buildings shall be forfeited to the Company, to be disposed of as is provided for in the eleventh section of this act.

Sec. 13. And be it further enacted, that should the Company fail, neglect, or refuse to pay the State bonds aforesaid, interest and principal as the same shall become due and payable, this charter shall be forfeited and the mortgages which have been taken for stock, shall enure to the benefit of the State, and the property mortgaged may be proceeded against, seized, and sold for the amount of said bonds, or such portion thereof as the Company may have failed to pay. Provided, however, that the road hereby authorized to be constructed, with all its fixtures and appurtenances thereunto belonging, shall be held first liable for such defalcation, and may be proceeded against, seized and sold, under the pledges contained in this charter, or such portion thereof as may be necessary to meet such defalcation.

Sec. 17. And be it further enacted, that at the regular annual meetings of the stockholders of said Company, it shall be the duty of the President and Directors in office for the preceding year to exhibit a clear and distinct statement of the affairs of the Company under such penalties as may hereafter be provided by law. And also at any called meeting of the stockholders a majority of those present may require similar statements from the President and Directors, whose duty it shall be to furnish them when thus required, and at all general meetings of the stockholders, a majority in value of all the stockholders in said Company may remove from office any President or any of the Directors of said Company, and may appoint others in their stead, but this power shall not extend to the removal of any Director appointed on the part of the State. Nor shall any thing be construed to authorize the State to continue their appointment of Directors, after the extinguishment of the State bonds are made, or are provided for to the satisfaction of the General Assembly. But thereafter the whole number of Directors shall be chosen by the stockholders, as provided for in the fifteenth section of this act: Provided, however, that whenever the dividends of said road, deposited in Bank, shall be equal to the amount of the bonds issued by the State, the property hereby mortgaged to secure the State, shall be released, and the stockholders be entitled to all the interest and benefits of said road, as if no pledge or mortgages had been given.

Sec. 19. And be it further enacted, that the President and Directors of said Company shall be, and they are hereby invested with all rights and powers necessary for the construction, repair, maintenance, and use of a Railroad from the city of Mobile, or from any navigable point on the waters of Mobile Bay, (provided that said road shall not cross the Tombecbee river above McCrew's shoals,) to some point on Tennessee river, thence north to the Tennessee line. The said road not to exceed one hundred feet in width, with as many sets of tracks as the President and Directors may deem necessary: Provided, however, that in passing hills or vallies, the said Company may be author-

ized to extend said width, in order to effect said object, and the said President and Directors, or a majority of them, may cause to be made or constructed, or contract with others, for making said Railroad or any part thereof, and they, their agents, or those with whom they may contract for making any part of the same, or their agents, may enter upon, and use, and excavate any land which may be wanted for the purpose of said road, as well as in the erection of ware-houses or other works necessary for said road, or any other purpose necessary or useful in the construction and repair or maintenance of said road or its works, they may build bridges, viaducts, and may lay rails, take and use any timber, earth, gravel, stone, shells, or other materials, then being in their natural state or condition, that may be wanted for the construction, repair, or maintenance of any part of said road or any of its works, and may make and construct all works whatever, which may be necessary and expedient for the proper completion of said road and its successful operation: Provided, however, that if the said road should cross any navigable stream, canal, or other water course, the said road shall be so constructed and arranged as not to obstruct the free navigation thereof, and it shall and may be lawful for this Company to extend a Railroad or roads to any point within the incorporated limits of the city of Mobile, with like rights and privileges: Provided, always, the said Railroad shall be so constructed as not to prevent the use of travelling on the streets: And provided, also, that said road shall not pass through any of the streets of said city, without the consent of the corporate authorities thereof first having been obtained, and that if this Railroad is not commenced in two years and completed in ten years after the receipts of the proceeds of the State bonds, so as to transport freight and passengers throughout its whole extent, unless further time shall be granted by law, this charter shall be forfeited, and the stockholders shall forfeit and pay to the State of Alabama, the sum of two hundred thousand dollars, which shall be recovered on motion in the Circuit Court in any county within this State: Provided, however, that the President and Directors shall first complete said road north of the point at which it shall strike the navigable waters of the Mobile Bay.

Sec. 20. And be it further enacted, that the said President and Directors shall be authorized to contract for and receive conveyances for any land, stone, gravel, or other materials henceforth, which may be necessary and required in the construction of said Railroad, and when the owner and the Company cannot agree, or when the owner is an *infant* or *non compos mentis*, then it shall be lawful for said President and Directors to apply to any Justice of the Peace for a warrant directed to the Sheriff of the county, commanding him to summon a jury of seven disinterested freeholders, a majority of whom shall be authorized to assess the damages under the same rules and regulations now established by law in cases of other roads; said jury shall forthwith assess the value of said land, stone, gravel, or other materials, &c., subject to the right of an appeal to the Circuit Court by either party who shall think themselves aggrieved; when the trial shall be *de novo*, by a jury as in other cases, and the Sheriff shall return the same to the office of the Clerk of the County Court of the proper county, and at the next term of the Commissioners' Court, the same shall be affirmed, if no objection, and if the Court shall set the same aside, said Court shall order a new writ, and an assessment made in pursuance thereof, shall be final, and the land, stone, gravel, lumber, &c., so contracted for or condemned, shall enure to the said Company, upon the payment of the said money to the persons contracted with, or into Court, as the case may be; and the whole proceedings shall be entered on record in said Court at the expense of said Company: Provided, however, that the said work shall in no wise be delayed on account of the proceedings had as aforesaid, but the said Company, on tendering the amount to which the land, stone, gravel, or timber shall have been valued, to the owner, or depositing the same in the office of the Clerk of said Court, may proceed with the work as if there had been no appeal: And provided, also, that no right shall exist in said Company to pull down or remove any dwelling house, without the consent of the owner thereof: Provided, that in all cases when it shall become necessary to assess the value of property for the use of said Railroad Company, the jury trying the same shall take into consideration the advantages and disadvantages for and against the individual or Company, and render a verdict in accordance thereto.

Sec. 21. * * * And be it further enacted, that the Company shall have power to place on any railway, constructed under this act, all machines, locomotive, vehicles, cars, or carriages of any description whatever, which they may deem necessary or proper for the purpose of transportation on said road, of goods, produce, merchandise, or other property and passengers, at such rates as the Company shall think proper to fix: Provided, however, that the rates shall be so fixed as not to allow annual dividends upon the nett profits of more than 15 per cent. per annum, from the time the money upon the State bonds is received; and the said road or roads, with all their works, improvements, and profits, and all the machinery of transportation are hereby invested in said company, incorporated by this act, and their successors forever. The capital stock of said company shall be forever exempt from taxation, and all their other property of every kind and description, necessary for said work, including the road and rails, shall be exempt from taxation for and during the period of fifty years from the passage of this act, but no longer.

Sec. 22. And be it further enacted, that after the payment of the State bonds shall have been provided for, the Board of Directors shall annually or semi-annually, declare and make such dividends as they may deem proper of the nett profits arising from the receipts of said Company, after deducting the necessary, and current, and probable contingent expenses thereof.

Sec. 24. And be it further enacted, that the Board of Directors of said Company are hereby empowered to accept from any other State such powers and privileges as may be offered to said Company for the continuance of their road within their limits.

Sec. 26. And be it further enacted, that at the expiration of fifty years from the completion of said road the State of Alabama shall be authorized to take the whole of said work as the property of the State, upon the payments to said company of the actual cost of said road, and other property belonging to said Company. If the State of Alabama should so elect to do, within one year after said term, and if the State should not elect so to do, the said charter shall stand renewed for ten years from the expiration of said fifty years; and at the expiration of said term of ten years, the State shall again have the same privilege; and if not taken at the expiration of ten years, the right is hereby reserved to the State successively for every five years, from term to term; and if not taken the charter shall stand renewed to said company.

Sec. 27. And be it further enacted, that the President and Directors of said Company shall be and they are hereby invested with all rights and powers necessary for the construction, repair, maintenance, and use of a Railroad, branching from the main route at some convenient point, running in the most eligible route towards Brown's Ferry above the Suck, on the Tennessee river; and they shall also have power and authority to connect said last mentioned road with the Alabama river at the most suitable point, to be designated by the Company; and said branch roads shall be subject to all the provisions provided for the construction of the main route: Provided, that the Legislature shall have the right to authorize any other company to construct the road contemplated by this section.

We subjoin an interesting account of the London and Greenwich Railway. The idea of a viaduct instead of embankment, or of the more old fashioned way of conforming as nearly as possible to the surface of the ground, is novel, and the plan of turning the arches into offices, houses, &c., droll; but the calculations in regard to the income to be derived from renting such offices, &c. is most extravagant. A house without a chimney, and with an everlasting rumbling of locomotives overhead, is not the most desirable location for a man of business or leisure.

From the London Mechanics' Magazine.

THE GREENWICH RAILWAY.—This Railway, it is well known, is to proceed

from near the foot of London Bridge on a viaduct 22 feet high, supported by about 1000 arches, to Deptford and Greenwich. In so short a distance as 4 miles, great differences in the under soil were hardly to be expected. However, substrata of clay, gravel, sand, peat, bog, and floating land, seem to have presented themselves in luxuriant variety, the best soil often in juxta-position with the worst. But with these the engineer has successfully contended, so that it would require a professional eye to discover any effect of settlement out of 575 arches already built.* In general, the arches are segments of circles; but almost every species of arch in use, except the Gothic, is pressed into service as circumstances need. The eye is occasionally arrested by an arch commencing with the segment of a circle, and when looked through, presenting a parabola or part of an ellipse. Professional men well know the difficulties of such oblique structures, yet, as far as I could perceive, there was no deficiency of symmetry or regularity, while the transition of figures seized the mind with its pleasing effects.—The prevailing character of the work may be summed up in uniform neatness and strength without heaviness.

For the purpose of additional security, cross walls are built between the arches, over which the rails are to lie for the trains, and the intervals are filled with concrete.—By this means the mass is rendered one solid piece, and the weight of the carriages is spread over a large space.

It seems to be a favorite maxim with Colonel Landmann, the engineer, that wherever the lead is long, a viaduct is generally more economical than an embankment. Without implicitly subscribing to this doctrine, in which there is often more truth than some civil engineers are willing to admit, it is evident that embankment in the Greenwich Railway would have been little short of insanity. Putting out of the question the enormous expense of forming it where all the materials have to be raised to the embankment, not to be drawn out on a level, and of the additional ground to be purchased, both for the embankment and materials; setting, I repeat, all this aside, together with the immense rental which must ultimately result from nearly 1,000 manufactories, shops, houses, and warehouses, into which the arches are being converted, it is probable that long before such an embankment of 22 feet high could settle into a road fit for locomotive travelling, the Colonel's viaduct will be finished, and likely enough return a large portion of the capital expended.

At the Deptford end several of the arches are now occupied by the Company for smiths', carpenters', and other shops, which must obviously be a great saving to the concern. One or two of the arches are also tenanted as public houses. Over two made into two five-room private houses, I have been, and I must confess, contrary to my expectations, I found them comfortable, roomy, and compact. The inconvenience I anticipated in my former communication from smoke, is removed by the use of gas stoves, with which the houses are furnished. In the neighborhood of London many of these arches will doubtless be let for offices, vaults, and warehouses. I have heard that 500*l.* per annum have already been offered for some between Joiner-street, and the bridge terminus. At all events, it will be the managers' fault if ultimately they do not turn in a large revenue. It is said there will be about 1000 of them, which some calculate will fetch 30*l.* per annum each; or, on the whole, a rental of near 30,000*l.* per annum. But suppose only 900 of them let, and at 20*l.* each, the rental will be 18,000*l.* per annum, or 2,000*l.* annually more than the interest of the whole capital (400,000*l.*) at 4 per cent.; a tolerable argument that the engineer had here good reason for preferring his viaduct to a profitless embankment.

* Lest my friend Sir John Rennie should again hazard an expression that I am "unacquainted with the engineering details," I must here beg to observe, that a few of the piers on each side of the abutments supporting the elliptic arch over Earl's sewer, nod a little towards the sewer, from a circumstance of which it is unnecessary to go into the "engineering details," but I will if Sir John wishes it.

The following evidence of Dr. Lardner on the "Great Western Railway Bill," will be found to contain many items of interest and amusement to our readers.

We suspect that some of the learned Doctor's opinions on the question of railroad "inclines," will not receive a very ready assent from many of our civil engineers. However, the whole is worth a perusal; and if the parts of the examination in relation to "noxious air," do not excite a smile, our readers must be of different material from ourselves.

We shall continue it in our next.

From the London Mechanics' Magazine.

EVIDENCE OF DR. LARDNER

On the Great Western Railway Bill,

3d of August, 1835.

The Earl of RADNOR in the Chair.

DIONYSIUS LARDNER, LL. D., being examined, gave evidence as follows;

You have heard a good deal said in extenuation of the Box tunnel; what is your opinion upon that subject?—The combination of a tunnel with a slope appears to be the objection to it; and the power requisite to pull a load up a slope of 1 in 107 is greater than the power necessary to pull the same load on a level in the proportion of 30 to 9.

In round numbers, nearly 3 1-2 to 1?—Yes; it requires 9 lbs. per ton to pull a load on a level line, and it requires 30 lbs. to pull it up 1 in 107.

Applying your attention to the question of the tunnel, in what way is that difficulty aggravated beyond the mere proportion of the greater power required?—The increased power necessary for a slope must be produced by a proportionably increased consumption of fuel; that will produce a proportionably increased destruction of atmospheric air; and, of course, if the tunnel be intended to be kept as pure on the slope as it would be necessary to keep it on a level, the transverse section of the tunnel ought to be greater on a slope than on a level in the proportion of 30 to 9.

Mr. Joy.—Your attention has been called to railways in various parts of the world; do you know of any parallel to this, uniting the length of this tunnel with that inclination?—No, I am not aware of any.

Is it justifiable, except in a very extreme case, to unite those two disadvantages, such a length of tunnel with that inclination?—I think nothing but an overruling necessity could justify it.

Have you considered the different modes proposed for working that tunnel; additional locomotive power or a stationary power, either by an endless rope or a single rope?—Yes.

Have you also considered it as worked partly by the one and partly by the other?—Yes; it might be worked partly by one and partly by the other; the tunnel is not the same length as the slope; the slope is two miles and a half, and the tunnel a mile and three quarters in length; it might be worked by a rope through the tunnel.

First, as worked by locomotive engines, what would there be its great objection?—I think I have stated its great objection already; the probable difficulty attending the destruction of air by the fire; and in considering that it appears to me that it ought to be considered, not so much with regard to the positive injury that may be produced to the health or life of the passengers—I do not think there would be any—but with regard to the unpleasantness and inconvenience arising from the existence of a quantity of noxious vapor through which they would be carried.

That is an objection more or less applicable to tunnels upon a level?—Less applicable to them, because there would be less power requisite.

Would the atmosphere of the tunnel be injuriously affected and impregnated with the gases produced by the combustion?—Not injuriously, but inconveniently, I think.

You have stated that there would be so much greater power required, and that requiring a greater proportionate quantity of combustion, that the ill effects would be produced in that proportion. What would be the proportion of increase in the consumption of fuel?—As 30 to 9.

In the same proportion as the increase of power?—Yes.

Mr. Joy.—Would there be as much air consumed in that tunnel as in a tunnel on a level of five miles and four-fifths long?—Yes, nearly. The length of the tunnel would be in the proportion of 30 to 9; there would be as much air consumed in this tunnel as there would be in a level tunnel longer in the proportion of 30 to 9.

Do you think any method of ventilation could be attainable that would render it otherwise than almost intolerable?—I scarcely think that the common mode by shafts would do it.

I have asked you whether it was actually practicable; is it not a feature devoutly to be avoided?—Yes.

To be avoided at almost all hazards?—Yes.

Would it be an eligible thing, such a tunnel in the course of a line, or almost intolerable?—I think it could be justified only by overruling necessity.

Mr. Joy.—Is this grievance much the same, or very materially aggravated, by such a tunnel and such an inclination being in the middle of the line rather than at the extremity?—Yes, it is more objectionable than at the extremity.

Why?—Because of the unpleasantness, and the interruption to the transit of the trains when the passengers are in them; you come to a stand-still; they must undergo a change in the moving power, and a similar change takes place at the top. At the end, if there is a tunnel, passengers hardly consider they have started until they have already passed through the tunnel; that is the case upon the Liverpool line, where there is a short tunnel at starting; no one could have travelled that line without feeling that had that tunnel occurred at Rain-hill instead of where it is, it would have been felt a much greater inconvenience, though the absolute loss of time might not be more.

Supposing Mr. Brunel shall have said, in answer to a question as to the danger of the atmosphere being rendered noxious by the passage of the engines, "I think not; there is one in existence upwards of a mile, and another on the Birmingham line;" and again, when asked, "Is the inclination so steep?" if he should have said, "It will not affect the atmosphere," is that correct or erroneous?—I think Mr. Brunel is in error there; it would affect the atmosphere.

In point of fact, is it not true that there will be an additional difficulty, as to the ventilation, from the increased power that will be requisite?—It will require more ventilation in the proportion of 30 to 9.

If it is assumed by the engineers on the other side, there will not be more ventilation required than on a level, that is an oversight, in your judgment?—Yes, that is an oversight, I suppose.

Supposing coke used instead of coal, would not the gas produced be more noxious?—No, not more noxious; it is the same gas; the combustion of coke produces carbonic acid gas, sulphurous acid, and azote. Coal would be quite inadmissible.

Mr. Joy.—Would not the gas that would escape from coke be of a more injurious nature if it existed in any quantity?—Yes; it is not only gas that escapes from the combustion of the coke, but the gas that is decomposed in the atmosphere would be more injurious.

Would not this gas, unless it found a vent in a heated state, be likely to remain?—Yes, from its specific gravity: it is half as heavy again as the atmospheric air; the carbonic acid gas.

That is the offensive gas of which you speak?—Yes, the gases are mixed together, and if they cool they are heavier than the atmosphere, and apt to remain.

The mischief must very much depend upon the quantity; is not the carbonic acid gas what the miners call choke damp, in a great degree?—Yes, it is what exists in wells and in the Grotto Del Cane.

If it is an excessive quantity, it is fatal to life?—Yes.

The degree of injury, if any there be, must depend upon the proportion?—Yes.

It may be diluted with common air, so as not to be fatal to life or health?—Yes, there is always a quantity in the air.

If the extra power is supplied by a stationary engine, the consumption of fuel would not be greater in the tunnel?—No.

Mr. Joy.—Have you made calculations of the proportions of these gases?—Yes; of the proportions of foul air to be produced.

Without troubling you to go into it in any detail, could you tell us the different gases you think injurious; the round sum of them produced in the passage through this immediate tunnel, for a load of 100 tons in a tunnel of a mile and three quarters long, upon a slope of 1 in 107? Have you calculated the quantity of noxious gas that would probably be made?—Yes; the total quantity, taking for granted that it takes half a pound of coke per ton per mile upon a level to draw a train, which, I believe, is in practice nearly the case, the quantity of noxious gas produced in this tunnel would be something less than 4,000 lbs. weight, with a load of 100 tons.

Every time a train goes through?—Yes.

Mr. Joy.—Does any objection exist with regard to the assistant engine on the Manchester and Liverpool line; they have one there?—Yes; not in a tunnel.

I am speaking of the inclination; is there not an inclination on that line very near this?—Yes; 1 in 96.

Is there any practical inconvenience there, as you have observed the line so frequently, with reference to the additional engine?—The additional engine is not always ready to assist the train, and they have sometimes to wait.

Have they sometimes to wait from its being out of repair?—They have delays from various causes; it may not be lighted, or it may be employed upon one train, when wanted for another.

Have you known trains come to a dead stop on that inclined plane?—Yes; I have been upon it more than once when that has happened.

Have you had to wait a considerable time?—Yes, until the engine could be got.

Would the extra cost necessary for keeping this engine ready for use be another objection?—Yes; they would be always obliged to keep it ready for use, whether wanted or not.

I will call your attention to another mode mentioned, that of the endless rope; have you made a calculation of what would be the result if that system was practised?—Yes, I have.

What on the Liverpool and Manchester line, where they have a slope of 1 in 48, is the one they use?—That slope is 2,000 yards long, and the rope they use is a six inch rope, to draw loads of twenty-five tons.

At the rate of about ten miles an hour?—I do not think the rate makes any difference in the strength of the rope.

Is that the rate?—Yes.

What sort of rope would the Box tunnel require, taking the Liverpool one as the basis of your calculation?—I consider it will require a seven inch rope.

What would be the weight of a seven inch rope per yard?—I believe the weight of a seven inch rope would be six pounds and a half per yard.

What would be the total weight produced?—The total weight of that endless rope would be about 57,000 pounds.

How long?—About five miles.

Mr. Joy.—Calculating the friction of such a rope thus worked at about a twelfth of its weight, which was the proportion given by Mr. Stephenson and Mr. Locke, what pull would it require to work a train of fifty-two tons?—To propel fifty-two tons upon a slope of 1 in 107 will require for its gravity a 107th part; you are to divide the 52 by 107, and you will get the power of draught necessary to overcome the gravity of the load.

What would that be?—1,088 lbs.; then there would be the friction of the load, which is at the rate of 9 lbs. per ton, which for fifty-two tons, 468 lbs.; these two together would come to 1,556 lbs.; that is exclusive of the rope. Then the experiments of Mr. Stephenson and Mr. Locke on the friction of the rope show us, that the friction may be taken at about a twelfth part of the weight of the rope; and those experiments appear to me to be very satisfactory and conclusive; there was an average of several taken, and they have given very nearly the same result; and taking one-twelfth part of 57,000 lbs. you will get the force necessary to pull the rope, which alone is 4,752 lbs.; the load therefore would require 1,556 lbs., and the rope 4,752 lbs., making a total of 6,308 lbs.

Is not the result of this calculation, that it would require about three times the power for the rope, compared with the load?—Yes; for a load of fifty-two tons it is in the proportion of 15 to 47, very nearly.

To move that at the rate of fifteen miles an hour would require what power as expressed in horses?—Twenty-five pounds pulled at the rate of fifteen miles an hour is equal to one-horse power, and therefore 6,300 lbs. pulled at that rate, would be equal to 252 horse power.

Have you a corroboration of that result from the proposed engine on the tunnel now making on the Liverpool and Manchester railway?—The tunnel for passengers is a tunnel of a mile long, I think.

What is the power of the engine there proposed?—It is, they say, 140-horse power.

That is for passengers only?—Yes, for light loads.

What is the declivity there?—1 in 100.

Very nearly the same as here?—Yes.

Mr. Joy.—Is that consistent with the calculation you have just been giving to the Committee?—Yes, it agrees very nearly with it, as nearly as possible. I should state it would be necessary to have two engines, one to work while the other is accidentally deranged or repairing, otherwise the whole traffic upon the road will be stopped; there must be a pair of engines.

May not that be estimated at a lower tonnage in consequence of its being intended for passengers only?—Fifty tons is the amount of an ordinary load of passengers, including carriages.

Is not that about half the length of the Box tunnel?—Yes, it is about a mile long.

Is it correct to suppose that a five and a half inch rope would be sufficient for the

Box tunnel, because the incline is flatter than the tunnel upon the Manchester and Liverpool Railway of 1 in 48?—No, because the length is there omitted; the length is a very material consideration; it is a much more material consideration than the degree of acclivity.

Would the calculation of the sufficiency of rope, a five and a half inch rope, be conclusive if it was applied to so much shorter a line?—No; the acclivity has nothing whatever to do with the calculation; an endless rope, which would be sufficient for a certain load on one inclination, would be sufficient for any other inclination; the weight of the rope has nothing to do with it; it balances itself.

In order to arrive at a proper conclusion, is it not necessary to take into account the greater length of the line?—Yes, and that alone.

And not the steepness?—Not when it is an endless rope; a single rope would require steepness to be taken into consideration, but not an endless rope.

At the tunnel in question, on the Liverpool and Manchester line, is not the load of the locomotive divided into five or six different portions, and drawn up at five or six different times?—Yes; it is drawn up in loads of twenty-five tons; this would not do in the middle of a line.

Is it comparatively unimportant at the end?—If the load was to be drawn up in that way in portions in the middle of the line, the line would be occupied a considerable time, and the trains of passengers would be stopped until all this business of carrying up the loads was finished; and even at the end of the line, unless the slope was exclusively devoted to goods, it would not do there.

If a load of 100 tons were to arrive at the top of such an inclination, there would be a waste of time in the arrangements necessary to divide it?—It would be divided into four, and then one would be drawn up, and then another.

Whereas 100 tons can be very easily moved upon other parts of the line?—Yes.

Do you happen to know whether the elder Mr. Stephenson asserts that an endless rope of five miles long is impracticable?—Yes, I recollect he says that.

Do you agree with him?—Yes, it is within the bounds of mechanical possibility I think, but in the common sense of the word it is impracticable; I hardly think any one would attempt it.

Have you any idea that it would be adopted?—No; the power expended upon the rope would be so preposterously great compared to the load to be drawn.

You consider it, in common parlance, impracticable?—Yes.

Now turn to the single rope. Suppose it is to be worked by a single rope, is it one of the objections necessarily involved in a single rope, that there must be a small locomotive to draw it back?—There must be some means to draw it back again, and the weight is so considerable that the power must be considerable.

Do you consider, speaking of a single rope, it would be but half the length?—Yes.

Two miles and a half; would not that require a small locomotive in consequence of its length?—It would require a considerable power, and a small locomotive would do it.

Would not there be some objection to that in consequence of its consumption of vital air in the tunnel?—Yes; that would be an additional inconvenience.

Would it not be a constant expense?—Yes; there would be constant expense in the consumption of fuel.

Is the original cost of such a rope heavy?—Yes.

Is the wear and the tear considerable?—Yes.

Has it to be often spliced?—Yes; the rope on the Liverpool tunnel is spliced twice a week, I believe.

Are the sheaves and the pulleys that the rope runs upon likely to break and get out of order?—Yes.

What is the number of those pulleys in a mile?—220 in a mile, I think.

Do you know any thing of the cost of those pulleys?—From 15s. to 20s. is the cost, where less power is used.

Would not this mode require about three times the power usually expended?—Yes; I should say in the proportion of 15 to 47 by an endless rope.

I am speaking of a single rope?—There would be less waste of power in a single rope, but we must take into account the power to carry it back.

Would it not come nearly to what I have stated?—I have not calculated that.

Have you any objection to stationary power in the midst of a line like the Great Western?—Yes; there is an objection to it in the interruption it would occasion in the rapid transit of passengers and the change of power; those are sufficient objections to it.

What would be the sort of power necessary to draw up a single rope?—It would be pulled back by an engine attached to the end of a single rope, which would draw it back.

If the load be 100 tons, should you not require a rope nine inches in circumference to draw it up?—That is for an endless rope.

Mr. Talbot states, that an endless rope had never been proposed, from the beginning to the end, by the parties promoting the bill, and that calculations based on the assumption that it was to be used were therefore irrelevant.

Mr. Joy is heard in answer to the observation.

Mr. Joy.—Leaving both the endless rope and the single rope, I wish to call your attention to the breaks. There was an experiment stated by Mr. Brunel on the Canterbury and Whitstable inclined plane. Is that applicable to the Box tunnel? Supposing it to be stated by Mr. Brunel, with reference to the Canterbury and Whitstable Railway, "I have been down that plane twice, without a rope in the carriage, alone, with nothing but a break to check the carriage, and allowing it to run all its full velocity; by the break it was stopped in sixty yards.—How many passengers were there in the carriage? We were five only; of course, I did not try an experiment of that sort with many passengers.—Was it fully loaded? No." I would ask you whether that gives at all a sufficient explanation of the practicability of stopping such trains as would usually go on such a line as this; upon such an inclination as the Box plane?—No; because the power of the break is inversely as the load; and though you might stop a wagon loaded with five persons (I believe the average weight of a man is 150 lbs., which would be 750 lbs. plus the weight of the wagon), though it might be easy to stop that with a break, it would require a greater power by the break to stop it with a greater load—a power greater in proportion to the load. You cannot infer much from that experiment.

Supposing the carriages to start from the top of the plane in a state of absolute rest, what resistance would be required in order to limit its speed to 30 miles an hour?—It will be the resistance of the same number of pounds per ton, whatever be the limit of the velocity. The circumstances will be these: a train descending a slope of 1 in 107 has a downward tendency, which would be balanced by 12 lbs. per ton; and, of course, whatever the velocity you want to restrict the train to, the break should exert a retarding force, amounting to 12 lbs. per ton.

Taking those data, what resistance would it be necessary to exert through a distance of two miles and a half, 7,588 feet?—To limit the velocity to 30 miles an hour, supposing it to begin from a state of rest, the trains starting from a state of rest at the top, and being allowed to proceed by gravity only, without power, would acquire a velocity of 30 miles an hour after passing over 5,612 feet. Then supposing the break to be applied, so as to check any further increase of velocity, it must exert a force of 12 lbs. per ton in order to do that, and that force must be exerted through the remainder of the slope, which would be 7,588 feet; and the total force would be equivalent to 4,500,000 lbs., raised a foot high.

You have stated that, on the supposition that the train starts from a state of rest; is it not notorious that they constantly do start with a considerable degree of velocity?—They never do start from a state of rest.

At what sort of speed do the trains generally arrive at the summit of such a plane?—At the top of the slope on the Manchester Railway they generally arrive at the rate of 20 miles an hour.

I need hardly ask you whether the increased velocity you have spoken of would not then be much more dangerous?—The velocity would be much more increased if it broke loose from the break.

If Mr. George Stephenson should have stated that the break often fails to act; is he correct in that?—Yes; I have seen it frequently fail on the slopes on the Manchester Railway.

Did you ever find that inconvenience yourself when making experiments on that Railway?—Yes.

On an inclined plane of 1 in 96?—Yes; I have seen it totally fail with a train of goods; it was burnt; the friction burnt it.

Just state the particulars of that?—I was descending the slope of 1 in 96 on the Manchester Railway, with a train of goods; the engineer let the train run down for a consid-

erable time without the break, and we obtained a velocity that appeared to me to be exceedingly dangerous. I ordered him to apply the break, but the break totally failed; it was burnt. A signal was made to us by the road police to stop, but the train did not stop for a considerable distance from the foot of the slope. When we descended we found that the wheel of one of the wagons had broken, so that both wheels dragged along the rail during the descent, forming a more powerful break than the common breaks, and, notwithstanding this, the train went down with this furious velocity.

Do you know what the velocity was?—I can only conjecture that it was something very great; I should say from forty to fifty miles an hour.

Have you ever had any other misfourtune of the same kind in a curve?—Yes, I did; I recollect an instance of it in a curve or bend in the line; that was not on a slope; it was nearly level.

State the circumstances?—I was proceeding from Liverpool to Manchester with a train of passengers, and at a bend in the line, where, from the flexure of the road, the engineer could not see a great distance before him, it happened that a train of stone wagons was occupying the road in advance; a signal was made to the engineer by the road police to cut off the steam and put the breaks on to retard it; and he alleged that he did so; but the velocity continued to be so great, notwithstanding the breaks, that we came against the train of stone wagons, and smashed them all to pieces; the wagons were broken all to pieces, and the stones thrown about, and the framing of the engine, though of strong iron, was broken.

Did you knock the stone carriages to pieces?—Yes. We were protected by the engine and the springs; some of the passengers were bruised a good deal. There are provisions made in the carriages that carry passengers to protect them from the effects of collision, but there are none in the case of stone wagons.

Was this upon an embankment or a cutting?—It took place in a cutting quite sufficient to hide the wagons.

What is the length of the radius of the curve where this accident took place?—It is a very considerable radius.

Mr. Joy.—Do you know the radius at the bottom of Box Hill?—It is stated to be three quarters of a mile.

If you were in a cutting would not that aggravate the difficulty, as you would not see the wagons before you?—Yes, it would.

What is the distance of the curve from the end of the Box Plane?—I believe it is stated to be a quarter of a mile.

In your judgment, is it sufficient to prevent any injury at that distance?—There will be great danger of having undue velocity; and on arriving at the curve, if the break should fail, the engine would arrive at the curve with very considerable speed. A quarter of a mile would make very little abatement.

If it should be contended that a quarter of a mile is sufficient to obviate any aggravated inconvenience from the velocity, is that correct?—If accidental velocity be acquired it is not, but if all precautions are taken there is no danger in arriving at the curve; but upon the trains breaking loose, and acquiring that velocity that the descent would give them, there would be danger.

Is it not objectionable that there should be such a curve at the bottom of an inclined plane?—Yes; it would be better further off.

Though a quarter of a mile is sufficient for the expenditure of the common power, is it not insufficient for the expenditure of the dangerous power acquired by that increased velocity?—Yes, it would be.

In your judgment, supposing the train to be worked by a single rope, and such rope were to break, would there not be great danger?—There would be danger arising from the train being precipitated down.

If it is the opinion of Mr. Brunel, that there would be no great danger if the rope broke and that the slightest resistance of the break would stop it dead, is not that erroneous?—I do not agree in that at all; I do not think any resistance would stop a train dead; it would gradually stop it.

Mr. Brunel says he has not calculated the amount of velocity that would be acquired; have you calculated the amount of velocity acquired in falling down these slopes?—Yes.

Just state what it is without any break?—A carriage or train, commencing from the top of the Box Hill Incline, from a state of absolute repose, supposing it not to be propelled by any power, would at the foot of the slope have a velocity of forty-six miles an hour by gravity only, and the time of descent would be six minutes and a half. I omit the small fractions.

That is allowing the friction of nine pounds a ton?—Yes, it is.

That is assuming the train to descend with any power whatever, and to commence from a state of rest?—Yes; and if it does not commence in a state of rest, you must add to the forty-six miles an hour the velocity that it had at the beginning.

If it was starting at the rate of twenty miles, it would get up to sixty-six?—Yes.

Would not that be perfectly serious and formidable?—That is a matter of opinion; I am not afraid of those high velocities if the road be straight and level; but the curve which takes place in a quarter of a mile from the end of the plane would render it quite objectionable.

Quite formidable and dangerous?—Yes.

There would not be sufficient space in that quarter of a mile to correct such extreme velocity?—No, nothing like it.

Mr. Joy.—Suppose it is contended that the danger was reduced to nothing almost, because it was in cutting?—The difference only would be this, that if they were thrown off the rails, they would not be thrown over an embankment, but against the side of the cutting; there would be a difference of result likely to arise, but not a diminution of the chance of being thrown off the rails.

Mr. Locke states he descended the tunnel on the Liverpool and Manchester when the break was not applied at all; have you calculated what must be the speed there?—Supposing the wagon to descend from a state of rest at the top of the tunnel (I speak of the tunnel for goods, 1 in 48,) the velocity acquired at the foot would be fifty-four miles an hour.

If Mr. Locke should represent that to be not accompanied with danger, must not it have been in consequence of previous precautions specially taken on the occasion?—Yes, oh certainly; because accidents have happened where the trains have broken loose in that tunnel, and the wagons have been all smashed to pieces.

Is there to some extent a natural tendency for the engines to get off the rails produced by the centrifugal force upon such a curve as that you have mentioned?—Yes, there is; and for that reason curves are inadmissible, except with a very large radius. When a body is moved in a circle it has a tendency to fly from the centre, and this tendency in the case of trains on a railway presses the wagons against the outside of the curve, and gives them a tendency to run over the rail on the convex side of the curve.

Does not that tendency increase in the same proportion as the square of the speed and the smallness of the radius?—Yes.

Have you calculated the effect of this curve, and the lateral tendency to run off the rails which this speed will produce?—Yes; it is a matter of very easy calculation.

First tell us with a speed of fifty miles an hour and a load of 100 tons?—The outward tendency would amount to 93 lbs. a ton; that would be 9,300 lbs. altogether; that is, with three quarters of a mile radius.

At forty miles an hour?—57 lbs. per ton; that would be 5,700 lbs. altogether.

At thirty-five miles an hour?—47 lbs. per ton; 4,700 lbs.

At thirty miles an hour?—33 lbs. or 3,300 lbs.

These different aggregates of outward pressure would be divided equally among all the parts of the train, and would not apply to any one part?—It would apply at so much per ton, according to the weight of the wagons; if the wagon was loaded with five tons, then the outward tendency would be five times 93 lbs.

Upon that wagon?—Yes.

If they were divided in a space of five feet, each one of those five feet would bear a proportion?—No, it is on the flange of the wheel; it would be divided between the two flanges of the two outward wheels, and the two outward wheels would be pressed outward with the force I allude to; each would be pressed with half the weight I have stated.

If there were ten wagons, each wagon would have a tenth of the whole; and if there were four wheels to each wagon, that tenth would be divided between the four wheels of each of those wagons?—No; it is only the two outward wheels that are affected, and it is divided between them equally.

Mr. Joy.—Does not it follow from what you have stated, that a very slight addition would tend to throw the wheels off the rails?—Yes; a very slight pressure with that tendency would help them over the rails. At the junction of two rails they are very seldom flush. After they have been worked a little time one gets a little lower than the other, and the wheel coming against the

corner with that pressure would give it a tendency to go over.

In your judgment, would not the danger of such a curve be extreme with respect to passenger trains from Bath to London?—Yes; I think it would be dangerous, in a train acquiring undue velocity, in descending the slope at Box Hill.

What should you consider undue velocity?—Fifty miles an hour I should consider undue velocity.

Would you consider 30 miles undue velocity?—I consider it is objectionable.

Mr. Joy.—If the Lowther Arcade has been alluded to as an illustration with reference to this tunnel, it must be considered as confined only to its similarity in point of steepness?—To its appearance; slopes upon Railways have a tendency to remove the appearance of danger, and to create its reality.

What do you mean by slopes upon Railways?—I mean inclines; an incline, that has no appearance of danger when you look at it, may have a great deal of real danger in it, though that inclination is one that will not be perceived by the eye.

Do you mean to say that an inclination that does not appear to be dangerous to the eye may be so in point of fact?—Yes, there are slopes on Railways which, while they do not appear to have any danger whatever in their appearance, have a great deal in reality; it would not apply to such a slope as 1 in 1,000.

But some, which are nearly imperceptible, are very dangerous?—Yes.

(To be continued.)

Applications of Chemistry to the Useful Arts, being the substance of a Course of Lectures delivered in Columbia College, New-York, by James Renwick, Professor of Natural Experimental Philosophy and Chemistry.

I.

ACIDS OF COMMERCE.

1. SULPHURIC ACID.

AUTHORITIES.—PARKES. Chemical Essays.
DUMAS. Chimic appliquee aux arts.

History.—Sulphuric acid was originally prepared by the distillation of the sulphate of iron, in a mode that we shall have occasion to mention, as still used in manufacturing it for a special use. As this sulphate was known by the name of green vitriol, the acid was called oil of vitriol. It was afterwards discovered that the combustion of sulphur under vessels moistened with water, produced the same result. Finally, after the reception of the modern theory of chemistry, Lefevre and Demerey conceived that the oxidation of the sulphur might be promoted by mixing it with nitre, a salt whose acid is easily decomposed. Their experiment fulfilled their expectations, although their view of the rationale is now known to be erroneous. The operation was at first performed in large glass vessels, but as these are expensive, leaden chambers were substituted, and finally when the several steps of chemical action which occur in the process were investigated, a method was discovered in which the use of nitre might be dispensed with. Nitre is however still employed in most of the manufactories in this country and England.

Rationale.—When nitrous oxide (deutoxide of nitrogen) and sulphurous acid are introduced together into the same receiver, they mix without any chemical action upon each other; but if oxygen be present, nitrous acid gas is at once formed, whose presence will be manifested by a quantity of red fumes. This last named gas will also remain unacted upon by the sulphurous acid, unless they be also mingled with the vapor of water. But when this vapor is mixed with them, the red vapors gradually disappear, and a white crystaline solid is deposited on the sides of the receiver. These crystals are a compound of sulphuric acid, nitric acids and water. This crystaline substance is highly deliquescent, so that if the bottom of the receiver is covered with water, they fall into it and dissolve with a slight effervescence; the water becomes charged with sulphuric acid, nitric oxide is evolved, and in coming into contact with oxygen is again converted into nitrous acid gas. It is only necessary to supply a new quantity of sulphurous acid, and the formation of the solid substance may be again repeated, and an additional quantity of sulphuric acid obtained.

It is therefore obvious, that sulphuric acid may be formed by burning sulphur in a chamber whose floor is covered with water, and into which nitric oxide is introduced in any manner whatsoever, for the combustion of the sulphur will furnish sulphurous acid, and the spontaneous evaporation of the water the quantity of its vapor which is necessary.

Nitric oxide may be furnished by the action of burning sulphur upon nitre. And on this fact the most usual process depends. It may also be obtained by the action of sugar or of starch upon nitric acid. On the latter fact the new and improved process is founded.

Manufacture by a mixture of Sulphur and Nitre.—The chambers in which sulphuric acid is manufactured are made of sheet lead. They are of a rectangular shape. The bottom is raised about six feet from the ground, and supported by stone flags; the sides and top are sustained by a wooden frame, and a space of about six feet is left between this frame and the walls and roof of the building which contains it. The separate sheets of lead are carefully soldered together, and are united to the frame by clamps of lead soldered to their outer surface.

Single chambers have been constructed of all dimensions, from 5,000 to 100,000 cubic feet, and they have been made of smaller size, but so arranged as to communicate with each other. It does not appear that the exact shape and dimensions which are most favorable have yet been discovered. At any rate, a quantity of sulphuric acid proportioned to the sulphur consumed has never been obtained. A bed of water a few inches in depth is spread over the floor of the chamber. Immediately above this, a door, covered with lead, is placed, by which the materials are introduced. These are sulphur mixed with not less than one-eighth of its weight of nitre. They are placed in a shallow vessel of earthenware or cast-iron, mounted on a wheel carriage, and, after being ignited, are shoved in through the door, which is shut after them. When the combustion is completed, and the acid condensed in the water, the carriage is withdrawn, the residuum taken out of the vessel; it is then charged with a fresh quantity of the mixed materials, and re-introduced after they have been ignited. These successive combustions are continued until the liquid at the bottom of the chamber acquires a density of 1.375 to 1.5.* Beyond the latter limit, condensation is unprofitable, because the attraction of the acidulated liquor for the sulphuric acid diminishes, and nitrous acid gas begins to be dissolved by it. This gas is separated with difficulty, and impairs the useful qualities of the acid.

The liquor having reached the above degree of concentration in the chambers, is removed from them to leaden boilers, where, by the aid of heat, it is further concentrated to 1.7†. Beyond this the concentration cannot be carried in a leaden vessel, for fear of melting the metal.

The acid liquor is therefore next placed in close retorts. These were originally, and are still, in most manufactories, made of glass, and set in an iron sand bath; in them the acid is brought, by the evaporation of the water in which it had been condensed, to the specific gravity of 1.84.‡ This is the greatest strength of the acid of commerce, and is sufficient for all practical purposes.

Glass retorts are liable to frequent breakage, in consequence of the violent agitation with which the separation of the bubbles of steam from the acid is attended. The size of the bubbles may be lessened, and the risk of breaking diminished by the introduction of angular fragments of glass, or strips of platinum, into the retort. But it would be far better to employ, as has been done in some French establishments, retorts of platinum. The only objection to these is their original cost, but when a sufficient capital can be obtained, the cost of the acid is lessened by employing them.

An improvement in this process was effected by Chaptal, who succeeded in making the action of the chambers perpetual, instead of intermitting, by burning the mixture of sulphur and nitre in a separate furnace, directing the current of gases evolved from it through the chamber by means of flues, and forming a draught by means of a chimney. This method is attended with difficulties and a risk of loss, if not carefully managed; but, when well conducted, it gives a larger quantity of acid than the other. The first described method yielded, in its earlier stages, no more than 150 pts. for 100 pts. of sulphur. As it ought to produce 318 pts. of acid at 1.84, more than one half is lost. By more careful management, the product has been raised to 240 pts., but the method of Chaptal has yielded 300, involving a loss of no more than 6 per cent. To give it this superiority, it is

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* 40° to 50° of Beaume's hydrometer.

† 60° of Beaume. ‡ 66° of Beaum

however necessary to form the apparatus of several successive chambers communicating wi h each other; and where the method was most completely successful, the last chamber communicated with the chimney by a sloping channel, along which a stream of water was made to flow. The method of Chap'al, too, is dependent for its results upon the scientific skill of the persons who direct it, and even with every precaution, is not certainly successful.

Improved Method of Manufacture.—The method which is on all accounts the best, is that of Payen. We shall, therefore, describe it in detail.

The chamber of lead has a capacity of about 20,000 cubic feet, and is of the following dimensions:

Leng'h, 50 feet.
Breadth, 27 "
Height, 15 "

From one end of the top two chimnies rise to a height of at least 15 feet. These are about 18 inches square, and communicate with the chamber by water-valves, so constructed as to prevent any return of gas downwards, without interfering with the upward draugh', but also capable of being opened for the re-admission of atmospheric air, when the process is completed.

At the opposite end of the chamber, a circular hole of 8 feet in diameter is made in the leaden floor. To this a cylinder of sheet lead is soldered, which rises about 10 inches in'o the chamber, and projects about 7 feet beneath it. The lower end of this cylinder is turned inwards, and bent up os as to form a circular channel, in which a quan'ity of acid liquor is constantly kept, for the purpose of preventing the lead from being melted by the burning sulphur. The heat, which is thus prevented from reaching the lead, serves to concentrate the acid liquor.

Within the opening left in the bottom of the cylinder, a circular plate of cast-iron is placed, about 3½ feet in diameter, and slightly concave on its upper surface. Beneath this plate is a furnace, by which it may be heated until it becomes capable of inflaming the sulphur.

The sulphur is introduced by a door made in the side of the cylinder, about 2 feet in height and 18 inches in breadth. At the lower part of this door is a small hole about one inch in diameter.

By the same door a small capsule of platinum may be in'roduced, which is separated from the plate which receives the sulphur, by an iron tripod.

In the vicinity of the chamber, a steam boiler with its furnace and chimney are placed. This boiler communicates with the middle of the chamber by a pipe 1 inch in diameter, having a plate at its extremity, by which the opening is reduced to a circle of the diameter of ½ inch. The fire surface of this boiler is about 5 square feet.

In order to commence the process, the door in the cylinder and the valves of the chimnies are closed; a fire is lighted in the furnace, and when the plate is so far heated as to inflame a teaspoonful of sulphur thrown upon it, 100 lbs. of sulphur are put in. At the same time the platinum capsule is charged with a mixture of 9 lbs. of nitric acid, and 1 lb. of molasses. From this mixture nitric oxide is disengaged in great abundance, and pouring upon the surface of the sulphur, is speedily mixed with sulphurous acid.

While this action is going on, the water in the steam boiler is heated; at the end of about two hours from the introduction of the sulphur, a stopcock upon the pipe is opened, and the steam permitted to enter the chamber. In a few minutes, a condensation begins, which renders it necessary to admit atmospheric air, in order to prevent collapse. This is done by opening the circular hole in the door by which the charge is introduced.

The injection of steam is continued for an hour after the nitric acid sulphurous vapors are condensed. It is then permitted to condense in its turn. When this vapor is wholly condensed, the door and the valves in the chimnies are opened, in order to give free access to atmospheric air, and when the ventilation is complete, they are again closed, preparatory to a renewal of the operation.

The form of the apparatus may be better understood by the annexed plate. (Fig. 1.)

AABB, section of leaden chamber, whose bottom BB is inclined, in order that the stratum of water CC may be drawn off, after it is charged with acid.

D, cylinder of sheet lead, turned up at the lower end, so as to form a channel, which contains a layer of acidulated liquor, EE.

FF, concave plate of iron for burning the sulphur, which is heated by the furnace G.

H, chimney.

I, valve to prevent the entrance of air.

K, steam-boiler.

LL, pipe which conveys steam from the boiler to the chamber.

M, stopcock.

N, furnace for heating the steam-boiler.

O, capsule of platinum to receive a mixture of nitric acid and molasses.

As many as four charges may be consumed in this apparatus in 24 hours; but it is better to be content with three, or even two. In the latter case, the condensation is more complete, and the product from a

Fig. 1.

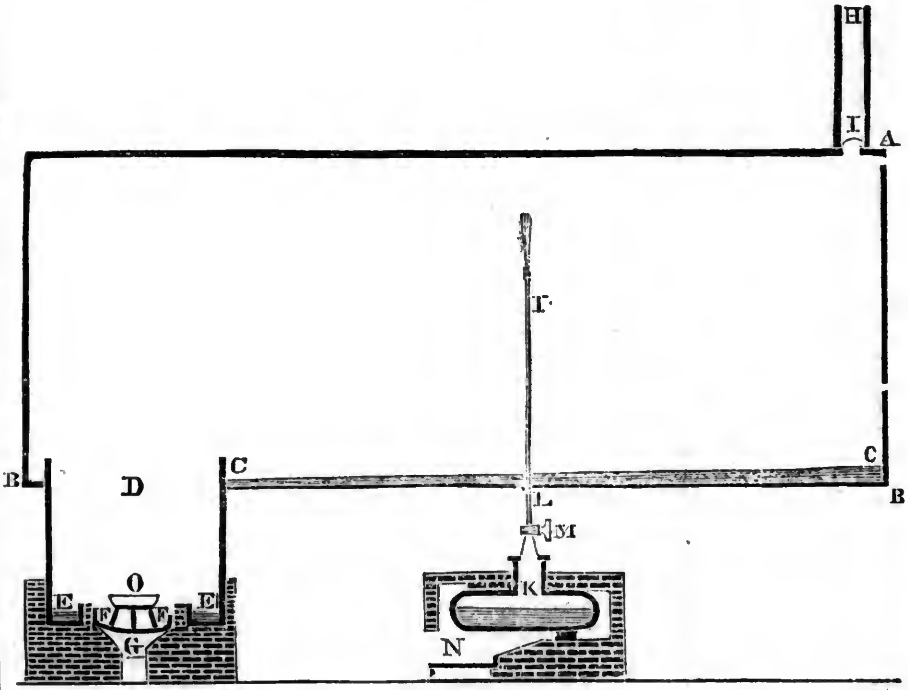
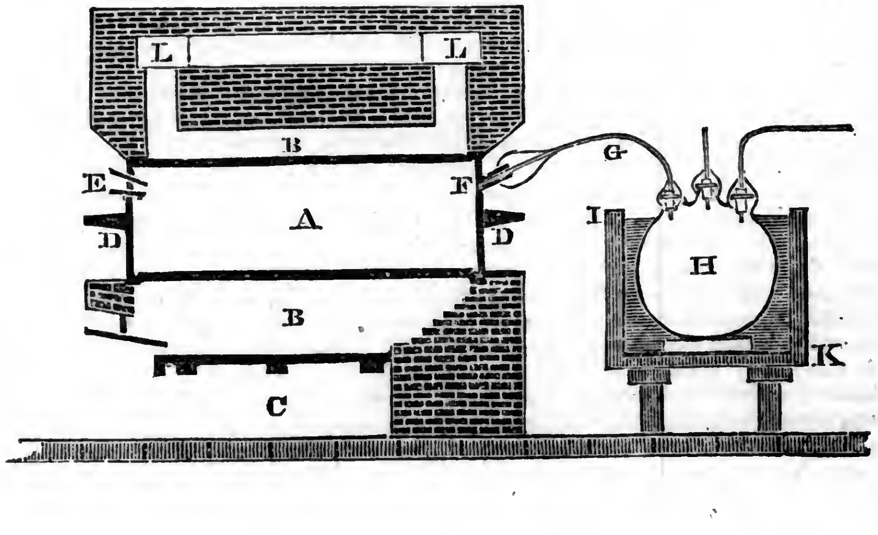


Fig. 2.



given quantity of sulphur, larger; the chamber, also, is less liable to injury.

This method gives, with ordinary care, as large a product of acid as that of Chaptal, say 300 pts. for 100 of sulphur.

The nitric acid is not wasted, for by its action on the molasses, a quantity of oxalic acid is obtained, whose value is more than equal to their joint cost.

Sulphuric Acid, of Nordhausen.—Common sulphuric acid contains water as one of its essential constituents, and is, therefore, a hydrate. But sulphuric acid may also exist uncombined with water. In this state it is solid at ordinary temperatures. The sulphuric acid of Nordhausen is made up of various proportions of hydrated and anhydrous acid; it also contains sulphurous acid, whose presence is accidental. This acid is made at Nordhausen, by the distillation of sulphate of iron, but the details of the process have not been made public. The following method will, however, give a similar product.

Dry sulphate of iron is placed in an earthen retort; the neck of this is luted to a receiver charged to about half its depth with common sulpuric acid, in which the anhydrous acid driven by heat from the sulphate of iron is condensed. In manufactures on a large scale, several globular receivers communicating with each other, would be necessary, and cylinders of earthenware might be substituted for the retort.

2. MURIATIC ACID.

AUTHORITIES.—PARKES. Chemical Essays.
DUMAS. Chimie appliquee aux arts.

History.—Muriatic acid was at first manufactured only on the small scale, and in glass vessels. Vessels of earthenware were next substituted, and to these succeeded retorts of lead. The lead retorts being found incapable of bearing a sufficient heat, were replaced by cast-iron kettles, closed by covers of lead. The last named method is still employed in England. The manufacture of soda from common salt having become a process of much importance in France, a simple and ingenious apparatus was constructed for the purpose of decomposing salt by sulphuric acid. At first, the quantity of muriatic acid gas which was thus set free, was so great that if condensed, it would have been unsaleable; but as the applications of the liquid acid in the arts became more extensive, condensing apparatus were connected with that for the decomposition of the salt.

Manufacture.—The best apparatus for the decomposition of salt by sulphuric acid, is composed of several cylinders of cast-iron. Each cylinder is about five feet in length, and eighteen inches in diameter. The thickness of the metal is about one inch. The cylinders are arranged horizontally and in pairs, each pair being built into a separate furnace, and the flues from ten such furnaces are united in a single chimney. The ends of the cylinders reach the surface of the masonry of the furnace. The two ends of each cylinder are closed by disks of cast-iron, an inch in thickness. Each of these disks has a handle cast upon it, and a small tube cast in an inclined direction. The position of these tubes is higher than the horizontal diameter of the disk, and the inclination towards the interior of the cylinder is downwards. One of these tubes is used for the introduction of the acid, the other conveys the gas to the condensing apparatus.

The condensing apparatus is formed of a number of three necked vessels, similar in form and use to the bottles of Wolf's apparatus. They are arranged in two rows, of twenty each. Each vessel of the first row receives gas from one of the cylinders, by means of a bent tube, and is also connected by bent tubes with the two contiguous vessels, with the exception of the first and last vessel of the row. In the first vessel, the third neck is closed, but the last has a pipe connected with it, which conveys the gas which has not been condensed to the corresponding vessel of the second row, which becomes first in order. The number of vessels in the second row is the same as in the first, and they are connected by bent tubes in such manner that the gas passes into them in regular succession, until the whole is condensed. The first row of vessels is kept cool by immersing them in a cistern of water; this is slowly changed by admitting cold water at the bottom of the cistern, and allowing the heated water to run off at top. The arrangement of a cylinder and the condensing apparatus may be understood by reference to the annexed plate. (Fig. 2.)

A, cast-iron cylinder.
BB, furnace.
C. ash-pit.
DD, circular disks to close the ends of the cylinder.
E, tubes by which sulphuric acid is introduced.
F, tube to which the glass tubes which convey the gas are luted.
G, glass tube.
H, glass receiver, with three necks.
IK, trough filled with water.
LL, flues.

Each cylinder is charged with 160 lbs. of salt, and to this is added, after the several joints have been closed by luting, 134 lbs. of sulphuric acid, of the density of 1·8.* The furnace must be so constructed that the cylinders shall be completely enveloped in the flame, in order that they may not be broken by unequal expansion. The fire is made as brisk as possible at first, and diminished when the gas comes over freely. At the end of the process the heat is again raised, in order that the residuum may be left in a liquid state, and thus be more easily discharged from the cylinder.

Each of the vessels of the condensing apparatus must be half full of water, which will conduce about 1-5th of its weight of gaseous acid. The purest acid is condensed in the second row of vessels; that which is condensed in the first, contains a little sulphuric acid, and sometimes sulphate of soda, and chloride of iron.

By this method 100 parts of common salt give 130 parts of liquid acid of the density of 1.190†; and the loss is no more than about 9 per cent. By other processes little more than half the quantity is obtained.

*65° of Beaume. †23° of Beaume.

3. NITRIC ACID.

AUTHORITY.—DUMAS. Chimie appliquee aux arts.

History.—Nitric acid is prepared in laboratories by the action of sulphuric acid upon nitric (nitrate of potassa.) The first attempt at manufacture on a large scale, was by the decomposition of nitre by means of clay in earthen retorts. Since the improvements in the manufacture of sulphuric acid, the action of this acid on nitre has been also made use of on a large scale.

The best apparatus for decomposition is composed of iron cylinders, exactly similar to those described as used in the manufacture of muriatic acid. Four of these are arranged in a single furnace. The condensing apparatus is composed also of three necked bottles; four rows of these are necessary, the two first of which are immersed in a cistern of water.

The cylinders are charged each with a mixture of nitrate of potassa, and the strongest sulphuric acid of commerce, in the proportion of 100 parts of the former to 60 of the latter. The nitre ought to be purified.

The several joints are luted with clay, which is covered with loam, mixed with horse-dung. The heat must be gradually raised, and well regulated. The process is known to be nearly finished when red fumes no longer appear in the glass tubes; a sudden increase of heat is then given, in order to separate the residue of the acid. The fire is then extinguished, the heads of the cylinders opened, and the sulphate of potassa which remains is easily taken out by iron tongs. The acid condensed in the first row of bottles contains sulphuric acid, and is the least pure. That condensed in the second, and part of the third rows, contains no other impurity but nitrous acid gas, and chlorine. These may be separated by boiling in glass retorts. The acid ought then to be colorless, and have the density of 1·333,* in which state it is brought into the market. The liquor in the last row of vessels is weak, and is placed in a succeeding process in the first and second rows, in order to receive a higher charge of acid. The two last rows of vessels must always be charged with pure water, in order that the condensation may be complete.

II.

ALKALIS OF COMMERCE.

1. *Pot and Pearl Ashes, and Salt of Tartar.*—The basis of these several substances is potassa combined with carbonic acid. This compound retains an alkaline reaction, and is therefore properly a subcarbonate, although usually called the carbonate of potassa. This carbonate is rendered impure by the mixture of earthy and vegetable matter, and some metallic oxides. Of these, potash contains the greatest quantity, and salt of tartar the least.

Potash is prepared from wood ashes, which are made in great quantities in clearing wood land in order to bring it into cultivation. This product is of so much value, that during the wars of the French revolution, when, for reasons hereafter to be mentioned, it maintained a high

*36° of Beaume.

price, the whole cost of clearing our forests was defrayed by it.

As practised in this country, the art of making potash begins by piling logs in heaps, in the fields whence they are cut. These, when sufficiently dry, are set on fire, and burnt to ashes. It is better that a trench be formed in which to build the pile, in order that the combustion may be gradual, for when it is too rapid a part of the ashes is carried off by currents of air.

These ashes are then lixiviated, and the ley evaporated to dryness. The lixiviation is performed in tubs, or vats. A hole is pierced in the bottom of each of these, to which a spiggot is applied; this hole is covered with a piece of earthenware, to prevent it from being choaked. The bottom of the vat is covered with straw, on which a piece of canvass is laid. The rest of the vat is filled with dry ashes. Water is gradually added to the ashes, until they are thoroughly moistened, in which operation they subside, and the space which is thus left is filled up with water. The whole is left at rest for 12 hours, when the spiggot is withdrawn, and the liquor permitted to escape. The tub is again filled with water, which remains in contact with the ashes for two or three hours, when it is drawn off; and this operation is repeated until the alkaline matter in the tub is exhausted. The weak liquors last obtained are heated and used to lixiviate fresh ashes. The earlier runnings are evaporated in cast-iron vessels having the shape of a portion of a sphere, and which are known by the name of potash kettles. It is more convenient to prepare it for these, in evaporators of sheet-iron, which may also be used to heat the weak liquors, which are to be used a second time in lixiviation. When evaporated to dryness, the lower part of the mass in the kettle is partially fused, and the whole forms a hard cake, which must be broken by a mallet and chisel.

In this form it is packed into casks, and known in commerce by the name of potash. It is of a brown color, owing to the presence of soluble vegetable matter. As it is deliquescent, it is liable to damage from exposure to the air.

Damaged potash, and that of inferior quality, is converted into pearlash by exposing it to heat in an air furnace. This furnace is heated with wood, and is composed of a horizontal hearth covered by an arch, on which the potash is laid, and two fireplaces. The smoke and heated air escape on the side of the hearth opposite to that on which the furnaces are placed. The same opening which permits the escape of the smoke serves for the introduction of the potash. The heat is sufficient to fuse the potash, which would adhere to the hearth were it not stirred. About an hour after the fusion is complete, the vegetable matter takes fire, and is converted into carbonic acid and vapor of water. If chloride of potassa is present, it is decomposed and decrepitates at the commencement of the operation. The substance thus becomes white, with the exception of a few stains of a violet color, which are owing to the presence of the oxides of iron and manganese.

Salt of tartar is prepared from the lees of wine, in countries where that liquor is manufactured. In the several decantations to which it must be subjected, solid matter is left in the tons and casks. This is put in bags and pressed. The paste thus obtained is bent, by the pressure, into the form of a roofing-tile, and is dried upon planks in the sun.

These masses are then burnt on a circular floor of well beaten earth, about six feet in diameter, which is surrounded by a wall of brick without mortar, about 8 inches in height. A faggot of twigs is placed in the centre and set on fire; this is surrounded by about 20 of the dry cakes. As soon as they are inflamed, more cakes are added, until the space inclosed within the wall is filled. The wall is then gradually raised and the heaps of lees increased, until all that have been prepared are consumed, if less than 1000 cakes, at which number the process ceases. The combustion is to be maintained in a regular and steady manner, by varying the quantity of the lees which are added.

The ashes obtained weigh about one-sixth of the weight of the lees employed, and contain about half their weight of carbonate of potassa. They are therefore sufficiently rich to be used, without further preparation, in several arts; but in order to obtain the salt of tartar, they must be lixiviated, and the ley evaporated to dryness.

2. *Barilla, Kelp and Sal-Soda.*—Barilla and kelp contain a carbonate of soda analagous to that of potassa, which is procured from the ashes of wood. They are obtained from marine plants, or those which grow in the immediate vicinity of salt water. Barilla is manufactured from the *salsola soda*, which is cultivated in great quantities on the Mediterranean coast of Spain, for the purpose. The plants, when they have attained their full growth, are cut and dried in the air. They are then burnt in pits about a yard in depth and 3½ feet square. The combustion lasts several days, and the product is a hard, compact mass, partially fused. It is so rich in soda that it is not necessary to lixiviate it, but it may be employed in many of the arts without any further preparation. The quantity of carbonate of soda varies from 25 to 30 per cent.

An inferior quality of barilla is prepared in the south of France, from the *salicorna annua*. This does not contain more than 15 per cent. of carbonate of soda.

Kelp or wareck is made on the north coast of France, and on those of Scotland and Ireland, from sea weed, (*fucus*,) which grows abundantly on the rocks which are within reach of the tide. It does not contain more than from 3 to 5 per cent. of carbonate of soda. It contains, however, a large proportion of the sulphate of soda and potassa, and the chlorides of their metallic bases. It may, therefore, be employed as a substance rich in alkaline matter, under circumstances which will insure the decomposition of the sulphates, and the conversion of the chlorides into oxides. The iodides of potassium and calcium are likewise constituent parts both of barilla and kelp, and the greater part of the iodine used by chemists is obtained from them.

The substance known in the shops as sal-soda or common soda, is usually obtained from barilla or kelp, by lixiviation and crystalization, so conducted as to separate the several soluble matters in the order of their respective solubilities.

The carbonate of soda, which exists in barilla and kelp, has an alkaline reaction, and is composed of one equivalent of soda to two of acid. Another carbonate is used in the manufacture of soda water, which is composed of one equivalent of soda to three of acid. The same salt exists native in Africa, and is known under the name of nation.

The demand for soda in the arts is such, that it cannot be supplied by the ashes of marine plants: it has therefore been obtained from common salt, and the manufacture from this material is now successfully conducted in France.

The first part of the process is the same as that described for the manufacture of muriatic acid. The residuum in the cylinders, after the whole of the acid has been evolved, is sulphate of soda.

To decompose sulphate of soda, various modes have been proposed, but that which has superceded all the others is the invention of a French manufacturer of the name of Leblanc.

PROCESS OF LEBLANC FOR THE MANUFACTURE OF ARTIFICIAL SODA.

AUTHORITY,—DUMAS. Chimie appliquee aux arts.

History.—Sulphate of soda may be converted into sulphuret of sodium by calcination with charcoal. The sulphuret of sodium is soluble in water, and may be converted into bi-carbonate of soda by passing a current of carbonic acid through the solution; for under the influence of that acid, the sodium will decompose the water, and unite with its oxygen. A gentle calcination will cause the bi-carbonate to part with its excess of acid. There are, however, but few cases where this plan could be advantageously employed. Before the French revolution, sulphate of soda was heated in a furnace with charcoal and iron. The product was a fused mixture of caustic soda and sulphuret of iron. But this method is no longer practised.

Rationale.—In Leblanc's process, 1000 pts. of dry sulphate of soda are mixed with 1000 pts. of chalk (*carbonate of lime*), and 550 of charcoal in powder. The proportions are nearly the same as 2 equivalents of sulphate of soda, 3 of carbonate of lime, and 18 of carbon. When these are heated together, the sulphate of soda and two equivalents of the carbonate of lime mutually decompose each other, and become carbonate of soda and sulphate of lime; the latter is decomposed by the carbon, and becomes sulphuret of calcium. This sulphuret being soluble in cold water, and being then reconverted into sulphate, which in such case would act upon the carbonate of soda to produce a double decomposition, the third equivalent of lime is necessary, for this forms with the sulphuret of calcium a compound which is insoluble in cold water.

Manufacture.—The three substances above mentioned, being mixed in the proper proportion, are placed on the hearth of a reverbera-

tory furnace, by means of a door left in the side wall. The mixture speedily begins to fuse and run together in lumps. To prevent the last action, it is well stirred with a rake. So soon as the whole is fused, innumerable bubbles of carbonic oxide escape, and burn as soon as they come in contact with air. The water which exists in the materials is next decomposed, and uniting with sulphur and carbon, yields carburetted and sulphuretted hydrogen, which also burn. So long as these gases are forming, the mixture must be continually stirred; when their escape ceases, the process is nearly completed. The mixture is tested by thrusting a bar of iron into it, and examining the crust which adheres; when this exhibits a homogeneous character, the operation is finished. The fused mass is then drawn from the furnace, and permitted to cool upon the ground-floor of the factory.

If the charge be 800 lbs. of sulphate of soda, and the proper proportions of the other materials, the action lasts about two hours; and about five charges may be acted upon in 24 hours.

The solid matter thus obtained is composed of about equal parts of carbonate of soda, and the compound of sulphuret of calicum and lime. Their joint weight is about 60 per cent. of that of the materials employed; the remaining 40 per cent. has gone off in the form of gas.

The carbonate of soda may be separated by lixiviation and evaporation to dryness. The latter process is performed in an apparatus composed of four boilers placed over the same flue. That which is farthest from the fire is merely used for heating the liquor to the boiling point; in the two next it is concentrated, and in that which is over the fire, the evaporation to dryness is completed.

The dry mass obtained from the furnace in which the decomposition is effected, generally contains some sulphuret of sodium; by exposure to the air this is converted in hypo-sulfite of soda, which is soluble in water, and exists in the product obtained by evaporation to dryness as an impurity. Pure and crystalized carbonate of soda may be obtained by permitting the ley to crystalize in cold weather. The mother waters of this process are evaporated to dryness, and give a soda of inferior quality.

Such is the demand for the artificial soda in France, that it has not been found possible to supply it, and at the same time save all the muriatic acid which is set free in the formation of the sulphate of soda. In many of the manufactories the common salt and sulphuric acid are heated in a reverberatory furnace, and the waste heat is used to heat a second furnace, in which the sulphate is decomposed. Hence the mixed gas and heated air is made to pass into large chambers filled with blocks of quick lime. This serves to condense a part of the acid. From this chamber the smoke is conveyed, by a sloping channel, also lined with quick lime, to a chimney.

When a sufficient quantity of water can be commanded, the fumes are conveyed from the furnaces to a sloping channel, along which a current of water flows, or enter a lofty tower filled with pebbles, over which a small stream of water trickles.

If this manufacture should ever be introduced into this country, the muriatic acid will probably be at least as important a product as the soda; the method of cylinders and condensing vessels of glass will therefore be the most advantageous.

It cannot be doubted that the time is not far distant when these substances will be manufactured to advantage in the United States, probably in the vicinity of our salt springs.

It may also be mentioned that the *salsola* is a native of our maritime coast, and that our extensive salt marshes might probably be applied with profit to its culture.

3. AMMONIA—SAL AMMONIAC.

History.—The ancients were acquainted with a salt brought by way of Egypt from the Temple of Jupiter Ammon, in Lybia. As this was found in the stables of that temple, it was probably the triple phosphate of soda and ammonia. A substance of different origin, (the muriate of ammonia,) being subsequently brought from Egypt, the name of the former (sal-ammoniac,) was applied to it, for in the infancy of chemical science the two substances were confounded. The manufacture of sal-ammoniac was afterwards introduced into Europe—putrescent animal substances being employed for the purpose of furnishing the volatile alkali. This manufacture received its greatest extension on the establishment of the *abattoir des chevaux*, at Montfaucon, near Paris. Still more recently, large quantities of ammoniacal liquor have been obtained at the works where *gas* is prepared from coal for the purpose of illumination.

Process used in Egypt for the manufacture of Sal-Ammoniac, (Muriate of Ammonia.)

AUTHORITY.—Description d'el Egypte.

Almost the only fuel employed in Lower Egypt is obtained by drying the dung of camels and other animals. In the decomposition of this, by the heat of the fire, muriate of ammonia is formed, which being volatile passes into the chimnies, where it is condensed along with carbonaceous matters in the form of soot.

The soot being collected, is introduced into large globular vessels of thin glass, until they are more than half full. A number of these balloons are then placed in a species of long stove, the opening by which the soot was introduced being placed uppermost. Heat being applied to the bottom of these vessels, the opening is closed as soon as the air contained in them has reached its full expansion. If closed before, the vessel would be broken; and it is necessary, towards the close of the process, to keep this opening free, by an iron rod.

The muriate of ammonia which is sublimed from the soot, condenses on the upper part of the interior surface of the globular vessel, in the form of slender acicular crystals, which, by their aggregation, form a tough, tenacious cake. In this form, it becomes an article of trade. The cakes weigh from 3 to 6 pounds, and are slightly blackened by the carbonaceous matter.

European Process.—In the cities of Europe, the collection of rags forms an object of industry. Those of linen are employed in the manufacture of paper; some of the woolen rags contain colors of sufficient value to make it worth while to extract them; but the greater part are of no other use but to be decomposed by heat, for the sake of the ammonia they are capable of yielding. This decomposition is effected in iron cylinders at a low red heat. The volatile matter which is evolved, is condensed in receivers of glass or earthenware. By condensation about half the weight of the woolen is obtained in a liquid form, charged with an impure carbonate of ammonia, along with an empyreumatic oil, which is of no value. To convert the carbonate of ammonia into muriate, the mother waters left by the crystalization of common salt, which contain muriates of the alkaline earths, (or more properly, chlorides of their bases,) are employed. These are concentrated by boiling to a density of 1.367*, and are then mixed with the ammoniacal liquor in the proportion of 1 to 2. By the double decomposition which ensues, a quantity of muriate of ammonia is formed, which remains in solution in the liquid, while the carbonates of the earths are precipitated in the solid form. The latter are separated by decanting and filtration, and the liquid is evaporated to dryness. In this state, or merely crystalized, it might be an article of trade, but as the form of the Egyptian sal-ammoniac is required by the consumers, it is sublimed in glass balloons, exactly as in the Egyptian process, and it has a superiority over what is obtained from that country, in being of a purer white.

Bones, horn, parings of hides, and almost all other refuse animal matter, whose putrefaction has commenced, when distilled at a low red heat, yield ammonia and its carbonate. The horns of deer, in particular, yield it in a tolerable degree of purity, and were employed in the fabrication of the liquid known as spirits of hartshorn, a name that is still occasionally employed to designate the pure solution of ammonia which is obtained from the decomposition of its muriate.

A sulphate of ammonia has been manufactured by filtering the liquid obtained by the distillation of animal substances through powdered sulphate of lime (gypsum). The sulphate of ammonia is obtained in the solid form by cyrstalization. This sulphate has also been converted into muriate, by mixing it with common salt and subliming. This method has been claimed, by Dr. Ure, for an Englishman of the name of Minish, but it was invented many years since, in Germany, by Wensel.

For the manufacture of the liquid ammonia, the sulphate answers as well as the muriate.

Instead of iron cylinders, tight kilns of brick have been used for the decomposition of the animal matters. Muriatic acid gas may be generated in a similar kiln, by the action of sulphuric acid on common salt. If the two gases be made to meet in a receiver lined with lead, the bottom of which is covered with a few inches of water, the sides and top will be covered with crystals of sal-ammoniac.

The muriate or sulphate of ammonia may be decomposed by quicklime, and gaseous ammonia evolved; or, by the addition of water, the solution of that gas in the liquid may be obtained, and condensed in proper receivers. This process is rather an object of elementary chemistry, than of its application to the arts.

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*40° of Beaume.

METEOROLOGICAL RECORD,

For the month of October, 1835, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10' N., Long 91° 59' W. nearly,) by P. G. VOORHIES. [Communicated for the American Railroad Journal.]

OCTOBER.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	55	82	76	calm	clear	
2	70	82	73	..	cloudy	light showers in m'ng and thunder in ev'ng
3	60	80	74	..	clear	
4	65	75	66	SE	cloudy	light showers in the morning—ev'ng heavy thunder and rain
5	62	61	61	NE	..	
6	61	63	59	calm	clear	
7	43	72	61	..	..	Red river on a stand
8	43	70	60	..	..	Red river rose this month 5 inches—below high water ¼ in.
9	46	65	60	..	..	
10	47	70	61	..	..	Red river falling
11	43	71	64	..	..	
12	47	72	67	..	..	
13	51	75	68	..	..	
14	53	75	67	SE	..	
15	53	73	71	E	..	cloudy in the morning, and a little rain
16	72	78	74	SE	cloudy	heavy showers rain m'ng, and high wind
17	75	72	69	S	..	thunder and heavy rain all day
18	60	64	61	W	clear	at noon heavy rain and thr, and all night
19	57	62	63	calm	..	wild geese flying to the south
20	62	71	62	..	..	
21	66	77	71	..	cloudy	foggy morning
22	63	77	72	SE	clear	.. ..—cloudy ev'g
23	63	78	75	calm	..	
24	67	76	75	..	cloudy	all day
25	64	76	72	..	clear	
26	59	77	62	..	..	
27	53	73	61	..	..	
28	53	76	65	..	..	
29	64	79	72	..	..	
30	63	77	72	..	..	cloudy evening—rain all night
31	53	55	52	N	cloudy	

Red river fell this month 2 feet 11 inches—below high water mark, 3 feet 4½ inches. On the 7th Red river had rose this month 5 inches, and was then ¼ in. below high water mark.

From the London Mechanics' Magazine.

ELECTRO-MAGNETIC MOVING POWER.

British Association.—Section of Mathematics and General Physics.—The Rev. Mr. M'Gauley exhibited the working model of a machine for producing moving power by the application of electro-magnetic influence. The model consisted of a pendulum, the lower part of which was a magnet placed with its poles opposite to the ends of two horse-shoe bars of soft iron, round which were coiled helices of wire so arranged that by the end of the helices dipping into cups of mercury the poles of a simple galvanic battery could be alternately made to communicate with the cups in one order, and the next instant the machine reversed that order by means of a system of bent wires, caused to vibrate upon an axis, the ends of these bent wires alternately dipping into one pair of cups, and the next vibration into another; by these means the soft iron horse-shoes are at one time a magnet with the poles in one order, the pendulum being then attracted towards both these poles, but the next instant, the poles being reversed, the pendulum is thrown forcibly back, while the opposite soft iron horse-shoe is now a magnet ready to attract it; then again it is thrown back from this second temporary magnet by the instantaneous reversing of its poles, and so on. The model worked smoothly and with a very uniform regulated motion, and appeared to be capable of working for a great length of time. Mr. M'Gauley stated that the erosion of the zinc plate was so inconsiderable, that there was hardly any limit to the length of time that the model would continue working. The acid best suited to the purpose was a mixture of one part nitric acid, two parts sulphuric, and one hundred water; he also stated that the acid in practice could be always renewed by having a constant dropping of fresh acid liquor into the trough, while a similarly gentle discharge of the spent acid from the trough could be kept up. He stated, that a numerical comparison of the economy of this mode of producing motive power with that depending upon the agency of steam, would give a vast preponderance in favor of this method, while the part of the power consumed in working the machine itself might be left entirely out of account, since the apparatus which changed the poles in his model, would equally suffice in a machine capable of working with the power of one hundred horses. In his model he only worked one of the two soft iron magnets, and its power was only that of lifting seven pounds, and yet this appeared to be sufficient to overcome all the friction, inertia, and other impediments to motion, of the several parts of the machine.

The exhibition of this model was received with sincere and reiterated applause, and many scientific men present expressed sanguine expectations of the value of the method in a practical point of view, all agreeing that it was the best attempt yet made of the many schemes that had been proposed for producing motive power by the electro-magnet.

It is but an act of justice to state that the foregoing apparatus is in every respect similar to one described, some time ago, in Silliman's Journal, and being the invention of Professor Henry, of Princeton, N. J.—Prof. H., we understand, was the first to start an idea since frequently practised upon.

A few weeks since we copied an article, stating that common cranberry juice externally applied to Ring Worms, would perfect a cure. Since that time, a person in our office, subject to this distemper, has applied the specific with entire success.—[Syracuse Standard.]

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, FEBRUARY 6, 1836. [VOLUME V.—No. 5.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 6, 1836.

☞ The Editor of this Journal is desirous to obtain a few copies of the following Numbers, of Volume 4, viz: Number 1—5—32—41—45—47—48—49—of which very few were saved.

NEW-YORK AND ERIE RAILROAD.—The bill authorising a State loan of three millions to this Company has just passed, by a vote of 63 to 45.

RAILROAD MACHINERY.—One amongst the best evidences of the wonderful increase of Railroads in this country, will be found in the constantly increasing number of machine shops and foundries in this city and elsewhere, for the manufacture of *Locomotive Engines, Cars* and *Railroad Machinery.* We have been led to these remarks by the discovery, in one of our rambles, of a new establishment *in the line*, at least new to us, at 100 *North Moore*, corner of *West street*, by H. R. Dunham & Co. On entering the shop we were pleased to find a Locomotive on the stocks, and in some respects upon a new plan. Also a large number of car wheels, of cast-iron, which appear to be a first rate article. We were informed that, out of about 200 wheels furnished the Camden and Amboy Railroad Company, there has not been a single failure.

Messrs. Dunham & Co. are prepared to receive orders in their line, which will be executed promptly, in the best manner. To the gentlemen of this establishment, and indeed all others in the line, of whose manufactures we may have an opportunity to speak in commendation, we hope a liberal patronage may be extended. Their advertisement will be found on our last page.

We should do violence to our feelings if we were to refrain from expressing our gratitude for the kind favors of our friends. We select the following from many similar communications which have been received within a few weeks, and we need not say that we duly appreciate the kindness of those who take so much interest in our affairs. Gloomy as was the prospect on the morning of the 17th of December last—and it *was indeed gloomy*, when the flames and smoke covered the space where, but a few hours before, all was activity, and life, and prosperity; and where, in a small space, was gathered together the fruits, *small* though they were, yet to us of much value, being the earnings of *ten years* hard labor—we have *much reason to be grateful* that our friends do not forget us.

"Feb. 7, 1836.

"D. K. MINOR:

"Sir,—I inclose ten dollars, one year's subscription to your Railroad Journal, for I. H. and for O. C. H.—both of this village—commencing with the present year. Please send receipts for each.

I am pleased thus to add my mite towards the support of your truly American System Journal. I believe in this particular I advance my own sentiments best by helping you.

In future, as our little village grows, I shall, I hope be able to send you other names. Yours, respectfully,

A. S. W."

Logansport, Ia., Jan. 26, 1836.

To the Editor of the Railroad Journal:

Dear Sir,—As I have learned, through the medium of the public papers, that you were among the unfortunate at the late fire in your city, and not having heard, until yesterday, that the publication of the Journal would be continued, I had declined remitting you the amount of my subscription to your paper, for this year.

I now inclose you ten dollars, for my subscription to the Railroad Journal for 1836, and for the subscription to the same paper, for the same period, for J. P. T., of this place.

I also send you the "Indiana Journal," containing the Internal Improvement Bill, as it passed the Legislature of our State, at its *present* session. By this, you will discover that Indiana has authorised a loan of $10,000,000 to be applied to the construction of works of Internal Improvement. This bill has, no doubt, determined the destiny of Indiana, and, I hope, placed her upon a level with her more aged and wealthy sister States. By a reference to the map of this State, you will discover the route of the White River or Central Canal, extending from Evansville, on the Ohio River, through Indianapolis, to the Wabash and Erie Canal, at, perhaps, Wabash town—uniting, in this way, the commerce of the Mississippi and Lake Erie by a Canal of 450 miles in length, 80 or 90 of which will be through the State of Ohio.

There was some diversity of opinion with regard to the policy of constructing a *Canal* upon this *route*, as it was believed that a Railroad proposed many and *important* advantages over Canals, as it would connect Lake Erie, and consequently New-York, with New-Orleans, by a route *shorter* by TWO DAYS IN TIME, than any other which could be projected west of the Alleghanies. A Railroad from Evansville to Fort Wayne, passing through the Capital of the State, would be about 280 miles in length—thence to the Maumee Bay, by the Wabash and Erie Canal, 100 miles. Passengers, therefore, who might leave Evansville by Railroad, would reach the Lake before a steamboat, which had left the former place at the same time, had arrived at Cincinnati.

Respectfully, L. B. W.

Publicola is welcome again; it is a long time since we last heard from him.

For the Railroad Journal.

SOCIAL INFLUENCE OF ROADS AND RAILWAYS.

In rude states of society, there are no good roads intersecting a whole country. In consequence, different sections have no intercourse with each other; and there has existed in former ages a multitude of petty kingdoms, fifty miles square, or a hundred miles square, or larger or smaller, according to natural boundaries. These were jealous of each other. Each viewed its neighbors as strangers and enemies; and, having no commercial transactions with them, or but to a small extent, it had little temptation to avoid a state of war. Great nations were first formed where communication was easily maintained between remote places. Thus the making of good roads over the surface of the earth, has been one of the most efficient causes in forming great nations; and the formation of such great nations has destroyed jealousies and prejudices, and has put an end to hostilities between the provinces which now constitute one country, but which before were distinct kingdoms, and had their peculiar languages or dialects.

Railroads will make, in some parts of the world, as great a change in the existing state of society, as good common roads have helped to make in past centuries. They will make intercourse so easy with places two thousand miles distant, that the people of the two places will have literary, religious, social and commercial connexions with each other, too close and valuable, to allow of being interrupted by wars, without extreme necessity.

But not only may railroads be viewed as important by binding together in friendship distant countries, or remote sections of the same country; the system may be applied to the accommodation of the people scattered over the whole surface of our soil in the whole business of social life. When it is considered that as easily as a man can wheel on a common road by his own labor a single bushel of corn, he could move on a railroad, with the same rapidity, a load of more than 1200 lbs., it will appear probable that railpaths for short distances, to main railroads, will be formed for the use of men. This will be further apparent from the fact that the same power which a man exerts in going up stairs twenty feet high, would propel him forward on a level railpath nearly a mile; and if his carriage in which he moved himself weighed 500 lbs., the additional power necessary to move this, would be only that exerted by a man in raising two pounds twenty feet high, or as easily as a man can ascend a stairs twenty feet, carrying with him two pounds weight, he could propel himself in a car weighing 500 lbs., very nearly a mile. There would be a vastly greater amount of business done oevr the country but for distances of three, five, eight and ten miles, at which people are from the places where they might do their business.

Many articles of produce, or of the growth of the land, would be vastly more valuable to the farmer but for these short distances over which bulky articles must be carried.

The advantages of the whole public for attending higher schools, and all literary and religious meetings, are incalculably diminished by these distances.

Accordiug to Sir John F. W. Herschel, a man working eight hours a day, would exert the power of raising 364½ lbs. ten feet high each minute, or 729 lbs. five feet high each minute. But the power required to raise 729 lbs. five feet high in a minute, would carry such weight forward on a level railroad five times 240 or 250 feet, or more than a fifth of a mile. Thus a man exerting on a level railpath the strength he lays out in his ordinary labor, for only five minutes, may propel a weight of 729 lbs. more than a mile.

A man lays out his whole ordinary strength in walking a mile in fifteen minutes, without any load; but on a level railpath he could, with the same application of power, move a weight of 729 lbs. three miles in the same time. But if we should take all seasons of the year into view, it would be found that in the country a man would as readily do common labor for twenty minutes, as walk one mile; for he must sometimes wade or wallow in snow or mire, when a walk of one mile would be equivalent to half an hour's labor.

Could the country to any great extent be intersected by such railpaths as are here referred to? What then are the difficulties?

1. The cost—a very important consideration. But the cost would be very small, no more strength or solidity being required in the structure than to support at one point, or under one car, about 2000 lbs.

2. Deep cuttings. These would never be needed; for the railpaths are supposed to have but a few miles to run before they enter into larger railroads; and these railroads will be along the vallies of rivers, or at their level at least; the railpaths will easily fall into them; and if they must be extended several miles to avoid crossing a hill, as they are cheaply made, the increased length is no great evil.

3. Inequalities of ground. As to a great part of the minor business and intercourse of the agricultural districts, the course of trade, &c., is controlled very much by the lay of the land. Between two villages five or six miles apart there is a very high hill, or a deep valley and a tract of barren land. This hill, waste, or valley becomes a natural boundary between the people on each side as to social, religious and commercial affairs. Thus the business, social, and ecclesiastical connexions of towns depend very much on their being on a great or easy road, or natural channel of conveyance. If railpaths should be adapted to the inequalities of the ground, so that a level should be preserved, business would flow into these paths just as has been always the case in opening new and better roads; and if the existing course of business should be in some instances greatly disturbed, it would only be a temporary derangement.

4. Want of business. The internal travelling and transportation, social, religious and commercial, in nearly every town in the country, is, I think, from five to ten times all the travelling and transportation it makes out of the territory of the town, even over all the roads and railroads in the nation. There will not then be a want of business for a few judiciously selected railpaths through every well settled township in the Union.

5. Want of funds to build them. They must be free, and therefore be made by public corporations, towns, cities, counties, or states. If these do not choose to make them, private corporations will make them, for the revenue which they will see a fair prospect of deriving from them. When they have thus succeeded in the most promising routes, other routes will be commenced, and the system will extend. Such a system, if successful, or if only partially practicable, would greatly augment the business and revenue of the main railroads. They would be to these roads like the rills and brooks and smaller rivers to a noble flood that still swells as it receives one tributary after another, and pours its full tide into the ocean by some great city. This, though it may be rich and powerful and proud, owes all its commerce to the labors of farmers and mechanics, scattered widely, whose productions collected in small, and then in larger and larger quantities, till they swell to the mass of goods that fill a great centre of trade.

PUBLICOLA.

The foregoing communication is well worth a perusal. The idea thrown out is a novel one, yet deserving of notice. We wish all manner of prosperity to "*railpaths.*"

RAILROAD AND CANAL INTELLIGENCE.

NEW-YORK.

Several meetings have been held in Dutchess county, in relation to a proposed Railroad from New-York to Albany—recommending the direct route, instead of the one proposed through Stockbridge, &c.

NEW-JERSEY.

WEST JERSEY.—We have noticed recently gratifying indications of a spirit of improvement in West Jersey. Among other schemes of improvement, Railroads have been projected from Mount Holly, in Burlington county, and from Woodbury, the county town of Gloucester, to Camden, opposite Philadelphia. The latter route has been examined by an Engineer, Mr. H. R. Campbell, of Philadelphia, who estimates the entire cost, including the eight miles and a half of Railroad single track, the locomotives, cars, &c., at $80,400, and the

annual expense, including interest on the capital, $14,374. Mr. Campbell furnishes the following estimate of the probable receipts:—

100 regular passengers, or 50 each way, at 25 cents, $25 per day, and 313 days in a year,	$7,825 00
50 pleasure travellers, or 25 each way, who would not travel except by Railroad, at 25 cents each,	3,912 50
50 market men, or 25 each way, with marketing, at 25 cents each, per annum,	3,912 50
Transportation of merchandize, produce, wood for fuel in winter season, lumber, &c.	4,000 00
Total income per annum for 5 years,	$19,650 00

A respectable committee, of which Dr. Spencer is chairman, has been appointed to prosecute the Road from Mount Holly.

The citizens of Burlington, we notice by the Gazette of that place, are zealously contending that a Road from their county town to the Delaware at that place would answer a better purpose than the route to Camden, the two places being only 7 miles distant. The importance of increased facilities of getting to market is shown by a variety of considerations. Among other things, it is stated that 100,000 bushels of grain were sent down the Delaware and Raritan Canal from that county during the last season.

In Salem, too, measures have been devised to give increased energy and facilities to business by the removal of the obstructions in Alloway's Creek.—[Newark Daily Advertiser.]

In the Legislative proceedings we find a number of Railroad bills in successful progress—some having passed the House unanimously.

PENNSYLVANIA.

Several Railroads and Canals have cause to rejoice in the passage of the "United States Bank" bill. Among others, the Williamsport and Elmira Railroad. This Road connects the Pennsylvania Canal at Williamsport with the Chemung Canal at Elmira, by a very direct route.

MARYLAND.

Several memorials have been presented to the Baltimore City Council, requesting them to subscribe to the Baltimore and Ohio Railroad to assist an extension of the Road to the Ohio.

From the Baltimore Gazette.

Annapolis, Feb. 14, 1836.

In the Senate, yesterday, Mr. Pigman reported a bill supplementary to the act for the preservation and repair of that part of the Cumberland Road which lies within the limits of this State.

In the House, Mr. McLean presented the memorial of the President and Directors of the Baltimore and Port Deposite Railroad Company, showing the manner in which they have commenced and prosecuted their work, denying the charges made against them, and freely assenting to the most rigorous scrutiny of their proceedings; also the memorial of Thomas Ford, Wm. H. Stump and others, protesting against any interference with the construction of said Road.

On motion of Mr. Jones, it was ordered that the Committee on Grievances and Courts of Justice, be instructed to inquire into the expediency of adopting such measures as shall compel the Chesapeake and Delaware Canal Company, to adjust the claim of a certain John Randall, of Delaware, against said Company, or to cause said Company to permit all vessels hailing from ports of entry in Maryland, and to pass through the Canal within the limits of Maryland free of toll, until said claim shall have been finally settled.

Mr. Pratt, from the Committee on Internal Improvements, reported to the House that in obedience to the order of the House, they had requested of the Baltimore and Susquehannah Railroad Company, a report of their proceedings under the act authorising them to construct a lateral Road to Westminster, and had received an answer from the President of said Company, containing the desired information, which he laid before the House.

RAILROAD IN MAINE.

Surveys have been made under the authority of the State of routes for Railroads from Portland westward to Gorham, and from thence through Alfred to the State line near Dover, N. H., one of the most flourishing manufacturing towns in the Union. From Dover, the Railroad is expected to extend to Boston. The Board of Internal Improvements, of which James Hall, of Portland, is Engineer, have also acted on petitions for surveys of a Canal to connect Moosepond with Sebasticook River; of a Canal from Readfield to Gardiner; of a Railroad from Brunswick to Casco Bay; and of a Canal from Androscoggin River to Sebago Pond.

RAILROADS IN MICHIGAN.

Companies have been chartered for the construction of Railroads from Detroit to the mouth of St. Joseph's; from Toledo to the mouth of the Kalamazoo; from Monroe to some point on the Detroit and St. Joseph's Railroad—Marshal, we believe; from Detroit to Pontiac, which will probably be continued to Saginaw, or the Grand River; from Mount Clements to Saginaw. Perhaps the whole length of these cannot be less than 700 miles. The money paid on account of ardent spirits by a population of 200,000, would be sufficient, in six years, to complete all these works.—[Detroit Jour.]

INDIANA.

The great Internal Improvement Bill passed the Senate of Indiana on the 17th ult., and has become a law. It provides for a loan of *ten millions of dollars* on the credit of the State, to be expended under the directions of a Board of Internal Improvement, on the following objects:—

$1,400,000	on the White Water Canal;
3,500,000	on the Central Canal, to terminate at Evansville;
1,300,000	on the extension of the Wabash and Erie Canal, to Terra Haute—thence, to connect at the point on the Central Canal which will be most conducive to the public good, at or between the mouth of Eel River and Black Creek, Knox county;
1,600,000	on the New Albany and Lafayette Railroad;
1,300,000	on the New Albany and Crawfordsville McAdamised or Railroad, and
1,500,000	on the Louisville and Vincennes McAdamised Road.

"The bill also provides a loan to the Laurenceburgh and Idianapolis Railroad of $500,000.

CANADA.

We notice in the Quebec Mercury that a discussion on the subject of the improvement of the navigation of the St. Lawrence—also, a motion to appropoiate $500 to explore Lakes St. Francis and St. Louis, in order to ascertain the depth of water in the channels of those lakes.

The party that had been despatched by the St. Andrew's (N. B.) Railway Association, for the purpose of exploring the best route for the Quebec and St. Andrews Railroad, returned to the latter place on the 15th ult., and gave a very gratifying account of the result of their labors. Their plans and reports had not been submitted to the public.

ILLINOIS AND MICHIGAN CANAL.

The following particulars may prove interesting:—

William Gooding, Esq. has been appointed by the Canal Commissioners Chief Engineer, and Edward B. Talcoot, Esq. Assistant Engineer, of the Illinois and Michigan Canal. Mr. Gooding is now engaged on the Wabash and Erie Canal, Indiana, and sustains a high reputation for experience and ability in engineering; and the practical knowledge of Mr. Talcott gain d on the New-York works insure confidence in his ability.

We learn that Mr. Smith, of Wabash, (member of the Legislature,) has also been appointed Assistant Engineer, and Mr. Manning Secretary to the Board. The Commissioners will meet at Chicago on the 5th of March next. The Engineer Department is to be organized on the arrival of Mr. Hubbard, and the Board hope to be able to let contracts by the first of June.

FOREIGN.

The navigation of the Danube by steamboats may be considered as decided upon. The subscriptions for the undertaking already amount to 1,200,000 fr., and a general meeting is to be held in March, when all the preliminary works and plans will be prepared to be laid before the share-holders.

The Belgian journals mention a new system of iron Railroad invented by a watchmaker at Brussels, which he calls *proving iron Railroad*, because it moves with the carriage by which it is carried. Vehicles of every kind to which this system is applied, will travel as they now do on the ordinary roads and streets, and may be set in motion by every sort of power. It will be recollected that something of the same kind was some time ago mentioned in the English papers as having been invented in Great Britain.

A German paper arrived to-day, asserts that the Prussian Government has refused its assent to the Cologne Rhenish Society, which was formed to construct a Railroad from Cologne to the Belgian frontier. The journal, however, expresses a hope that the Prussian Government itself will undertake the task of constructing this Railway.—[London Courier, Jan. 2.]

RAILROADS IN GERMANY.

The Director of the Iron Railroad Society has had the honor of being admitted to an

audience of his Majesty the Emperor. As soon as the season will admit, the workmen will begin the Railroad to Gallicia, and will proceed with all possible activity, so that it is hoped the communication with Gallicia will be open in the year 1837. This enterprise is greatly encouraged here, and the shares meet with a ready sale.—[German Paper.]

We think the following Report of so much importance, that we give it entire:—

PHILADELPHIA AND COLUMBIA RAILROAD.

Report of the Committe appointed to examine into the present state of the Motive Power on the Philadelphia and Columbia Railroad.

The Committee appointed by the House of Representatives on the 6th instant, to examine into the present state of the motive power on the Philadelphia and Columbia Railroad, and for other purposes, expressed in the resolution authorising their appointment, make the following report:

That in the afternoon of the day on which they were appointed, they proceeded to Columbia, at which place they entered upon the investigation of the subject committed to their charge. They thence advanced along the line of the Railroad, stopping at such places as they deemed most likely to afford information relative to the object of their mission, and examining those persons whom they judged best qualified to impart to them a full and fair understanding of the subject of inquiry. On the evening of the 11th, they reached the city, where they availed themselves of the opportunity to examine many individuals connected with transportation companies, or engaged in forwarding merchandise on the road, from whom they obtained much important information.

The number of locomotive engines belonging to the Commonwealth on the Philadelphia and Columbia Railroad is SEVENTEEN.

[Here follows a detailed account of the various engines on the road, but it is unnecessary to give it a place.]

The committee find that much dissatisfaction exists in regard to the inefficiency of the motive power, under its present management; and that it is, and has been for some months, decidedly and palpably insufficient for the required transportation. They have it in evidence, and that too from one of the officers employed by the State on the road, that in the month of December, of the seventeen locomotive engines, owned by the Commonwealth, the average number actually running daily, was but three or four! Some little improvement seems to have taken place since the commencement of the present month; but without a radical change of the whole system of management, the services of the motive power must remain insufficient, and extremely uncertain. It has baen satisfactorily proved to the committee, that loaded cars have frequently stood waiting for conveyance by the motive power, for several weeks; often to the great detriment and loss of the owners of merchandise and produce; and that waggons and other modes of conveyance have to be employed to forward it. It is believed that the loss to the State in tolls, which would have accrued on produce forwarded by other means than the Railroad, in consequence of this deficiency of motive power, is very great. The proprietors of one of the transportation lines, whose tolls alone amount to $3,000 per month, have stated to the committee that they have been compelled to take merchandise from their warehouse on the Railroad, and to forward it by the Union Canal. A large amount, also, of the merchandise and produce transported between Philadelphia and Ohio, for which our Railroad would be preferred, if furnished with capable motive power, is sent by the way of Baltimore and Wheeling.

After careful inquiry into the cause of the inefficiency of the locomotives during the latter part of the past season, the committee are convinced that much of it has arisen from the want of a proper workshop and tools for repairing the disabled engines. This, they hope, will now be remedied by the new State establishment, judiciously located at Parkesburg, in Chester county, about midway on the road, where a large and convenient building has been erected, in which the workmen have recently commenced operations. A steam engine is now being put up, attached to this shop, which will afford material aid in certain parts of the work; and the whole is now under the direction of a careful and experienced machinist. The repairs done at the Schuylkill and Columbia depots, are not superintended by persons scientifically or practically acquainted with the business.

The principal cause of inability in the engines, as will be perceived by the specific report of them already given, is the want of tire for the driving wheels. This, from the peculiar structure and location of our road, is subject to severe wear, and requires frequent renewal. It is an article, which as yet, has not been manufactured to any extent in this country; and the impossibility of obtaining it in sufficient quantity, and in proper time from England, has kept a considerable number of our engines idle for some time, and has materially retarded the successful operation of others. The committee, however, have the satisfaction of being able to state, that this defect in our domestic manufactures is now about to be supplied, and that a considerable quantity of tire is very soon expected to be furnished, made in our own country, and of our own iron, which, it is believed, will be found much more durable than that heretofore imported.

There is also little doubt that the locomotives are very frequently injured by the carelessness or incompetency of the engineers managing them. The want of a proper system of direction, and the necessity of a reform as regards the regulation of this branch of the subject confided to their examinations, the committee feel bound to say, is very apparent. From the time the engine leaves the depot, and while running the entire route, the engineer is under no control whatever, and is under no responsibility as to his conduct or the management of the engine. His speed is regulated by his own will; the times of his stopping and starting appear to be according to his own convenience or caprice; he takes on his train such way-cars as he chooses, and rejects those which he does not wish to take; and the farmer, or the miller, whose produce has been lying in the car for days, or even for weeks, waiting for a chance of conveyance to market, has no mode of redress. His complaints are unheeded, the locomotives pass by, and his cars must stand on the sideling until some engineer is sufficiently obliging to attach them to his train.

It is believed that great necessity exists for a proper regulation of the speed of the locomotives, and that if such a system could be brought into effective operation as would in some measure equalize their velocity, and prevent immoderate running down grades and around curves, a material saving in the wear of both engines and road would be the consequence. The committee, in the course of their investigation of this branch of the subject, examined many persons possessed of science, intelligence, and experience, and found them universally to agree in opinion, that the speed of engines drawing passenger cars, should be so regulated as not to exceed 15 miles per hour, and that those with burden cars should be limited to ten. This might be effected by having competent and careful agents at Columbia, Parkesburg, and the Schuylkill depot, whose duty should be to inspect and examine the condition of the engines as they arrive, and on every departure, to give a clearance to the engineer, noting the time of their arrival at, and departure from, each of these places. Or a careful and responsible individual might be sent with every train as State agent, whose duty it should be to control and regulate the speed, and with whom should rest the general direction of every part of the business, except the mere management of the engine itself. A saving to the State would result from this plan, particularly if it be true, as is asserted, that incorrect returns are made of the passengers conveyed on the road. It seems that no register of way-passengers is kept, and that by the mode of making out the returns, the Commonwealth does not receive the amount of toll upon them to which she is entitled. This matter could be easily and fairly regulated by a travelling agent of the State with each train.

The committee are also of opinion, that the locomotive engines would be kept in much better repair, and less frequently injured, if the present mode of paying the engineers by the day, should be changed for that of paying them by the trip, or by the number of miles run in a week. At present it is a matter of indifference with the engineer, whether his locomotive is in order, or disabled—he receives his daily pay. Indeed it might occur that a locomotive would be designedly broken, by one whose inclination should lead him to prefer the period of rest and leisure consequent upon an accident, to the more arduous task of performing his duty on the road. It is believed that much better care would be taken of the engines generally, if the engi-

neers were paid only for the actual service performed by them.

From estimates furnished to the committee by transportation companies, of the probable amount of the business to be done on the road during the approaching season, they are led to believe that a very great increase will result over that of last year. One company alone, which last season ran forty-five cars, and then suffered great inconvenience and loss from the want of sufficient motive power, have made arrangements for running one hundred at the opening of the spring business. Other companies are also extending their facilities, new associations for pursuing the same business are about to engage in it, and arrangements have been made for transporting goods from New-York to the west, through our State improvements.

Without an increase of the motive power, all these designs will be frustrated, —the laudable enterprise of our citizens will be rendered useless to themselves and to the community, and an immense amount of tolls lost to the Commonwealth. We shall have constructed a Railroad eighty-two miles in length, and at an enormous expense; and having completed it, suffer it to lie comparatively idle and unproductive, for want of knowing how to use it to the best advantage; while the Canals and Railroads of other States, are used to convey the trade for which ours would naturally and advantageously be preferred.

With regard to the number of locomotive engines which will be required to accommodate the anticipated amount of trade for the coming season, the committee estimate, from data in their possession, that not less than eight engines, leaving each end of the road daily with the burden cars, and one with passengers, will be sufficient. This will require eighteen locomotives to be kept constantly in effective service, and admitting one-third of the whole number to be under repair, the requisite total will be twenty-seven. The Commonwealth now owns seventeen, upon four of which (of the English manufacture) little reliance can be placed. One is expected daily from Mr. Baldwin, and also one from England. Should these prove effective, the number fit for duty (rejecting the four above mentioned) will be fifteen; thus requiring twelve additional ones to be immediately procured. The committee however believe, that if the whole number were such as are manufactured by Mr. Baldwin, that considerably more than two-thirds of them could be kept constantly in service by proper management, and the requisite facilities for repairing.

On the question of the expediency of the Commonwealth still continuing to own the motive power, the committee have found considerable difference of opinion. It is thought by some that it would be best for the State to sell to individuals or companies, all the engines now on the road, and that under a proper system of regulations, the motive power would be much better managed by them than by the State agents. They contend that greater facilities would be furnished to the transporting trade, and that all classes who may find it convenient to use the road, for whatever purpose, would be much better accommodated. Others again believe that if the proper regulation of the motive power, when only one interest is concerned, is found to be so difficult, it would be impossible, by any system of management, to regulate and control so many separate interests, engaged in locomotive engines of different power and speed, stopping frequently at different places, and managed perhaps by persons unfriendly to each other, willing to hinder and obstruct the progress of their rivals, and that the inevitable consequence would be continual encounter, dispute and litigation. Nor is this all. They assert further, that the lives of passengers would be endangered by the collision of rival companies, and the violence too often consequent upon the conflict of opposing interests. They say, if this is alarming and dangerous when confined to stage travelling, what would it be when a machine of such tremendous speed and power as a locomotive engine, might be made the instrument of malicious opposition or revenge? They therefore contend, that the State should continue to hold the motive power; and believe that under the direction of capable and efficient officers and agents it might be so regulated as to be found satisfactory to the transporters; and that if managed with *proper economy*, it will not only maintain itself, but may also aid in diminishing the burden of the public debt.

In relation to the occasional use of horse power on the road, the committee discovered upon investigation that different opinions were also entertained. The many disappointments and vexatious delays which the way-transporters suffered during the past season, have induced them strongly to advocate the use of horse power. They have been compelled to resort to the use of it, in order to prevent their produce from standing for weeks in loaded cars, which the engines were daily passing, and the engineers unable or unwilling to transport. It is however believed that they would be generally satisfied if they could be served at all times with the steam power; but if this should be found impracticable during the next season, it is very desirable that some plan should be adopted by which the occasional use of horse power could be so regulated as to be both safe and useful.

Having thus expressed their views generally upon the subject entrusted to them, the committee conclude by expressing a hope that the wisdom of the Legislature will lead them to adopt measures which will so regulate the motive power, that it will be found to benefit all who are disposed to use the Railroad for convenience or advantage, and to conduce to the utility and reputation of our system of public improvements. Therefore,

Resolved, That the committee be discharged from the further consideration of the subject.

In a recent number of the Philadelphia *Pennsylvanian* we observe the following letter to the editor of that paper, upon which he makes the remarks thereto subjoined:

"'Feb. 4, 1836.

"'Dear Sir,—Since last Saturday, Jan. 30th, the Camden and Amboy Railroad Company have not been able to drive a single car ten miles!'

"On Monday they attempted to perform their usual trip to New-York, and after working eight hours, and making eight miles, they gave it up—in the mean time, the passengers would have frozen to death, if it had not been for the farmers on the road, who took them in. Since then not a car has gone by—four if not five days have been lying on their oars. This would have been fine work if they had had the mail. Five days without a mail to or from New-York!"

The failures here complained of ought not to impair the public confidence in Railroads, inasmuch as it is evident that they are referable to a deficiency in the management and not to any defect in the system. The Baltimore and Ohio Railroad, including the Branch to Washington, has been in operation from its first opening, in all kinds of weather, notwithstanding the unfavorable nature of the route, passing as it does through many deep-cuts, narrow defiles, and along almost perpendicular cliffs of great elevation, where snow-drifts and ice accumulate in much greater masses than in any open country. We have seen it stated that more than one thousand men are now employed on the Camden and Amboy Railroad in removing the snow. Now the Baltimore and Ohio Railroad has been kept open *by machinery* invented expressly for the purpose, by which not only snow but solid ice is effectually removed, so that the engines and trains of passengers can advance at the rate of eight or ten miles an hour under the most unfavorable circumstances.

As pioneers in the construction of Railroads in the United States, the Baltimore and Ohio Railroad Company deserve the thanks of the whole community for this great achivement, as it goes to establish the important fact, that Railroads can be kept open and in full operation in all kinds of weather, by the timely application of proper machinery.

The machinery above referred to consists of a snow plow which effectually removes the snow, and a *drag* which rips the ice from the rails, even when two or three inches thick, so that the engine and passenger trains can always pass; and as full evidence of the efficacy of the plan here in operation, we need only repeat that the trains of passenger cars to and from Washington and Baltimore have never since the opening of that road, lost a *a single trip*, though more unfavorable weather, so far as ice, snow and sleets are concerned, perhaps never occurred in this climate than has been experienced since that road has been in operation.—[Gazette.]

The *Carlsruhe Gazette* mentions a piece of mechanism which perfectly imitates the voice of a child, and produces distinctly every word with its proper modulation. The mechanism, it says, is very simple, consisting of sixteen levers answering to the sixteen simple sounds, moved by so many keys, like those of a harpsichord, so that these, properly touched, produce any articulate sounds required.—[Lond. Mech. Magazine.]

From the London Mechanics' Magazine.

ON RAILWAY PLATFORMS. BY JOSEPH JOPLING, ESQ., ARCHITECT.

Sir,—Supposing the weight of the stone blocks, at the distance they are apart near Chalk Farm, to be sufficient for steadying the rails for such loads, and at such velocities as it is intended should pass along that railway, I have been considering whether it is possible to distribute the same weight in any other way more advantageously, and what description of material is best calculated for that purpose.

I have formed several plans, but venture first to submit to the consideration of engineers *a slate platform, with rails screwed directly thereto, that is, without chairs.*

I take it for granted that the less the distance is between the top of a rail and the foundation or bed on which the stone is laid to which it is to be affixed, the better, so that the rail be of sufficient strength and the stone be of sufficient thickness to hold firmly the fastenings for the rail.

Also, that the nearer the points for supporting a rail are to each other, the less the vibration will be.

Again, that if any rail be supported throughout its length, the vertical vibration of it will be the least possible.

And further, that the nearer the points for fixing a rail to its stone support are to each other, the less strain there will be upon each.

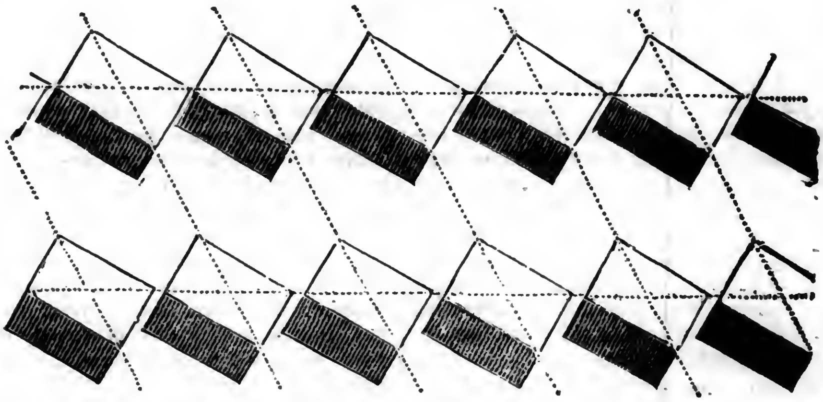
The difference between the method adopted for the London and Birmingham Railway and the one now submitted to your readers, will appear obvious by the accompanying figures and the following description:

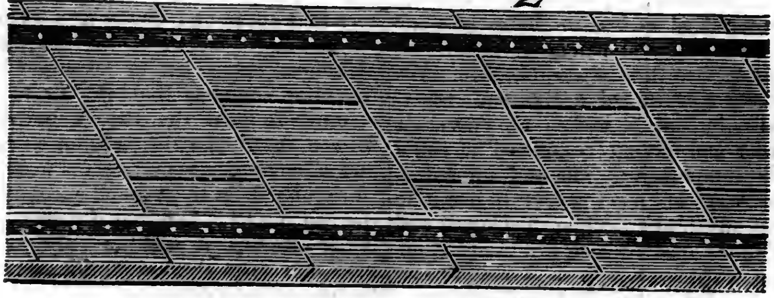
Fig. 1 is an isometrical representation of the stone blocks as they are placed for the chairs to support the rails, near Chalk Farm. The distance between the centres of the blocks under each rail is 5 feet; and the distance from the centre of one block to the centre of the next under the same rail is 3 feet. The top and bed of each block is 2 feet square, and the depth 12 inches. Therefore, each block contains 4 cubical feet, and each has a bed of 4 superficial feet; and, consequently, there are 8 cubical feet of stone, having in every yard in the direction of the length of each railway 8 superficial feet of bed. A chair is fixed over the centre of each block, and the distance from the top of the rail to the bottom or bed of the block is 18 inches. This will appear more evident by the transverse section, fig. 4, showing two of the blocks, and the position of the tops of the rails. The dotted lines *a b c*, from the top of each rail to the angle of each block on its bed, shows the greatest angle of resistance they have to lateral vibration. If the blocks were not placed diagonally, the angle of resistance would be much less, but probably more correct. It is, indeed, considered to be doubtful whether any advantage is obtained by the diagonal position of the blocks.

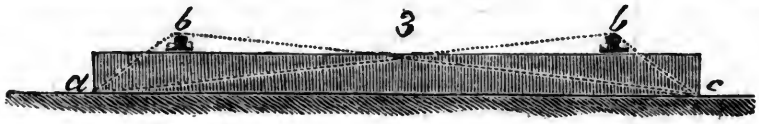
Fig. 2 represents a platform of slate, nearly 5 inches thick, and 6 feet 6 inches wide, containing the same cubical quan-

JOPLING'S IMPROVED RAILWAY PLATFORM.

Fig. 1.







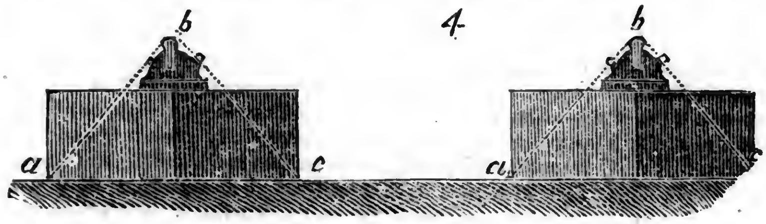


Fig. 5.

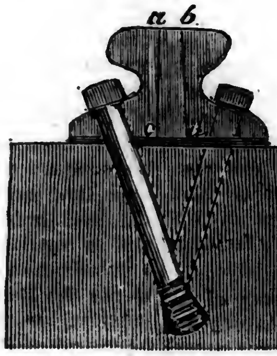
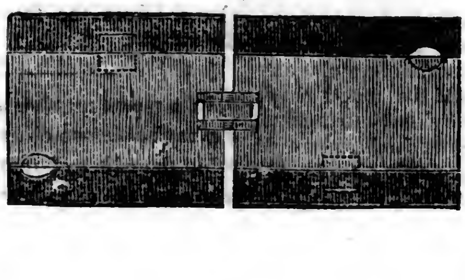


Fig. 6.



tity per yard as the stone blocks at Chalk Farm. Fig. 3 is a transverse section of the same, showing the top of each rail. The dotted lines *abc* show the angle which the top of each rail makes with the lateral extremities of the bed of the slate platform. The angles *a b c*, in fig. 3, are much greater than the angles *a b c*, fig. 4; besides, the latter is considerably too much. Therefore, the platform, it is considered, would hold the rails much steadier than the blocks at Chalk Farm; the weight per yard of each being the same, and both being bedded in the same way.

Fig. 5 is the section of a rail proposed to be affixed directly to the slate platform, by means of bolts and copper or brass nuts introduced into the slate. If there are eight of these bolts in each yard, the points of fastening to the platform would be four times as many as those to the stone blocks, and the strain upon each, therefore, if the rail was not bedded, would only be ¼th; but as the rail is proposed to be bedded throughout on felt and a leather collar under the head of each bolt, any jar or vibration the rail might have, it is considered, would scarcely be perceptible. The inner side of the rail, and the face of the slate under it, to be made quite fair. At each end of each piece of rail is to be a mortice, the vertical section of which is shown by the lines *a b c d* on this figure.

Fig. 6 shows the plan of this rail where two lengths meet, with the mortice in each, and the wedge which keeps them fair, which, as well as the elliptical holes for the bolts, allows for expansion and contraction. Two bolt heads are also shown.

This possibly may be sufficient for the present to draw attention to this subject; and I think I shall be able to show that slate material is applicable for this purpose, and may be advantageously used for Railways where there is great traffic, and where great speed is required.

I am Sir,

Your obedient servant,

JOSEPH JOPLING.

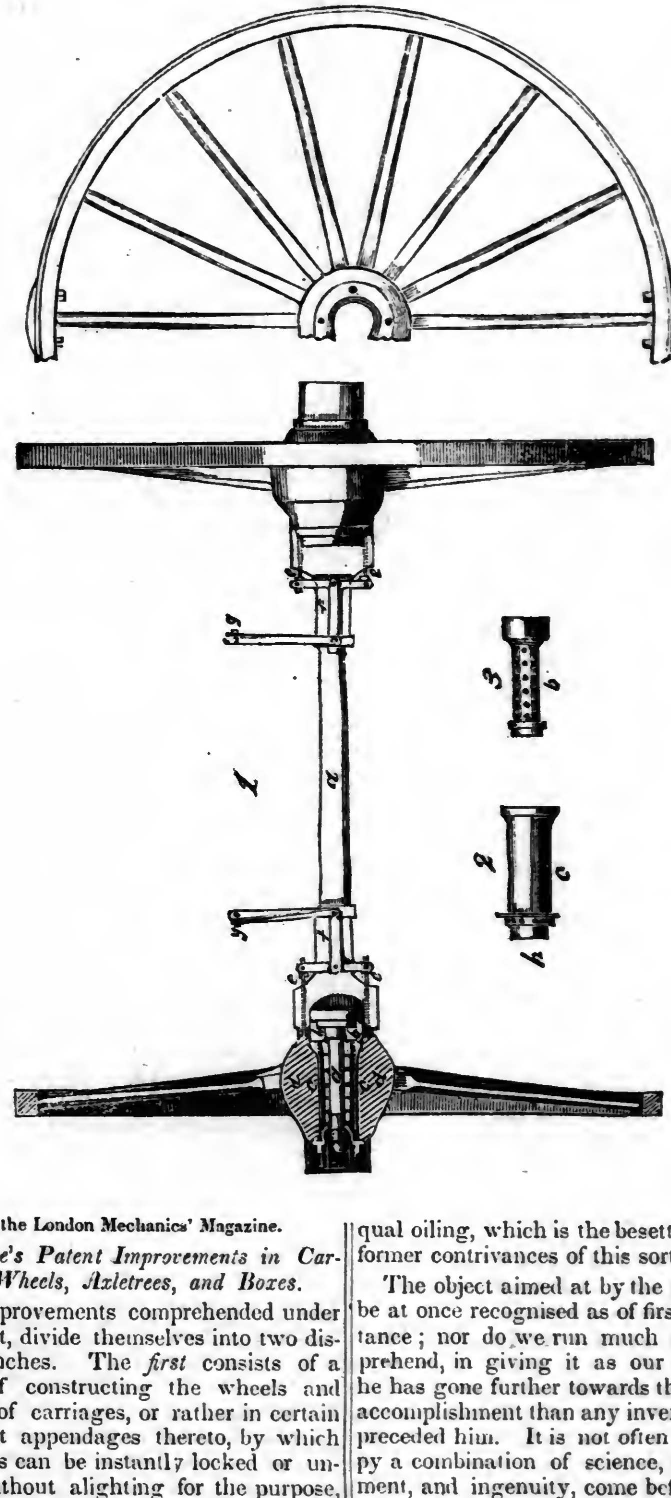
34 Somerset-street, Oct. 15, 1835.

We were present at an experimental trial at the Hereford Foundry, of a double-cylinder grinding-mill, of a construction entirely new to this part of the kingdom. The mill is intended for crushing fruit, bones, &c., is of great power, and very simple in its principle. The propelling power is steam, but horse power may easily be applied. Should the enterprising proprietor, Captain Radford, succeed in perfecting the machine, the economy which it will effect in horse and manual labor, will render the mill a most valuable agent on every farm.—[Hereford Times.]

FLAX SPINNING.—A letter from Lille says—"A great establishment is now erecting in this city. It is intended for spinning flax by machinery. Thus the great problem is solved, for which the Emperor Napoleon offered a reward of a million of francs, and we shall now enter into competition with the English, who eagerly buy up all the flax of our country."—[Brussels paper.]

HYNE'S PATENT CARRIAGE WHEELS, AXLES, AND BOXES.

Fig. 4.



From the London Mechanics' Magazine.

Mr. Hyne's Patent Improvements in Carriage-Wheels, Axletrees, and Boxes.

The improvements comprehended under this patent, divide themselves into two distinct branches. The *first* consists of a method of constructing the wheels and axletrees of carriages, or rather in certain convenient appendages thereto, by which the wheels can be instantly locked or unlocked without alighting for the purpose, as in the case of the ordinary drag-chain and slipper, and so concealed, that externally they are hardly perceptible; the *second* in so constructing the boxes and securing the ends of the axletrees permanently therein, that there shall be an abundant, never-failing, and *equally diffused* supply of oil to the rubbing surface, without its being necessary, as usual, to take off the wheels every now and then, to renew the supply of oil, or to remedy the effects of that unequal oiling, which is the besetting sin of all former contrivances of this sort.

The object aimed at by the patantee will be at once recognised as of first-rate importance; nor do we run much risk, we apprehend, in giving it as our opinion, that he has gone further towards their complete accomplishment than any inventor who has preceded him. It is not often that so happy a combination of science, sound judgment, and ingenuity, come before us, as is displayed in the various contrivances which we shall now proceed to describe in detail.

The figures on our front page represent, 1, a back elevation of a pair of wheels, axle, and boxes, constructed according to Mr. Hyne's patent, with one of the wheels and boxes shown in section; 2, a side-view of a box, with its external cover on; 3, a similar view of a box, with the external cover off; and, 4, part side-view of a wheel in its complete state.

1. *Of the Locking and Unlocking.*

The axle *a* (fig. 1,) differs essentially from all other axles, in having shoulders or enlargements, of the peculiar form represented in the engraving, at those parts where it comes into proximity with the inner ends of the naves—the axle and its shoulders being forged or welded together all in one piece. Two holes are drilled in each shoulder, through its entire length, for the reception of the locking-bolts *e*; and in the back of each nave there are four holes or recipients made at the four cardinal points of a circle, corresponding with that described on the rotation of the axle, by the holes in the shoulders thereof; so that when the wheels are screwed on and adjusted as close as possible to the shoulders, the bolts, on being let loose, must shoot with unerring precision into the first two holes in the nave which they come opposite to. The command of these bolts may be effected, either by a jointed lever, as shown at *g g* in our engravings; one end of the lever being placed within reach of the person riding in the carriage, or of the attendants; or by chains carried to any part of the vehicle which may be thought most expedient, and there secured by hooks, or other holdfasts. The size of the bolts must, of course, depend on the size and weight of the carriage; and also, in some degree, on the uses to which it is to be applied; as, for instance, whether it is to be worked at high or low velocities, whether on a level or a hilly country, &c. The inventor thinks that bolts of from half an inch to one and a half inch in diameter, would be found abundantly strong for the lightest private carriage up to the heaviest stage-coach; and though he considers *two* bolts inserted into the nave, in the manner described, to be quite sufficient to counteract the leverage force of the peripheries of the wheel, he has been careful to point out that the principle of his invention admits of *four* bolts being made use of, equally well with *two*.

As in every case of locking the wheels, a great increase of pressure must necessarily take place at one of the four points on the tires which correspond with the position of the bolts and recipients, Mr. Hynes, to protect the tires at these particular points, defends them with plates of soft steel, or case-hardened iron, about eight inches in length, indented or dovetailed into the tires, screwed thereto, and projecting but little beyond the general surface.

The contrivances which Mr. Hynes makes use of to adjust the wheels to the arms of the axletree, are those commonly known by the name of Collinges; namely, collets, nuts (with right and left-handed screws), linch pins, outer caps, &c. We gather from his specification, that he thinks this the most perfect mode of adjustment which has been yet invented; and perhaps he is right, though on this point it is certain all the carriage-making world are not agreed.

2. *Of the Axletree and Boxes.*

Every reflecting person at all acquainted with carriage economy, is aware that upon *friction* depends draft, and that, accordingly, in proportion as friction is reduced, so draft is diminished, and *vice versa*. The great desideratum, therefore, is a constant and abundant supply of oil to the arms, and every part of them—oil being the best of all known lubricating substances. The question here consequently presents itself—Have the grooves, or things called "reservoirs," which are now found in all the most improved boxes, ever yielded such a supply? It would not, we imagine, be difficult to demonstrate, that the very best boxes hitherto made never did or could accomplish any thing of the kind. There is an eternal law of nature, that of gravitation, which forbids it. In all of them—take Collinge's for example—there is a small space or groove called a reservoir. This groove is cast in the metal, is situated near its back end, and may contain, when fully served with oil, which can only be to about a fourth of its *circumference*, a table spoonful of oil. Well, at the other extreme *end* of the arm, that is to say, in what is called the "cap," in front of the wheel, there is a similar reservoir, containing, perhaps, another table spoonful of oil. However, *between* this last-mentioned reservoir, and the arm which it is intended to feed with oil, there are two nuts and a coned collet, all closely fitted and screwed on to the axle. Now, be it remembered, that the arm and boxes are presumed to be "*air-tight*," and that the position of the arm is nearly horizontal; and, moreover, that these reservoirs are placed absolutely *under* the lowest point or level of the thing which they are meant to lubricate! We are told, indeed, that the reservoirs *turning* with the wheel, "wash the oil *up*;" and further, that this constant action of the wheels has the effect of producing a "vermicular motion" about the arm, which, in its turn, again causes a "pumping" of the oil all along the *air-tight* arm, from one extreme reservoir to the other. But does not this amount to a mere reciprocation of impossibilities? The theory might, perhaps, have some little feasibility about it, were the boxes and reservoirs *fixtures*, and the arm a revolving cylinder within them; but as the case happens to be reversed, the arm being a *fixture*, and the boxes *revolving* bodies, no such vermicular motion can occur under any circumstances of time or place. As the box *revolves*, so must the *oil* within it. Beyond the boundaries of its narrow sphere gravitation will not permit it to stir; water could as easily return to its source, as oil mount *up* in the manner supposed, especially when we know that the motion of the wheel near its *axis* is comparatively a *slow* one, even when the *periphery* is in a state of the utmost velocity.

We have, for the sake of impartial comparison, here adverted to the very best boxes extant only, and not touched at all on those which are cast with *serpentine* grooves, which are, in fact, unworthy of comment. They carry in them the elements of their own destruction, for no tools can be made to "clean them out," even if they could be made otherwise effective.

Let us now proceed to describe the improved box of Mr. Hynes. This consists of two wrought-iron concentric cylinders or tubes (figs. 2 and 3), the one about a third less than the other, leaving a space between which serves as a reservoir for the oil. These tubes screw into and upon each other at their extremities, in such a manner that the space between them is perfectly closed at both ends, and the better to prevent any lateral escape of oil, a cap (*h*) is screwed on to both at the outside. But that the oil may pass freely and uniformly to the axle-arm, where it is wanted, the inner cylinder is perforated with holes at equal distances. In every other box hitherto in use, the oil, as we have before pointed out, is supplied to two or three parts only of the axle-arm, and never reaches, except, perhaps, in very remote portions, the other parts; but as this double box revolves with the wheels, it distributes through the holes in the inner cylinder an equal supply of oil to every part of the axle. As often as a new supply of oil is wanted, it is introduced without taking off the wheels (as the ordinary practice is), or even unscrewing and uncapping the cylinders, by simply withdrawing a small plug in the outer box (not shown in the engravings), which covers a small orifice leading to the intermediate space appropriated to the oil.

Both improvements, it will be observed, are of universal application—to all public as well as all private vehicles—to railway as well as to common road carriages. The safety-apparatus could hardly, we fear, be depended on at such high velocities, as are becoming common on railways; but to gentlemen's carriages employed for travelling on common roads, at ordinary rates of speed, it must prove an invaluable appendage.

From the London Mechanics' Magazine.

ON WATER AS A SUBSTITUTE FOR STEAM.

Mr. Editor,—On perusing Mr. Galt's "substitute for steam power," No. 629, p. 403, and the subsequent remarks of "Hydraulicus," No. 631, p. 460, I was reminded of an attempt made about two years ago by myself and an engineer, who has since constructed for me a steam-carriage, to employ water on the principle of Bramah's hydrostatic press, as a substitute for steam. My object was to propel a slow heavy carriage as a substitute for the carriers' waggons in present use. The experiment may be said to have failed: the utmost velocity that the experiment promised, supposing all intermediate difficulties could have been successfully combated, would not have exceeded a quarter of a mile an hour—too slow for my purpose. The same ideas, or some modification of them, seem to have presented themselves to Mr. Galt and to Hydraulicus. Should my experiment, and its result, possess enough of interest to entitle them to a place in the Mechanics' Magazine, you will oblige me by inserting this paper, whilst attention is directed to the subject.

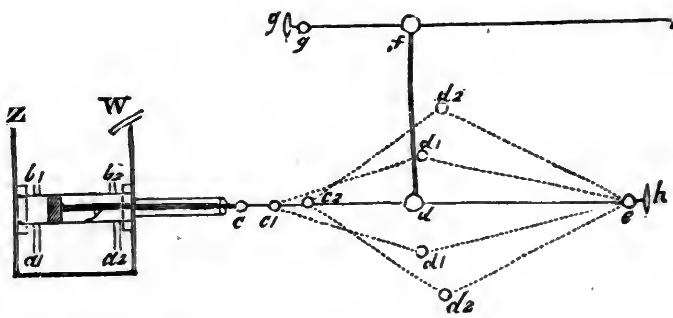
Having, in the first place, prepared a suitably strong iron stage, and an iron frame to carry a four-inch iron shaft, with a nine-inch throw crank at its centre, (the same I now have in my steam-carriage;) there was, in the next place, fixed upon the centre of the stage, or platform, an ordinary double-acting steam-cylinder, 12 inches diameter, 18" stroke. An ordinary sliding valve, moved by an eccentric upon the shaft, which valve I now use to govern the

ingress and egress of steam, was used, on that occasion, to regulate the ingress and egress of the water. To get over the dead points, a compensating fly, just previously patented by my engineer, was added at his suggestion: this was intended to supersede the necessity of introducing a second cylinder; the motion was, however, too slow to demonstrate the utility of that fly. After the water, which was conducted from the pump into the working cylinder by a two-inch pipe, had caused the desired motion of the piston, it escaped through a two-inch eduction pipe into the tank to perform again and again the same circulation. In the tank, which was of cast-iron, and firmly fixed upon the platform or stage, was fixed a double-acting pump on the principle of De la Hire. This pump is, I presume, so well known as to need no description. In virtue of certain arrangements for working this pump, by which it was filled four times, and emptied four times, by one revolution of its lever or handle, I hoped to obtain four times the speed that could be derived from a single-acting pump: these arrangements were as is below stated. The pump was strongly fixed, horizontally, in the iron tank. The rod of its piston was restrained to perfect perpendicularity of action by a strong guide. In the parts which may be denominated the continuations of the piston-rod, was a joint just without the guide; at about 18 inches beyond this was another, a double joint, where was united, at right angles to the line of direction of the piston-rod, a rod from the lever or handle; and at about 20 inches farther was another joint near to the fulcrum, which was as firmly fixed as our ingenuity could contrive. When the machine was worked, by raising and depressing the lever or handle, the double-joint oscillated past the line of direction of the piston-rod. When the continuations of the piston-rod were in a right line, the piston was at the bottom of its stroke; when these continuations were at their extreme angle, the piston was at the top of its stroke. The piston of the pump was thus worked by an oblique leverage; such as is, I believe, regarded as the peculiar principle of the Russel printing-press. According to theory, the force moving the piston of the pump is augmentable to any extent, by shortening the oscillations of the double-joint.

By thus uniting the principle of the Russel printing-press, to be worked by a common lever—that of the double-acting pump of De la Hire, made to double its celerity of motion by an arrangement of parts of its piston-rod, and that of Bramah's hydrostatic-press, to move the piston of a common double-acting steam-cylinder, so as that as little as possible of the resulting force should be neutralized by friction, I did hope to obtain an efficient power, which might be advantageously employed to propel heavily laden, slowly moving vehicles. But the experiment failed, inasmuch as the motion afforded was manifestly *too slow* for the purpose. When two men were working the lever, the engineer dryly remarked, "the principle throughout is good and correct, no doubt; it only wants a steam-engine to work the pump."

If—in mechanical pursuits, *if* is often a stiffly perverse monosyllable; it sometimes sticks, like a totally insuperable obstacle, right in the way of what you would do. *If* the resulting velocity had been satisfactory, the advantages contemplated were numerous. Amongst them are the following. The stock of water, costing nothing, would have circulated somewhat like the sanguineous fluid of an animal, and lasted an indefinite time. The expenses of fuel, of repair of injuries from fire, &c. &c., to which the steam-engine is liable, would have been avoided. Almost any imaginable force, at all events any force likely to be required to propel the most heavily laden carrier's waggon up the steepest roads in England, would have been obtained from the bodily strength of two or three men, simply by shortening the oscillations of the double-joint; but the machine would have crawled more slowly. When the machine was moving upon a plain road, or down a slight descent, the oscillations might have been augmented and the speed increased. Whilst descending the steepest declivity, the velocity could have been entirely governed, either restrained or the machine quite stopped, through the incompressibility of the water, at the will of the men working the lever.

Lest my verbal description of the pump used be unintelligible, I subjoin a rude sketch of its working parts. This, however, Mr. Editor, you are, of course, quite at liberty to suppress, if you consider that it is superfluous, or that it would be a waste of space in your valuable pages.



Z is the cast-iron water tank; *y* the double-acting pump of De la Hire, strongly fixed horizontally in the tank, under water; X the guide of the piston-rod; W the end of the eduction-pipe from the working cylinder, which returns the water to the tank, to be used over again; *a* 1, *a* 2, are the induction pipes of the pump, having valves opening towards the pump, or upwards. In using this pump for a common well, these pipes may be united below the valves, so that one tube only may run down into the water; *b* 1, *b* 2, are the eduction or force pipes of the pump, having valves opening from the pump or upwards; they convey the water to the working cylinder, which is not represented. In adapting this pump to domestic uses, these pipes may be united above the valves, to form one main, which may be carried to the top of the house, if required; *c* is the first joint of the continuations of the piston rod, situated just without the guide X; *d* is the second or double joint of the continuations of the piston rod; at this point the rod *d f*, from the lever or handle, joins the piston rod at right angles; *e* is the third joint of the continuations of the piston rod, situate near the fulcrum *h*; *f* is a joint which unites the rod *d f* to the lever or handle *k*; *g* is another joint of the lever or handle, situate near its fulcrum *j*.

The fulcri *h j* being immovably fixed, when the lever or handle *k* is raised, the double joint *d* will be moved through the point *d* 1 to *d* 2, above the line of direction of the piston rod; and when the double joint shall have attained the position of *d* 2, the piston will be drawn to the end of its stroke upwards, near the pipes *a* 2, *b* 2. By this motion the pump will be filled once, through the pipe *a* 1, and emptied once through the pipe *b* 2. On depressing the handle or lever *k*, until it regain its original position, the double joint will travel through the point *d* 1, and attain its original position at *d*. The piston will be forced to the end of its stroke downwards, near the pipes *a* 1, *b* 1; and the pump will be discharged, for the second time, through the pipe *b* 1, and synchronously filled, for the second time, through the pipe *a* 2. On continuing the depression of the handle or lever below its present position, until the double joint *d* passes through the point *d* 1 to *d* 2, below the line of direction of the piston rod, the piston will be again drawn to the upper end of its stroke, near to the pipes *a* 2, *b* 2; and the pump will be discharged for the third time, through the pipe *b* 2, and filled, for the third time, through the pipe *a* 1. On now raising the lever or handle until it shall have regained its original position, (when it will have completed just one revolution,) the double joint will pass through the point *d* 1, below the line of direction of the piston rod, to its original position at *d*; and the piston will be forced again to its original position near the pipes *a* 1, *b* 1. By this motion the pump will be emptied, for the fourth time, through the pipe *b* 1; and filled, for the fourth time, through the pipe *a* 2. Thus by one revolution of the lever or handle, or by one oscillation of the double joint *d*, the pump will be emptied four times, and filled four times. When efficient power is to be derived from the principle of Bramah's hydrostatic-press, the expeditious filling of the working cylinder is the grand desideratum—the difficulty. In short, from the relations of the two pistons concerned, (upon which relations the power of the machine depends,) it is impossible the filling of the working cylinder can be

quickly enough effected, if the power to be used is to be derived solely from the principle of the hydrostatic-press. From this circumstance arose the necessity of lessening the disproportion between the two pistons; so as, in the first place, to derive only part of the efficient force required, upon the principle of the hydrostatic-press; and, in the next place, make up in some degree by advantageous leverage, that could be worked quickly and powerfully, to impress the first impetus upon the water. This leverage seemed attainable most easily through the principle of oblique action used in the Russel printing-press; and if obstacles should arise, such as ascending a steep hill, greater than the primary force at command could overcome by full strokes of the piston, the resultant force might easily be augmented, by the employment of only the same primary force, by using half-strokes of the pump, by keeping the oscillations of the double joint between the points *d* 1 above and *d* 1 below the line of direction of the piston rod.

Although the combination of levers for working the pump was, I think, unexceptionable, and might be advantageously used on some occasions, still the experiment, on the whole, failed.

If there be any originality in the combination, I have no desire to reap any advantage from it by way of patent. I should, indeed, more desire to hinder any one else from so doing; first, by offering herein the unlimited use of it to any one who may chance to see its utility and applicability; and, secondly, by stating, that I have lately constructed another pump upon nearly the same plan. This pump, during the summer, I have had fixed holf-way down in a deep well—the surface of the water being 36 feet below the surface of the earth, and I have carried the eduction pipe, or main, up to near the top of an adjoining chimney. From the main go lateral pipes, of less diameter, to coppers, sinks, dairy, &c.

This pump raised water faster than either of the cocks upon the lateral branches would deliver it, whilst subject to only the pressure of the atmosphere. The water then accumulated in the main, more or less, according to the strength and activity of the pumper. The weight of the column of water in the main, which kept augmenting only until it reached a point now to be noticed, was adding continually its pressure to the weight of atmosphere, by which the delivery was accelerated by the cocks upon the lateral branch, turned on till it attained a point of equilibrium—a point at which the cock upon the lateral branch, although of less diameter than the main, or the barrel of the pump, delivered water just as fast as the pump could raise it.

When all the cocks upon the lateral branches were turned off,—the discharge up at the chimney, at the top of the main, was so profuse and forcible, that it led me to expect that, if a pump of this description were fixed in every house, and a flexible or hose pipe fitted by an union joint to the end of the main, or at some more convenient part, it might, in the case of fire in the establishment, be of considerable use as a fixed fire-engine, as well as serve the purposes of an ordinary pump for domestic uses.

KAPPA.

Sept. 21, 1835.

MR. MALLET'S EXPERIMENTS ON THE MANUFACTURE OF WHITE OR BLEACHED PULP FOR THE PURPOSE OF MAKING PAPER FROM CERTAIN VARIETIES OF PEAT.

[We are indebted to the *Literary Gazette* for the following detailed account of Mr. Mallet's process for manufacturing paper from turf, noticed in our report of the proceedings of the British Association. "It was a good-humored jest with the Irish populace," says our good-humored contemporary, "that the Association was planning to distil the bogs into whiskey. But instead of the cup of Circe, Mr. Mallet's manipulation of them would present provision, plenty, and civilization, where now only deserts and wretchedness exist."—ED M. M.]

A cheap, and yet good substitute for hemp rags, for the purpose of affording a pulp fit for paper-making, has long been a desideratum with the manufacturer. Many attempts have been made to procure one, but the difficulties of finding one such as would suit the required conditions, and the duty and cost of hemp rags have induced adulteration to a vast extent in the paper manufacture. Much of the letter paper now in use owes its apparent thickness, and stiff, close texture to an intimate admixture of the pulp or vegetable fibres with a cream of plaster of Paris or whiting. Brown paper is adulterated with ground clay, and, for similar purposes, curriers' shavings, chopped wool and hair, cotton-flyings, thistledown, and other similar materials, have been occasionally tried; but from none of them has good paper ever been made; and amongst the many experiments that have been attempted with them, being the only one that has been brought into successful use, is that of the manufacture of paper from straw, which answers tolerably for some purposes, though not for writing on, and is now made in some few places very extensively.

Under these circumstances, it appeared probable that nature might afford some vegetable fibres of a texture sufficiently fine for making paper, and which had never undergone any manufacturing process; and, on looking around, the *confervæ* of fresh waters, and also certain varieties of turfs or peats, suggested themselves. The former was soon found too fragile, and its structure unfit to resist the action of the bleaching reagents.

It is generally known that a peat-bog, and especially those of Ireland, consists of various strata, varying in density and other properties in proportion to their depth. The top surface of the bog is usually covered with living plants, chiefly mosses, heaths, and certain aquatic or paludose plants; immediately beneath this lies a stratum varying from only two or three inches to four or five feet, according to the state of the drainage of the bog, of a spongy, reddish brown, fibrous substance, consisting of the remains of vegetables, similar usually to those living on the surface, in the first stage of decomposition.

The chemical state of this stratum is nearly that of some of the papyri found in moist places in Herculanaeum; that is to say, having long been exposed to the action of water, at nearly a mean temperature, the vegetable juices have nearly all been converted into ulmin-geine, or impure extractive matter, and the fibres remain nearly untouched, together, probably, with some of the essential oils of the original plants. It therefore seemed that if these fibres, which were apparently sufficiently fine for the purpose, could be separated from their coloring matters, the object would be nearly if not entirely attained; to this, therefore, attention was directed, and was attended with success. It is unnecessary here to enter into any detail of experiments, or into any elaborate disquisition as to the principles concerned, in making a white pulp from this material, either as regards the manufacture or the pure chemist; presuming these to be already understood, the process may be briefly stated as follows:—

The proper description of turf being selected, is soaked in cold water until all its parts are softened, and, to a certain extent, disintegrated: it is then bruised in a suitable engine, in cold water, which is continually agitated and renewed, so that all pulverulent matter (or new dust while the turf is dry,) may be washed off. The so far cleaned fibres are then partially dried by strong pressure, in hair bags, under the hydraulic press, or by other suitable means, and then by suitable seives and winnowing; all roots, sticks or other gross matter incapable of being bleached, are removed. The fine, uniform, brown fibres, or rather minute stems, leaves, &c. &c. are then placed in proper vats, and digested in the cold; that is, at ordinary temperatures, with a very dilute solution of caustic, potass, or soda; preferring that made from what is called in commerce "black potash."

After some time, nearly the whole of the geine and other extractive matter is removed in combination with the alkali. The fibres are again pressed dry, or nearly so, from the digesting liquor, and are now found to be of a dark fawn color, in place of their former deep red brown. They are next transferred into an exceedingly dilute sulphuric acid, containing not more than fifty grains of acid of commerce to the quart of water. They remain in this at the common temperature for some time, generally about four hours, but varying with the kind of turf; this separates the iron and earthy matters from the fibre, and carries off the adhering portions of potass and of ammonia, if any exist in the turf, which is occasionally the case. The fibres are now washed with pure cold water, until they cease to give any acid re-action, and are finally pressed nearly dry, and immersed in a dilute solution of chloride of lime; in this they remain at common temperature until sufficiently white for the purpose of the paper-maker, and on being removed, will generally be found fine enough, as to fibre, for immediate manufacture; but if not, are to be reduced by the ordinary rag-engine, or other suitable machinery.

By this process, it is calculated that about eighteen pounds' weight of pure white, fine pulp may be procured from 100 weight of the raw or native turf.

Returning now to the solution of the potass, which has carried off the geine, &c., and which is chiefly in fact a geinate of potass; it is treated with dilute sulphuric acid slightly in excess, and filtered through a calico or linen cloth. The potass is taken up by the acid, and the geine and extractive matter precipitate, and are collected on the filter, from which being removed, they are dried by a steam or water bath, and become a valuable pigment.

Vandyke brown has long been known to painters in both oil and water colors. This is it, in fact, in its purest form; it is an extremely rich, glowing color, and valuable for its permanence, as scarcely any agent ordinarily met with is capable of affecting it.

When once perfectly dried, it becomes insoluble in water, and therefore is not in the least deliquescent, but it is still soluble in alkalies; thus possessing two properties eminently fitting it for the uses of the paper-stainer and scene painter, &c. &c. It is perfectly miscible with gum, mucilages, and with oils.

The liquid from which this color or bistre has been separated, now contains various sulphates in solution, chiefly of iron, lime, and alumina; but the major part, sulphate of potass or soda, whichever has been employed; if the former, Glauber's salt may be made from it, and if the latter, alum, as matters of commerce. The quantity of alkali used is small in proportion to the amount of fluid; but if the operations were very extensive, this economical use of them should be attended to.

After the fibre has been some time digested in the solution of chloride of lime, in most cases a resinous-looking matter floats upon the surface of the fluid in very minute quantity. This, when a large quantity is operated on, may, by careful management, be collected, and is found to be a species of artificial camphor, mixed with some gum resin, and probably an essential oil. This substance, or mixture of substances, possesses some singular characters: it would seem probable that the artificial camphor is produced by the action of some fine chlorine upon turpentine, existing in minute quantity in the turf; and it is a curious subject for reflection, that chemistry should thus, as it were, recal into existence and decompose the turpentine existing in, and produced by, trees or plants, which have for hundreds of years ceased to have life, or to exist as vegetables. As the properties, so far as they have been ascertained, of this singular substance are purely chemical, it is unnecessary here to detail them. It is not to be procured from every specimen of red or surface turf.

Some specimens of turf have been met with, unfit, however, for paper-making, from which it would appear to be profitable to manufacture bistre and ammonia, from the very appreciable quantity of the latter they contain.

This fibrous red surface turf, when dry, is extremely tough, and is proposed being also applied as a substitute for mill-boards or board-paper, for the use of engineers, &c. It is capable, when dry, of immense compression by the hydraulic press; and as the fibres naturally lie nearly all in one plane, they thus arrange themselves, so as to give great toughness and flexibility to a plate of it when compressed. Accordingly, suitable masses of this turf are placed in a strong cast-iron, or other vessel, and the air exhausted; the vessel is then filled with a mixture of dilute solution of glue and molasses, at a boiling heat, which fills all the pores of the turf. The masses are then removed, while hot, and exposed to powerful pressure in a hot-press, in a similar way to hot-pressing paper, which reduces them to the required thickness, that of the original mass having been previously properly regulated. The plates so formed, are found, when cold, to be hard, tough, and flexible, and will answer almost every purpose of mill-board. They are not injured by high-pressure steam. Many other substances may be used, according to circumstances, for filling the pores, previous to pressure, as fat, oils, boiling coal-tar, wax, &c. &c.

It is worthy of remark, that the substance proposed being used for all the above processes, is the worst turf for burning; so that the material which is worst, and nearly valueless as fuel, is the best and most valuable, by a fortunate coincidence, for manufactures. If, therefore, as there is reason to believe, the lower strata of turf can, by certain modes of charring, be made a valuable fuel, and the upper and more recent strata are used for the purposes of the various manufactures above adverted to, there is strong ground to hope that, at a future period, the bogs of Ireland, instead of being contemplated, as hitherto, as a blot and stain upon her fair and fertile champaign, may be looked upon as one of the centres of her industry, and the richest sources of her wealth.

EFFECTUAL CURE FOR SMOKY CHIMNEYS.

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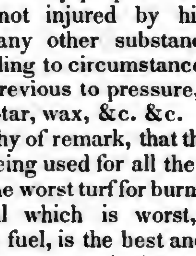

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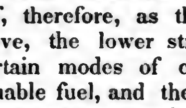

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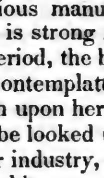


From the London Mechanics' Magazine.

Sir,—As the season of smokey chimneys is arrived, I send you for insertion a sketch and description of a very effective cowl that has, in every case hitherto tried, proved a complete remedy for that worst (but one) of all domestic nuisances.

Fig. 1 represents a section of the improved cowl, which is constructed as the common cowls are, so far as regards the general principle of the revolving of the lateral on the vertical parts of it; but instead of the end opposed to windward being, as is usual, closed, a funnel-shaped apparatus is introduced, terminating in a pipe of about three inches diameter, which is carried just over the opening of the vertical chimney-pot. The effect of this is, that the lateral pipe of the cowl being, by the operation of the wind on the vane, always turned endwise in the direction of whatever current of wind may happen to be strongest at the time, a draught is created by the wind rushing through the funnel-end of the cowl-top, and the smoke is thereby, with considerable velocity, carried completely out of the cowl. The stronger the current the more effectual the apparatus.

This method of cure has been tried in several instances of heretofore incurable smokey chimneys, and has been entirely successful in every case. It is the production of an ingenious friend of mine, a clerk in the Tower, where a suite of rooms, which were formerly untenantable in consequence of the impossibility of using the fire-place, has been brought into useful employment, simply by the erection of one of those cowls on each of the flues.

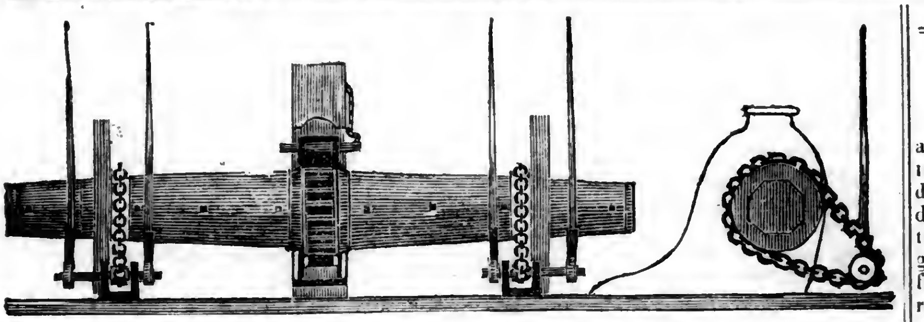
I am, sir, yours, &c.,

Oct. 22, 1835. L. Mundy.

From the London Mechanics' Magazine.

YOUNG'S PATENT INCREASED PURCHASE FOR SHIPS' WINDLASSES.

Sir,—Next in importance to the security of a ship's windlass, which is now so completely effected by the patent pall and riding chock, of which you have given place to a description in your last Magazine (page 41), are improvements by which a greater power can be given to its action, than by the common application of the handspike. For, however well adapted it may be, when the resistance to be overcome is much less than the power which can be so applied, it is a fact, well known to seafaring men, that there are times when the utmost exertions of the whole ship's company, by such means, are unequal to purchasing the anchor. And it still more frequently happens, that by their long repeated efforts, they are unable to advance the pall cylinder even one tooth in its revolution, that is, to bring in about two inches of the cable, until aided by some lucky wave or changed position of the vessel: consequently, in such cases, much time and strength are expended before a vessel can be got under way, merely for want of additional power. This has led to various mechanical contrivances, most of which have been modifications of the cog-wheel and pinion, but which have severally proved defective and unfit for the casualties to which they are exposed on ship-board, particularly from the changes which take



place in the distances of the centres, by the straining of the windlass, bits, or timbers, whereon they may be fixed. Complicated machinery, however powerful, is decidedly objectionable. Indeed, any apparatus to be applied to a ship's windlass should be simple in its construction, direct in its action, compact, strong, and not liable to be deranged, and withal, not too expensive. That *Young's patent purchase*, of which I herewith send you a description, combines these properties, will be readily admitted by those of your readers who are particularly acquainted with the working of a ship's windlass, as it is also by those who have adopted it in its present complete state.

Fig. 1, is a back elevation of a ship's windlass and bits, fitted with Sowerby's patent pall and riding-chock in the middle, and Young's patent purchase at each end within the garrick bits.

Fig. 2, shows a section of the windlass body, and an end view of the purchase and starboard garrick bits.

The patent purchase consists of a strong cast-iron wheel, firmly wedged upon the body, with semi-elliptci cavities in its surface, adapted to hold the sides of the link of a chain which embraces it, and a pinion with similar cavities in its surface. The pinion is keyed upon an iron axle, working in a carriage placed on the deck, and bolted down to a beam abaft the windlass. Ratchets are also keyed upon each end of the axle, and worked by a palling box, from which a socket arm is continued for receiving the handspike. The two ends of the chain are connected by a shackle made on the segment of a link, so that it also fits the cavities in the wheel and pinion. The chain may be tightened or slackened by means of adjusting wedges, which are fitted on the carriage. The drawings represent the handspikes in their places, which, on being depressed, bring the pinion round, and with it the windlass body, with a power proportioned to the size of the wheel to that of the pinion. The usual proprotions adopted are about four to one; consequently, one man using the purchase, is nearly equal to four men applied to the windlass in the usual way. Hence, with it, a small number of hands may get the anchor, when the whole ship's company would be unable to do so without it. In addition to its great power, it possesses other important advantages, a few of which I shall briefly enumerate as follows:—It is not liable to be injured by the heaving or pitching of the vessel in a heavy sea; the endless chain which embraces the two wheels fixed upon the windlass body and axle not being tight, but passing easily and loosely round them, added to the peculiar form of the wheels, renders them incapable of being thereby deranged or broken. The men can, with the same handspike, at pleasure, use the common windlass, or take advantage of the patent purchase, their faces being always towards the ship's bow. The handspike not requiring to be taken out (as they fleet themselves by the ratchets), no time is lost in re-inserting them, as with the common windlass alone. Should the cable ride, or a handspike foul, it allows the windlass to be turned backward. It is a considerable security to the windlass necks, as its pull is in an opposite direction to that of the anchor, and when riding, it answers as an extra riding-chock. It offers no obstruction to the free use of the windlass, having no spindle passing from bit to bit; no wheel projecting beyond the bits, and preventing the weather-bitting of the cable—no cog machinery to be deranged—whenever the windlass requires to be unshipped, the chain may be taken off in a few minutes. It may be fitted to one or both ends, or to the middle, even in a few hours, if necessary. It is admirably adapted to large vessels, as the chains may be carried to any convenient distance; and, if required, the speed of the windlass increased, by adopting a larger pinion. Its construction and action are so simple, as to render it unnecessary to encroach further upon your valuable pages, unless it be to say, that it is also the cheapest purchase which has hitherto been applied to a ship's windlass.

Yours respectfully,

T. Sowerby.

Patent Windlass Works, near Shadwell Dock Basin, London, Oct. 21, 1835.

Manufacture of Salt.—At the Anderton works, near Northwich, a new method of making salt has been discovered, and pans have been put up on a small scale to try the effect, which has proved so far most satisfactory. A fresh-water boiler is placed in the midst of the brine directly over the fire, the brine receiving at once the whole of the heat from the boiler and the fire; the overplus steam which is generated is applied to another pan; by this means a high temperature is obtained for 1,600 surface feet, which by the old mode would require four fires; immense expense in labor, and wear and tear, is saved. Mr. William Garrod is the inventor; he has taken out a patent. It is expected that more than five tons of salt will be made by one ton of coals; by the old method not more than two and a half or three can be produced from the same quantity of fuel.—[Mining Journal.]

AGRICULTURE, &c.

From the Cultivator.

AGRICULTURAL REPORT FOR 1835.

The season, as a whole, has been cold and dry, and consequently a late one. Natural vegetation was from ten to fourteen days later than usual. The spring was so dry, that the grasses, sensibly injured by the drought and cold of the winter, did not get their accustomed early growth; and from the scarcity of forage generally experienced, the scanty herbage of the meadows was fed off too late in the spring, as a matter of necessity. They did not recover their accustomed vigor. Winter grain withstood the severities of the winter better than the grasses, looked tolerable well when the spring opened, and maintained their good appearance. Indian corn, which habit has rendered almost indispensable in the economy of our farms, was not generally planted so early, by ten to fourteen days, as in ordinary years, on account of the backwardness of the spring; and it had many subsequent difficulties to encounter, which have tended greatly to lessen its product. The season has been more propitious to other crops, particularly to oats and potatoes. Yet on the whole, the products of our agriculture are less than a medium yield, as is evidenced by their high prices in market.

Wheat, we believe, afforded a fair average yield in most of the districts of secondary formation, where it constitutes the great staple. In other districts the result was less favorable. In the south, the product was seriously diminished by the Hessian fly; while in this vicinity, and to the north of us, the grain worm took at least one half of the crop. The quality of the grain was good; and there has been a manifest improvement, which we hope will continue to progress, in selecting clean seed. The extra price one pays for clean seed, weighs but as a feather against the advantages of a clean crop. Our apprehensions from the grain worm are in no wise diminished. We have tried the preventive means which have been recommended, without any sensible benefit. We hardly know of a more afflicting calamity that could happen to our State, than the extension of this evil, as now experienced here, to our western counties. And what is to prevent it? Is not the subject one of sufficient importance to call for legislative inquiry?

Hay has not been two thirds, and in some districts not one fourth, of an ordinary crop, from the causes which we have in part explained,—the want of the early and the latter rain, and the severe cold of the preceding winter,—causes, which human prudence could neither foresee or guard against. If there is any profitable suggestion which we can make, growing out of the failure of this crop, it is that of renovating old meadows, by subjecting them to the plough and an alternation of crops. So far as our personal observation will serve as a criterion, old grass grounds fell off in their product much more than grounds recently laid down, on our own lands three to one. This disappointment in the hay crop is however likely, we think, to do a vast amount of good—by coercing us to more economical modes of feeding it to our cattle, and to the better husbanding our means—and by extending the culture of roots. The practice of feeding at stacks and in open yards, or even in common racks, where the cattle tread and waste

nearly one half of the forage, is giving way to the better system of feeding in mangers, to which the cattle are tied, and where nothing is lost. The stacks and shucks of corn have been better saved, and if cut, as they are in many instances, they are affording an excellent substitute for hay. We give to-day a cut and description of a yard rack, well calculated to promote economy in fodder. The hay cutter is coming into general use.

Indian corn, as we have observed, was planted late, and was very generally and seriously injured by the grub worm. The replanted portion did not come to maturity before the frosts of September 14, 15—the mean temperature of the summer having been some degrees cooler than usual. The frost of the 4th of August also destroyed much in elevated districts, and upon the margins of small streams. Nor were these the only difficulties the crop had to encounter: the warm humid weather of October seemed to saturate the cob with moisture, or to prevent its becoming dry, and caused mouldiness in the grain; and in many cases where this was not fully ripened, absolute putrefaction. This was not only the case at the north, but extensively so as far south as Virginia. We note the fact here, that the reader may compare it with his own practice and its results, that we cut our corn at the ground, before all that had been replanted had become glazed; that it did not mould or sustain injury in the field; but it is due to truth to say, that it required much watchfulness and care to prevent mouldiness after it was husked—constant stirring and exposure,—and that we were obliged to uncrib a quantity, and to spread it, to save it from being injured. We think that corn dries and ripens better in stooks, than in any other situation, even than when topped and left in the hill. In the latter case it is receiving a constant accession of sap from the roots, which, for want of leaves to elaborate it, instead of being beneficial to the grain, serves but to bring on fermentation, as was stated by our Coxsackie correspondent, in the last Cultivator. The experience of the year seems to admonish us, —1. To fit our corn grounds for early planting, by freeing them from excess of moisture, by underdraining, or by ridging, where the surface is flat, or the subsoil tenacious. 2. To plant as early as the temperature of the season will admit. And 3. To select the earliest kind of corn for our crop. We have heretofore recommended a 12 rowed yellow variety, which *we* termed Dutton corn, and so far as we have learnt, this has ripened well where it was planted in ordinary season, and was not destroyed by the grub. The growth is rather dwarfish, but it will the better bear to be planted close; the product is abundant, and the grain hard, heavy and bright. Much of our seed has been sent, during the two last years, to New-Jersey, Pennsylvania and Ohio. We should be gratified to learn the result of its culture in those States, as well as in New-York. On the whole, we do not think the corn crop has been half of an ordinary yield.

Barley, which ranks next in importance to the preceding in the husbandry of many of our counties, has been a good, we think better than an ordinary, crop. On lands which will not carry wheat, and which are neither very light nor very stiff, this is a profitable crop. It gives nearly the same yield as oats, while it sells for nearly double in the market; and it is a question of some doubt, considering its superior nutritive properties, whether it cannot be as profitably raised for horse feed. In many of the eastern countries it is extensively cultivated exclusively for this purpose. The culture of this grain is extending in our State. Barley, for malting, should be threshed with a flail, as the machine, with the awn, often takes off the germinating part, which injures it for malting.

Rye is the bread corn of Germany and Russia, and the *natural* bread corn of many parts of the United States, for we are disposed to adopt, in this case, the opinion of St. Pierre, that every country produces what is most congenial to the wants, and conducive to the health of its population. One great difficulty is in reconciling this axiom with the actual condition of our brethren in some parts of New-England. Wheat they cannot grow,—of corn they grow but a modicum—and rye, they will insist their soil is incapable of producing. Whether this latter difficulty arises from actual sterility in the soil, from the absence in it of the peculiar pabulum of this grain, or from the difficulty of tilling the ground, we do not pretend to say; but the fact will not readily be erased from our memory, that in passing from Worcester in Massachusetts, to Enfield in Connecticut, in October, a distance, we believe, of 40 or 50 miles, we did not notice a solitary field of rye or wheat. The puzzle is, what, according to St. Pierre's theory, constitutes the *natural* food of the population? But, to leave this question unsolved, the crop of rye has been good, and the grain heavy. According to Von Thaer, this grain abstracts 30 parts in one hundred of the nutriment contained in the soil where it is grown. It is less exhausting than other small grains, and is ranked next to wheat in its nutritious properties. It contains a substance, in the opinion of Thaer, which facilitates digestion, and has an action particularly refreshing and fortifying on the animal frame.

Oats have been unprecedently fine. The cold season has been propitious to this crop. A large amount was sown, and both straw and grain were heavy. In many cases the crop was not secured till late in September.

Potatoes have, like oats, been favored by a cool summer; and where not cut down by the frost, before they were ripe, the crop has been a very large one. The scarcity of cattle forage and corn, however, will cause heavy requisitions to be made upon the oats and potatoes, to make up the deficiency, and present prices of these articles are likely therefore to be sustained and increased.

Mangel Wurtzel and *Ruta Baga.* The culture of these roots, as field crops, has been greatly extended, and as far as we can learn, with very encouraging success. We are yet hardly well enough versed in the management of these crops, and the labor saving machines which should be used in their culture, to enable us fully to appreciate the advantages they are capable of affording to our husbandry.

Hops have made but a very light return for the labor bestowed in their culture. The crop was light in New-York, and the quality generally inferior, on account of their not having matured well before the arrival of the autumnal frosts.

The dairy has been a source of handsome profit, on account of the high prices which butter and cheese have sustained in the market. This branch of husbandry is being considerably extended among us. It probably affords as sure a profit as any other department of husbandry. The gains may not be the greatest, but they are obtained at the least risk and expense.

Butcher's Meat, though rather scarce and high in the early part of the season, has been abundant and cheap towards the close of the year. The apprehension of a scarcity of fodder has led to the slaughter of a vast number of neat cattle and sheep; and induces an apprehension that both will be high the current year. *Pork* has been rather light, but the article has sustained a very liberal price.

From the Boston American Gardener's Magazine.

Observations on the Dahlia, its Species and Varieties. By John Lewis Russell, *Professor of Botany and Vegetable Physiology to the Mass. Hort. Soc.*

The surpassing beauty and brilliancy of the dahlia has raised it, in the estimation of the floral taste, whether considered in its single unadorned simplicity, or when brought to the acme of perfection by the ingenious labors of the horticulturist. Scarcely unrivaled by the unique elegance of the camellia, it has become, like that remarkably transmuted plant, as universal a favorite among the curious and wealthy; and still more a companion of the antique and venerable accompaniments of the cottage garden or the village flower-bed, of some humble admirer of nature's sportive wonders, such as may be found in every community, and not by any means few in our own happy, smiling New-England. Perhaps the moral and mental improvement of a people cannot be better estimated, surely not better promoted than in the observation and introduction of the spirit of the love of the more elegant and refined occupations attendant on agricultural pursuits. For my own part, I want no better proof of a feeling and exquisitely sensible mind, even under a rough and rude exterior, than may be observed in a love of nature, particularly that which relates to the care of flowers. A rose-bush, a honeysuckle, a pæony—famed in village love for pharmaceutic worth—a lilac-bush, or even a huge tuft of the singularly striped "ribbon grass," preserved by some rustic enclosure from the trespass of those sober, useful, though less intelligent tenants of the farm-yard, whose tastes are more alimentary than mental—all denote a higher order of mind, in some tidy housewife, or younger female; and when I discover the highly patronized dahlia, lifting its rich blossoms among the associates of its new and strange locality, to me it proves the gradual developement of a purity of taste and feeling, which, though not incongruous, is not always to be expected in such scenes. From the elevated sandy meadows of Mexico, where, scarce half a century since, they were probably first known, and shortly after were transferred from the Mexican Botanic Garden, the species, and almost innumerable varieties have extended with a greater rapidity and more accompanied admiration over the civilized world, than perhaps any other vegetable. The rich alluvial soils of the south, and the hard rocky lands of the north, are adorned with their cultivation; and with a singular accommodation to circumstances, they evince scarce a preference, in the expansion of their blossoms, for one section than for another. It is presumable, however, that heat is injurious to the perfection of their flowers,—a defect which might be obviated in a great degree by application of more moisture. Naturalization or acclimation cannot speedily, if at all, be expected in our northern latitudes, unless occasionally accidental escape from the effects of frost be deemed such, which has been known in this vicinity in several instances; and a case was mentioned of a root exposedto the winters of several years, pro-

tected entirely by the early and deep snows so common in the mountainous regions of New-Hampshire. In the Azores, they are lifted out of the soil at the approach of the winter season, and left exposed on the surface till the returning spring, undoubtedly with the view to give a temporary repose, and secure a greater amount of flowers.

So much has been said and written on the subject of my present remarks, that I can scarcely be expected to offer any thing new; and it is only with the design of presenting your Magazine with a succinct account of the early history and rapid progress of this superb flower, together with whatever observations may suggest themselves, that I undertake the task. Mr. Joseph Sabine, in the third volume of the "Transactions of the Hort. Soc. in London," has drawn up a very able and exceedingly interesting article, embracing all that was known at that time, (1818;) but as it may not be easily available to many of your readers interested in the subject, I shall consider it a sufficient excuse to pursue my intentions.

"The dahlia," says Count Lelieur, "was originally from Mexico, and introduced into Europe in 1789."—"From the Botanic Garden at Mexico, it was sent to that of Madrid, where it flowered for the first time in 1791." Cavanille (an ecclesiastic and eminent botanist,) dedicated the genus to Dahl, a Swedish botanist, a disciple of Linne, and the author of a work on his "Systema Vegetabilium." "In the same year (1791,) he gave the description of three varieties sent from Mexico, which he considered as three *species*, constituting the genus Dahl*ia*, viz: pinnata, *r*osea, and coccinea," (*Memoire sur le Dahlia*, &c. pp. 3—4.) In the number for March, 1835, of this Magazine, (Vol. I., p. 114,) some observations were made on the restoration of the old name of the genus, given by Cavanille, and altered from erroneous impressions of its being already appropriated, strengthened by a similarity of sound to Dalea, belonging to an entirely different natural order and artificial class. Willdenow, in his *Species Plantarum*, applied that of Georg*ina*, after Georgi, an eminent Russian botanist, and De Candolle adopted it, apparently on such authority.—With a similar desire of imitation, or the universal mania after new names, the florists of this country were fast falling into the supposed *improvement*, regardless of the untenableness of one averred objection, and the gross impropriety of violating that rule of every scientific nomenclature,—that the original name should be sacredly preserved, to the exclusion of every other, unless founded on *good* and *substantial reasons* of real physiological difference. It was with unfeigned pleasure that I therefore hailed the restoration of Dahl*ia*, and trust that the disciples of the illustrious star of northern Europe shall confer honor, and shed some reflected glory on the plant which was dedicated to his fame and memory.

In the third volume of the "Annales du Museum," we find a memoir on the Dahl*ia*, by M. Thouin, accompanied by a colored plate of three varieties, viz.: rosea, purpurea, and coccinea, probably answering, at least in color, to the three species of Cavanille,—rosea, pinnata, and coccinea. M. Thouin remarks that *r*osea was of the size of Aster chinensis *L.*; and from the plate, it seems to resemble a prototype of "Queen of Naples," a somewhat old variety. One these varieties is figured with semi-double flowers,—a fact not a little remarkable, as this plate was issued in 1804, and Count Lelieur mentions that not until 1817 could he obtain even two or three double varieties; about the same time, indeed, that the Dutch florists began to procure theirs from seed. A similar curious fact was observed in the difference of seed raised at Anteuil and St. Cloud, the richer soil producing only pure and simple flowers, whereas the thinner and lighter soils of the former place was only prone to produce the seeds of double varieties—accounted for on the philosophical principle, that it was a greater effort to produce a perfect seed than an imperfect one; that is, one capable of continuing an accidental and physiologically considered monstrous developement of petals instead of stamens.

After several attempts to reduce to species the different varieties of this flower, each botanist and cultivator adopting some trifling character, founded on the form of the leaves, or color of the flower, De Candolle discovered that the essential distinctions consisted in the absence or presence of fertile florets in the ray, and termed, in the second edition of *Hortus Kewensis, superflua* and *frustranea*. Mr. Sabine reduces under the two following species of De Candolle the several synonyms, as quoted from the Hortus Kewensis:

1. Dahl*ia superflua*, caule non pruinoso, flosculis radii fœmineis.

2. Dahl*ia frustranea*, caule pruinoso, flosculis radii neutris. [*Hort. Kew.*, ed. 2, Vol. v., pp. 87—88.]

By this arrangement it will be perceived that two species are formed, the first with "smooth stem, and fertile florets in the ray;" and the second with a pubescent or "hoary stem, and barren florets in the ray."

How far this arrangement has been observed, I have little means of determining. Loudon, in his *Hortus Britannicus*, gives a catalogue of sixty varieties of D. *superflua*, and only five of *frustranea*. But even with the characteristic differences which Sabine lays down, as to the coarseness of foliage and diffuseness of habit in *superflua*, and the delicacy, compactness and erect manner of growth in *frustranea*, I very much doubt whether in this country it would be easy to detect the species in the astonishing varieties of our gardens. It is almost certain that color would afford no test, although the original color was referable to purple in the former, and that of orange or scarlet in the latter. Still more uncertain the downiness or pubescence of the stems, which, though more or less observable in all, does not seem to constitute a permanent character. A series of experiments should be instituted, in order to endeavor to trace any observance of this specific difference of De Candolle, in the seedlings of our double varieties; and also whether, in this instance, unobserved, a real hybridizing process has not taken place between the two supposed genuine species.

It may be deemed presumptuous to seemingly question the authority of such celebrated names; but it must appear an important, and surely therefore a harmless inquiry, especially when we consider the tendency to confusion in such a myriad host of abnormal individuals, as our catalogues of the varieties of dahlias present. I trust, therefore, to the candor of discriminating minds, that nothing but a deep interest in the cause of scientific truth could for a moment prompt such an inquiry. Such a theory has been conceived before, from the failure of the Genevan botanist's characters, as also from other circumstances, which render it a still more interesting query; and at no better time could it be settled, unless it has already been done, than now, in the height of the universal popularity and general admiration which the subject of i obtains, as an ornament of our gardens and parterres.

It is a curious subject for reflection on the changes effected in horticulture, to be able to trace the opinions of learned men, founded in sound reason and observation, taking, for a moment, the situation they occupied, and casting a glance forward to our own experience and knowledge, which confirms or disproves their theories. Thus De Candolle foretold the improbability of the occurrence of a blue variety, and we have almost every combined shade and primitive color of the prismatic bow, excepting that Mr. Sabine tells us of the existence of a double white, which he feels inclined to doubt, and now "Kings" and "Queens," there are of double white, and even "Mountains of snow," and beauties of antiquity, and unrivaled only by the elegance and purity of these fragile flowers; the grandeur of an avalanche exhibited in a petal, and the winning loveliness of female character shining forth in an abortive stamen.

But with all the attractions of great and good and illustrious names, and the wondrous transmutations of floral skill—for wondrous they truly are—the simple, unadorned elegance of a fine single flower, with its eight perfectly formed petals and golden centre, expanding gradually into the florets of the disk, presents to my ideas a lovely work of nature's skill. Surely it is a mistake to exclude from our collections these primitive forms, to give place to double varieties only; and during the last season, one such has actually insinuated itself, of however only tolerable merit, more it may be suspected from its royal title or foreign origin, than from any returning taste to floral simplicity.

The dahlia, like many other cultivated plants, seems very prone to sportiveness or variation in the tints and pencilings of its petals. Cultivators begin to recommend the use of strong and nutritive manures in producing very fine flowers, an opinion entirely counter to one formerly entertained and practised upon,—that of planting in poor and meagre soils. Undoubtedly the former practice is the better one, and, added to this, the fact, that but a moderate degree of sun and heat is necessary to their increase, there can be no reason why the multiplication of flowers is not almost wholly at the disposal of the grower. The natural localities have been discovered to consist of sandy mountainous meadows, of 48 to 5400 feet above the level of the sea. A sandy meadow, in such a situation, may not be a poor or meagre soil; on the contrary, it is most probably a very rich one, being composed of the alluvial deposit of the decomposition, both mineral and vegetable, of the upper regions. It is certain that the effect of poor soil on the plant is to weaken the tendency to produce rich flowers, by the poverty of its entire growth, and that, when liberally supplied with suitable food and sufficient moisture, nothing can surpass the exuberance of its blooms.

The value of the dahlia seems confined to its intrinsic beauty and hardiness, as an ornamental plant. Many futile attempts have been made to introduce it among the esculent roots; but it would require a savage appetite, or a love for novelty, to bring this about. Its tubes, nevertheless, abound in farina, but the supposed presence of benzoic acid destroys their palatableness. The Compositæ, in their general characters, though of great importance to mankind in their medical properties, offer few articles of nutritious food. The tubes of the tuberous sunflower,

improperly and commonly called "Jerusalem artichoke," are indeed considered by some as delicate food, and the disk of the genuine artichoke, is used in some countries extensively as an accompaniment to the table.

Every season brings to the dahlia some new insect foe, which attacks its valuable and tender buds, or devastates its foliage. The grasshopper, (a common green species,) and the *Syrtis erosa*, with *Membracis bubalus*, better known to the unscientific as a two-horned triangular *bug*, has been peculiarly busy for a few seasons past. While some unknown pest, of a green and smooth larva, luxuriously riots on the rich petals, or undermines the leaves. A small dipterous (?) insect was observed for the first time this year, but I was unable to detect any such new depredator. Nothing but a careful examination and diligent use of the fingers in seizing and crushing the intruders, with perhaps some liquid application to the roots, which should promote a more speedy and vigorous growth, is a preventive. It is to be hoped attention will be paid to this view of the subject, that some method may fortunately be devised to save from disappointment the promised glories of our finest and rarest plants, or at least that these insidious mischief-workers may be known and exposed.

I conclude this article with only one question to the experimental florist, viz: whether sufficient experiment has been made, as to the soil or exopsure, to insure the perfection and bloom in that rich and superb variety, "Levick's Incomparable?" Every one who attended the last annual exhibition of the Massachusetts Horticultural Society, must remember a remarkable specimen which graced the magnificent display of its sister varieties, which was produced in the immediate vicinity. Yours,

JOHN LEWIS RUSSELL.

Salem, Jan 1, 1836.

From Chaptal's Chemistry of griculture.

CHEMISTRY APPLIED TO AGRICULTURE.

Influence of Heat and Light upon Vegetation.—The changes of temperature experienced by the atmosphere in the course of a year, are so great, as to cause some liquids to pass alternately either to the solid or aeriform state, and some solid bodies to become liquid. The natural effect of heat upon these bodies is, by dilating them, to weaken the force of cohesion which unites their molecules, and, by facilitating the action of chemical affinity, to enable them to enter into combination with foreign bodies. Thus heat renders the juices of plants more fluid, and facilitates their circulation through the cells and capillary vessels; and by giving activity to the suckers of roots, enables them to draw from the earth the juices necessary for their nourishment.

Above a certain temperature, heat, by promoting evaporation, causes the juices of plants to become thickened and dried in their organs, and thus vegetation is arrested, and life suspended. This effect always takes place during great heats, when neither rain, dew, nor irrigation can sufficiently repair the loss occasioned by evaporation.—This effect would be more frequent, if provident nature did not employ means to moderate the action of heat.

The first of these means is the transpiration of the vegetables themselves, which cannot take place without carrying off a large portion of heat, and thus preserving the transpiring body at a temperature below that of the air. The second means is found in the organization of leaves, which are the only parts of a plant where transpiration takes place. That surface of leaves which is exposed to the direct rays of the sun is covered by a thick epidermis, which resists the calorific rays. In herbaceous plants, as in stalks of grasses, this covering is composed principally of silex. In other plants it is analagous to resin, wax, gum, or honey; whilst the epidermis, which covers the opposite sides of the leaves, is fine and transparent. It is by this, that transpiration and the absorption of nourishment from the atmosphere are carried on. If we should reverse the order of things, and present the under surface of a leaf to the rays of the sun, we should very soon see that it would make great efforts to resume its natural position.

When a plant is dead, or rather when an annual plant has fulfilled its destiny, giving assurance of its re-production by the formation of its fruit, the action of heat and of the other chemical agents is no longer modified by any of the causes of which I have just spoken, and the plant receives their impression in an absolute and unmodified manner. When the temperature of the atmosphere sinks below a certain point, the fluids in plants become condensed, the movement of the juices is retarded, the activity of their organs languishes, and is at length suspended, until restored by the return of heat. The action of the atmosphere upon plants, when deprived of its due proportion of heat, is however modified by the emission or disengagement of caloric, which is always given out when liquids are condensed, or solids contracted; and this occasions the temperature of plants, during the winter, to be always a little higher than that of the atmosphere.

It sometimes happens that the temperature of the atmosphere sinks so low as to produce fatal effects upon plants by freezing their sap, and thus occasioning their death. This effect does not always depend upon the intensity or degree of cold to which they are exposed, but upon particular circumstances. I have seen olive trees resist a temperature of 22°.2 Fahrenheit, and perish from that of 28°.6, because in the last case the snow, which had collected upon the branches of the trees during a night, was dissolved the following day by the heat of the sun, and the wet tree was exposed during the succeeding night to the action of 28°.6. There is nothing more dangerous for corn and grasses, than those frosts which follow immediately after a thaw, because the still wet plants, not being deeply rooted in the ground pulverized by the frost, have no means of defending themselves from the effects of the cold.

Though the action of light upon vegetation does not appear to be so important as that of the other fluids of which I have spoken, it is not in reality less so. Plants, which are raised in the shade or in darkness, are nearly or quite without color, perfume, taste, or the firmness of texture of those that are exposed to the direct rays of the sun: and if the luminous fluid does not combine with the organs of plants, we cannot deny that it is a powerful auxiliary in their combinations.

When we reflect upon the influence which the atmosphere exercises over vegetation, and over the principal operations which are carried on in rural establishments, such as fermentations, the preparation of various productions, and the decomposition of some substances, in order to apply them to particular purposes; we are astonished at finding nowhere any of the simple and unexpensive instruments which announce its changes every moment.

I do not propose that delicate and complicated instruments should be provided; but I wish to find on every farm an hygrometer, to ascertain the humidity of the atmosphere, a thermometer to indicate the changes of temperature, and a barometer to determine the weight of the atmosphere. This last instrument would be particularly valuable, as predicting the changes of the weather; the rising of the mercury announces the return of dry weather, and its sinking warns us of rain and storms. We can regard these variations but as signs; but they are signs much more certain than those which country people derive from the changes of the moon.

Properties of Mould.—Land owes its fertility, mostly, if not wholly, to the presence, in a greater or less abundance, of principles analagous to those constituting mould.—These principles are furnished by manures, and by the decomposition of plants; but each harvest causes a diminution of them, a part being washed away by rains, and a part absorbed by the crops which are raised; thus the soil is deprived by degrees of its nutritive qualities, till at length nothing remains but an earthy residuum, deprived of its nourishing juices, and completely barren; it is to restore its fertility that land must be manured afresh, after having yielded several crops.

Dews—Suggestions to render them beneficial to Vegetation.—The aqueous vapors suspended in the air begin to be condensed and precipitated at sunset, and with them is deposited the greatest part of the emanations which have arisen from the earth during the day; these exhalations, though beneficial to vegetation, are almost always injurious to man, and it is not without reason that he fears and shuns the night damps. In southern climates, where the heat of the sun is more intense, and rains less frequent than in northern, vegetation is supported by the dews, which are very abundant. In order that the dews of night may produce their best effects upon vegetation, it is necessary that the soil should unite certain qualities, which it does not always possess.

When the soil is hard and compact, and forms by the action of the air an impenetrable crust, the dew is deposited upon its surface, and evaporated by the rays of the sun, without having moistened the roots of the plants or softened the earth around them; so that of the organs that serve to convey nourishment to the plants, the leaves are the only ones benefitted by the dew, while the roots which are the principal vehicles of nutriment when the plant is fully developed, are not in any degree benefitted by it. It is necessary in such cases, that the soil should be softened, lightened, and divided, so that the air may convey the water with which it is charged, to the roots of the plants, and to every part of the earth surrounding them, to a certain depth; then the plant can imbibe, through all its pores, the reviving moisture; and that which is received by its roots is more lasting than that which it absorbs in any other way, because the roots being sheltered from the direct rays of the sun, evaporation takes place less rapidly, and the moisture is retained, whilst the leaves are speedily dried by the heat. Besides, that earth which is most easily affected by the dews, yields most readily to the action of roots, whether it be to fix the plant firmly by their extension, or to draw from the soil its nutritive properties.

This explains in a natural manner the origin of a custom observed by all agricul-

turis s, and of which all acknowledge the advantage. When vegetables, such as peas, beans, potatoes, and other roots are sowed in furrows at equal distances from each other, the soil in the intervals is hoed, or dug, with the utmost care, and thus rendered light, soft, and permeable to the air, whilst at the same time weeds, which would be hurtful to the cultivated plant by depriving them of nourishment afforded by the ground, are destroyed; and the soil rendered more fit to receive the rain, and convey it to the roots. I do not deny that these benefits are real, but I hold them to be secondary, and subordinate to the advantage derived from opening access to the air, and permitting it to deposit its dews upon the roots, and upon the earth in contact with them.

I have uniformly observed the effect of this method to be equally speedy and favorable in the cultivation of beet roots, and I have never employed any other, to restore their vegetation to its freshness when it becomes yellowish and drooping; in three or four hours it will become of a beautiful green, and the leaves spread themselves out, although no rain may have fallen; and this often when the soil had not contained a single weed. I have observed the same effect produced upon the other culinary roots.

SAUNDERS' PATENT FOR CHILLING THE INTERIOR FACINGS OF IRON CASTINGS.

To all to whom these presents shall come:

Be it known, that I, William Henry Saunders, of Dobbs' Ferry, in the township of Greensburgh, in the county of Westchester and State of New-York, patent axle manufacturer, have invented a new and useful improvement in the manufacture of the cylindrical interior faces of iron castings by a new method of chilling the same, and that the following contains a full and exact description thereof.

The method commonly used in making iron castings with cylindrical interior faces, as pipes, steam cylinders, boxes for axles, &c., is to form what is technically called a core of loam or sand, which, by dampness and pressure or other means, is caused to adhere together in the form of a solid cylinder, which is inserted into the mould, and upon this core the melted iron is run or cast. After the casting is made, the sand or loam core is taken out of the interior of the casting and leaves a cylindrical vacancy in the space previously occupied by the cylinder of loam or sand. The castings so made, are in general equally soft on the interior and exterior faces, but in many cases, as in cylinders for locomotion and other steam engines, boxes for axles, eyes of sheaves, pulleys, and wheels which run loose on their shafts, &c., it is desirable that the cylindrical interior face of the iron castings should be as hard as possible. In castings with conical interior faces, as boxes for taper axles, this desirable hardness is produced by running the melted iron upon a conical turned solid iron pin, which is used instead of the sand core before mentioned, whereby the melted metal is condensed at the instant of its contact with the surface of the iron pin, and the conical interior face of the casting thereby becomes extremely hard; the pin is afterwards forced out of the casting, and the result is the very hard conical vacancy in the castings which was required.

This method of chilling the interior faces of castings cannot be applied where such interiors are required to be perfectly cylindrical, because the melted iron, while cooling, contracts upon the solid cylindrical iron pin, and retains it so forcibly that it cannot afterwards be withdrawn; and this practical difficulty has hitherto been found insurmountable in castings with cylindrical interiors, although it is in some measure obviated in castings with conical interiors.

My method of overcoming the difficulty hitherto found in chilling castings with cylindrical interiors, will be fully understood by the following description and accompanying drawings. Instead of using a solid iron pin for the core of the casting, I use a pin composed of two, three, or more parts, which parts are connected together by a collar at each end, and wedged firm in the said collars by two conical plugs, one of which is inserted into each end of the pin so composed, whereby the ends of the two, three, or more sides of which the pin is composed, are pressed against the inner circumference of the said collar, and so retained in their places; the angular or flat faces of the said sides of the pin are also, by the insertion of these plugs, firmly held at a small distance from each other, so as to allow the plates or sides of the pin to fall together when the plugs are withdrawn, and thus leave the castings which has been run upon them.

What I claim as my own invention, and as not previously known, the above described improvement in the manufacture of iron castings with cylindrical interior faces, is not the making of such castings with sand or loam cores, or chilling the same upon solid, conical or cylindrical iron or other pins, but the chilling of such castings upon pins divided longitudinally and composed of two or more parts, by which contrivance, as well as by the use of the collars and plugs, (or by other methods which are obvious,) for retaining the parts of the pin at a small distance from each other, I am enabled to withdraw the said pins in parts from the said castings after they are cooled upon the pins, this withdrawal of the pin having been found impracticable in making iron castings with cylindrical interior faces, when cast upon solid pins.

I do not mean to limit my claim to the particular form of pin shown in the drawings, or to the improvement of boxes for axles alone, having chosen such forms only as exemplifications of the principle of my improvement, but I claim as included under my improvement all iron castings, of whatever form, size or kind, having cylindrical interior faces, and which shall be chilled upon iron or other metal pins composed of two or more parts and divided longitudinally.

W. H. SAUNDERS.

Witnesses, { WILLIAM WOOD, THOMAS LINDLEY,

We have seen a specimen of the above casting, in which the desired end appears to be fully answered. The patent is an ingenious one, fully and accurately described —[ED. M. M.]

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, FEBRUARY 13, 1836. [VOLUME V.—No. 6.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 13, 1836.

CHARLESTON AND CINCINNATI RAILROAD.—We are highly gratified to learn that the Legislature of Kentucky has adopted an enlarged and liberal policy in relation to the Charleston and Cincinnati Railroad. Let the people build Railroads where they will, and, if necessary, aid them *in all great* national works.

On receipt of the news at Cincinnati of the passage of the bill, the city was illuminated, and great rejoicings were had—and well may the people rejoice.

REPUBLICATION OF THE REPORTS OF THE BALTIMORE AND OHIO RAILROAD COMPANY.—We hear the question asked almost every day—Where can I procure a set of the Baltimore and Ohio Railroad Reports? And we have until the present been obliged to confess that we did not know.

The case now is otherwise. Mr. F. Lucas, Jr., of Baltimore, intends republishing the entire set—with additional matter—so that besides a history of the road, the work will contain a compendium of the principles of construction and locomotion, together with the series of experiments instituted by this Company in reference to the speed and efficiency of engines.

From the great interest attached to the proceedings of the Company, as well as the valuable additions, we consider this republication as invaluable not only to Engineers but to all feeling an interest in internal improvement. We refer to the proposals in this day's paper, giving particulars.

PROPOSALS
FOR THE REPUBLICATION OF THE REPORTS OF THE BALTIMORE AND OHIO RAILROAD COMPANY;

Condensed so as to include, together with other matter added thereto, all that is known at the present day of the location and the application of Motive Power and Machinery thereupon, accompanied with explanatory drawings. The whole being intended to serve as a Manual of the Railroad System, for the use of Civil Engineers, to which is prefixed a history of the Baltimore and Ohio Railroad Company.

The work, whose reports it is thus intended to republish, was the first of any extent commenced in this country for the purposes of general transportation; and its early history is but a series of experiments, costly to the Company which had it in charge, but furnishing results of the greatest value and importance to others. The character of the country through which the road passed, involved every species of excavation; and in the construction of the Railway, almost every mode was successively tried for the purpose of ascertaining the best. While portions of the road were straight, others were of the smallest admissible curvature, and the locomotive power employed had to be such, therefore, as was suitable to both cases. This led to a series of experiments in this department of the Railroad System, which has resulted in the production of Engines preferable to any in use elsewhere—equal in speed to the best imported, and far superior in efficient power. From all these circumstances, the reports of the Baltimore and Ohio Railroad, from its commencement to the present day, have been sought for by Civil Engineers for the sake of the knowledge which they contain, and the frequent demand for them has suggested to the subscriber their republication, with such additional matter as shall constitute a Manual of the Railroad Sysin the present state of knowledge on the subject.

The reports are now difficult to be procured, and but few complete sets are known to be in existence. While the proposed republication will therefore be of use to the profession of Civil Engineering, it will be the means also of preserving the records of a work whose importance and value are now universally appreciated. The work will be divided into five parts.

I. History of the Baltimore and Ohio Railroad Company.

II. The Location of Railroads, including the principles of reconnoissances, general instrumental surveys, and location for construction.

III. The construction of Railroads, including the excavation and masonry and the construction of the Railway on the graduated surface, turnouts, weighing, &c.

IV. The motive power including engines, cars, wagons, &c.

V. Forms of contracts for every species of work which has to be performed in the construction of a Railroad.

☞ As it is not practicable to ascertain what sized volume or volumes the contemplated work will make, the price cannot be fixed, but Railroad Companies and individuals who may subscribe for it, may rest assured, that it will be made as reasonable as the nature of it will permit. Orders directed to

F. LUCAS, Jr. Publisher,
Jan., 1836. No. 138 Market street, Baltimore.

RAILROADS AND RAILROAD MACHINERY.—The wonderful increase of the Railroad spirit in the United States may be in some measure estimated by looking over our weekly summary under the head of *Railroad and Canal Intelligence.*

The young State, GIANT we might well say, of *Illinois,* during the late session of the Legislature, chartered — Railroads. Illinois is not *alone* by any means in this matter—it pervades the whole Union.

The MACHINERY department, it would seem, will hereafter keep pace with the construction of roads. Machine shops are springing into existence in every part of the country; and in this branch of business, although of so recent origin in this country, we can compete successfully, and by some it is believed, excel the English manufacture.

By the following notice we learn that another extensive machine establishment, for the manufacture of *Locomotive Engines* and all kinds of Railroad and other machinery, is now in successful operation in Newcastle, Delaware—and it affords us pleasure to call the attention of Railroad Companies to their notice. Their establishment, we understand, is upon a very extensive scale, situated on the Delaware river, directly at the termination of the Newcastle and Frenchtown Railroads.

S. D. is again cordially greeted by us, and we hope he will not again permit other avocations to interfere for so long a period with his favors to the Journal.

We give the following communication an early insertion, believing fully with S. D.—and we are confident that Mr. Seymour entertains similar opinions—that in all practicable cases, *short* curves and *steep* grades should be avoided. Yet we are sure that neither the gentlemen managing the Baltimore and Ohio Railroad, nor Mr. Seymour intended to be understood that they deemed such inclinations and curves as unobjectionable. We have always understood the former gentlemen to congratulate themselves and the comunity, well they may, that they have been able to overcome with such facility, and in so short a period, the *very great* obstacles in the shape of *steep grades* and *short curves*, with which they had to contend. And Mr. Seymour only congratulated the Company on their prospects of success, when he discovered that the difficulties with which they had to contend were far less than those *already overcome* by the great pioneers of the Railroad System in this country—not that they had not serious obstacles to overcome, but that those obstacles were so much less than was by some supposed.

To the Editor of the Railroad Journal:

Sir,—In locating a Railroad, or any other mode of internal communication, the natural features of the country must, of course, govern the route. Were the surface a perfect flat, as on the prairies, and in some parts of the southern States, a straight and level line would be, as every one will agree, the proper course; and supposing the track equal in both directions, such a line efficiently finished would form the very beau ideal of a Railroad, but we rarely or never meet with such a happy predisposition in nature; more frequently the outline is more or less broken, the ground undulating in valleys and ridges, having various directions, and these, as often as otherwise, in opposition to the required course. In such cases, the judgment of the engineer is exercised; first, in ascertaining which of the various modes of attaining the same point, presents the fewest difficulties, or the most prominent advantages; and second, having thus fixed upon the route, (by reducing the rugged outline of the country as much as the conventional outlay admissable on such works will permit,) in conforming, as nearly as practicable, to a level and stright line, these two elements being the essential and leading principles of every mode of transportation.

But a level and straight line is, as I have already said, rarely obtainable in nature. All Roads with which I am acquainted are to a certain extent, both curved and undulating. This leads me to advert to the power in use on such Roads. Locomotive engines obviously must and do carry with them a surplus power, to enable them to overcome the extreme inclinations and curvatures in all descriptions of weather. But this surplus power has its limit. On the Sutton incline of the Liverpool Railroad, two engines are used: it does not follow from this fact, that an engine could not have been made in England sufficiently large and powerful to take the train up the incline in the worst weather. There are such powerful engines in use in England on the collieries, where moderate rates of speed and the entire control of the transportation, methodical as the action of the machine itself, renders them admissable. Such an engine might have been framed for the Sutton incline, and might have performed the entire trip, without any one but an adept understanding that a machine of double the necessary capacity was in use. This incline forming but a very small fraction of the length of road, it was better that extra power should be in readiness at this point, and that on the remaining portions of the route, engines of merely the required capacity should be employed. We are told that on the Baltimore and Ohio Railroad, engines can be made to ascend grades of 80 and 90 feet per mile. Who ever doubted it? The question returns, is this an econominal application of locomotive power? Such short grades of high inclination require undoubtedly and confessedly engines of double the capacity necessary for the general track. But admitting that, in particular cases, this should be found expedient, it is due to truth to let these be understood as defects, as exceptions to the rates of inclination, which any engineer intending an economical use of locomotives, would admit. In the letter of Mr. Seymour to the President of the Lake Erie Railroad, and also, I am sorry to say, in some of the Baltimore and Ohio reports, it is inferred, or left to be inferred, by the reader, that such inclinations are not greatly objectionable, that they are admissable in ordinary cases; in fine, it is implied, though not expressed, that the expenditures incurred on the best Railroads, to supercede the necessity of such inclinations, have been unnecessary and unjust.

In the same communication, Mr. Seymour refers particularly to the curves on the Baltimore and Ohio Railroad, and congratulates his employers that, in this respect, the Lake Erie Road will compare favorably, inasmuch as it possesses no curve of a radius less than 700 feet. One grade, he says again, has been admitted, for only a mile of a half, however, of 90 feet per mile; several there are of 60 and 80. Then we do not require to be told men use serious drawbacks, and the curves of 700 feet radius are serious drawbacks. Shall we go in search of information to excuse the deformities of the Road. If the nature of the country renders such grades absolutely necessary, they require no excuse, although they might very honorably be fairly stated to the stockholders as circumstances which will limit seriously the capacity of the Road. If they are not absolutely necessary and can be avoided, even by a more circuitous route, surely every engineer will bear me out when I say that they should be considered inadmissible, inasmuch as they deteriorate very sensibly, in the section of 2 to 1, the power of the machinery, in one direction, at least, reduce the rates of travel, increase the expense of transportation to all, and diminish, in a corresponding ratio, the returns of the stockholders. The same remark holds good in all curves of the radii mentioned by Mr. Seymour, though not to the same extent. It is, perhaps, assumed that the Lake Erie Railroad will, in any case, be so far superior to the Lake Erie Canal, as to render all such defects unimportant. In a great national Road of this description, the wisest policy and the truest economy consists in approximity to perfection as nearly as possible. Circumstances may induce private companies unwillingly to admit of certain deflections from the proper course; but that which is done by the State, and by a State so rich in itself, and towards a purpose so eminently beneficial, and so certain of a remunerating retun, should be such as the community generally could copy to advantage; should be a standing example of its class, condensing all the improvements of the day, and conducted by men of acknowledged experience and success in the department in dispute.

In adverting to the rates of curvature on the Baltimore and Ohio Road, Mr. S. states that they did not affect the speed of the engine, which was maintained at 14 miles per hour, throughout the journey, and might have been more but for the curves, I suppose. Mr. S., I trust, does not mean, by this statement, to convey the idea that an engine can run with equal speed on a curved line and on a straight. Fourteen miles an hour is but indifferent despatch on a Railroad, and unfortunately, those Railroads which Mr. S. happens to have visited, are not the most prominent examples of the superiority of Railroad transportion in the United States. Twenty miles an hour now a days, is a common and safe rate on a Railroad; twenty five very frequent; thirty and much larger rates have occurred, but I would always desire to see them considered as exceptions. Mr. S. will not, I trust, consider it impertinent on my part, to recommend his visiting various other Roads, where the perfection of this species of conveyance is more apparent than on those which he mentions, and where the grades and curvatures are correspondingly superior. The New-Castle and Frenchtown is perhaps the best on the list. The inclinations are stated not to exceed 25 feet per mile, and the curves as being of a very large radius. The rate of travel was consequently 18 miles an hour. The same on the Washington, which, how-

ever, is not detailed. On the other Roads 11, 12, 15 and 16 miles an hour are given as the usual rates. These last are not the best specimens in their way in the country; I do not say that they are the worst; from all of them there is doubtless much valuable information to be obtained; but no consolation should be drawn from their imperfections, nor should we seek to shelter under their faults, the defects, unavoidable, if you please, of another Road.

My motive in adverting to Mr. S.'s letter at all is, of course, but a desire to see the Lake Erie Road, both as regards route and details of route, as perfect as circumstances will admit. Respectfully, &c.,

S. D.

Leeds, England, January 22, 1836.

To D. K. Minor, Editor of the Railroad Journal.

Dear Sir,—Last month I had the pleasure to address you on the subject of Railway Iron, and as a very important change has taken place since, I will give such additional information as I think may interest you.

My last letter informed you that the meeting of the Welsh iron masters at Romney, had advanced the price of No. 2 bars to £7 10s per ton, *three months' credit*, from £7 per ton *six months' credit*, which reduction in the time of credit was equivalent to a further rise of 2½ shillings per ton. Immediately after this meeting, the demand increasing, (persons are always more free to buy on a rising than a falling market,) iron rose to £8, and orders flowed in from all quarters, which the manufacturers were very willing to *execute at any rate*, except at prices to be determined after the adjourned meeting of the 13th inst. should take place. This meeting occurred on the appointed day, and the price agreed upon was £10 per ton, three months' credit, and the parties present pledged themselves *not to sell below* that rate before the 1st of March next. This determination has made the market regular and steady, and large transactions are now taking place at this high price. You will recollect that on the 25th August the price was advanced *from* £5 10s per ton, six months' credit, and it now being £10 per ton, three mouths' credit, it appears that iron has advanced £4 12s 6d per ton in the short space of five months. This very great rise appears to many persons to be unreasonable, and not likely to be maintained even for a few months. I however think the iron masters are justified in demanding such prices, and that no reduction may be expected until a very considerable increase in the manufacture takes place, which cannot be accomplished soon, as the difficulty of procuring additional workmen, who cannot be had except by training up fresh hands, is insuperable. To procure even unemployed workmen of any kind is difficult, as every one willing and able to labor, throughout the immense population of Britain, is fully employed at good wages. Never was a country in a more flourishing condition than this. Every branch of business (even including agriculture, notwithstanding the landed interest complain of the low price of corn,) prospers, and every one is (or ought to be,) contented and happy. Every where I travel, whether it be in the counties of Derby, Nottingham, Lancaster, York, where new mills for silk, cotton, woollen and linen goods, or in Warwickshire, Staffordshire, &c., I see new establishments for various branches being erected. Every where throughout the country, new factories and dwelling houses are being constructed, and they consume a vast quantity of iron. In addition to the demand for ordinary purposes, the wants for railway purposes are even greater than I anticipated, and not one respectable house, either in the midland counties or in South Wales, is willing to take orders for any considerable amount, if a delivery be required before August or September next.

The result as regards the price of railway iron, I will relate from my own experience. On the 19th December last I put out an order for 2000 tons of rails for an American railroad company, at £9 17s 6d per ton, and wished the same house to extend it to 4000 tons, but they declined, and they had the option of accepting that quantity for three or four days; they however refused. In the mean time I made every exertion to procure other houses to take contracts at this, and even higher prices, but found a general unwillingness to come under any engagements before the adjourned meeting at Romney should fix prices. A fortnight after, the first contractor called on me, when he refused to take any more even at £1 per ton advance on the previous rate. Subsequently I have been compelled to pay a much higher rate for the balance of the contract. At this moment railway iron of No. 3 quality cannot be procured for £5 per ton advance on the price I contracted for it on the 1st August last. But I do not suppose, for the reasons mentioned above, that iron will be lower for many months, certainly not during the present year. If prices had been forced up by speculation, I should naturally expect a reaction, but this is not the case; they rest on *bona fide* consumptive demand, and there is every prospect of their continuing, as no stocks are held by any one, and the causes which produced the great change are likely to continue.

I am now on a tour through the manufacturing region, previously to my embarkation on board of the "North America," the packet of the 1st of February, for New-York, where I hope to have the pleasure to see you on my arrival.

The destruction of so considerable a portion of the commercial part of New-York creates universal sympathy throughout this country. Most sincerely do I regret this melancholy event, and trust that our government will not hesitate a moment respecting the propriety of giving such relief as will enable the enterprising citizens of New-York to rebuild their beautiful town within a short time. But whether the national government do their duty or not, I am convinced that no town in the world will so soon recover from the effects of this truly deplorable catastrophe, for no where is there such an intelligent, active and enterprising population as in the city of New-York. I am, dear sir,

very respectfully, yours,

Gerard Ralston.

RAILROAD AND CANAL INTELLIGENCE.

New-Bedford and Fall River Railroad.—A survey of the route of this proposed road has been made by S. B. Cushing, Esq. The length of this route is 13 miles 223 rods, being but 244 rods longer than a direct line between the two places.

More than 11 miles are disposed in straight lines, the remainder curved on radii of from 8,000 to 12,000 feet.

The inclinations are moderate, except at the village of Fall River, where additional power will be required.

The estimate for single track, including engines, cars, &c., is $211,970.

NEW-YORK.

The Long-Island Railroad.—The Directors have located the part of this road from Jamaica to Jericho, and authorised it to be put under contract immediately. The ceremony of breaking ground takes place March 31. The section from Brooklyn to Jamaica will be opened for use April 1st, with two locomotives and fourteen cars. The cheapness of the gradation throughout the whole route has been established beyond all question. Every one acquainted with Long-Island knew the fact before. In two years it is expected to be completed the whole distance to Greenport, opposite Stonington, Conn. As soon as the Jamaica portion comes into use, in a few weeks we have no doubt many merchants of New-York will take up their residence there permanently, as the twelve miles will be traveled in about half an hour from our city.—[Eve. Star.]

The proposed alteration in the course of the Erie Canal at Albany, making a saving of 14 or 15 miles, is highly approved through all the West.

The cost of the new route will not exceed that of widening the old Canal by more than $300,000. The city of Albany offers to pay this difference, for the use of the surplus water.

KENTUCKY.

Green River Railroad.—The portion of this road from Hopkinsville to the Cumberland River has been surveyed by M. A. Chinn, Esq. He mentions two routes from Hopkinsville, one terminating

at Harman's Ferry, the other at Eddyville, on the Cumberland.

From Hopkinsville to Harman's Ferry, } distance 56 1-3 miles, cost $360,305.

From Hopkinsville to Eddyville, } distance 47 3-4 miles, cost $296,885.

ILLINOIS.

The following acts of incorporation were passed by the Legislature of Illinois during the session just closed:

To incorporate the Beardstown and Sangamon Canal Company; Bellville and Mississippi Railroad; Warsaw, Peoria and Wabash Railroad; Wabash and Mississippi Railroad; Alton, Wabash and Erie Railroad; Mount Carmel and Alton Railroad; Rushville Railroad; Wabash and Mississippi Union Railroad; Shawnetown and Alton Railroad; Pekin, Bloomington and Wabash Railroad; Mississippi, Springfield and Carrolton Railroad; Galena and Chicago Railroad; Central Branch Wabash Railroad; Waverly and Grand Prairie Railroad; Winchester, Gynville and Jacksonville Railroad; Illinois Exporting Company; Sangamon Fire Insurance; Chicago Marine and Fire Insurance Company; Morgan County Mutual Fire Insurance; Shawnetown Insurance; Quincy Insurance; Marseilles Manufacturing Company; Chatham Manual Labor School; Franklin Manual Labor School; Alton Female Institute; Bloomington Female Seminary of Learning; McDonough College; Burnt Prairie Manual Labor Seminary; Franklin Institute; Chicago Hydraulic Company.

Gov. Duncan has obtained from the Illinois State Bank the promisse of a sufficient loan to enable the Commissioners to commence operations on the Illinois and Michigan Canal without delay.

PENNSYLVANIA.

The Canal Commissioners have divided the Columbia and Philadelphia Railroad into two sections, to be called the Eastern and Western Sections, and have appointed the following officers to take charge of it:

Joseph W. Patton, of Cumberland county, to be Superintendent of the Western Division of take Road.

Andrew Mehaffy, of Lancaster county, to be Superintendent of Transportation on the Western Division.

Frederick Vogle, of Philadelphia city, to be Superintendent of the Eastern Division of the Road.

William Ortlip, of Philadelphia city, to be Superintendent of Transportation on the Eastern Division.

A report favorable to a geological survey of the State, has been made to the Legislature.

MARYLAND.

The Senate have passed the bill authorising the Mayor and City Council of Baltimore to subscribe to the stock of the Baltimore and Ohio Railroad Company.

OHIO.

The citizens of Cleveland have sent a memorial to Congress, desiring an appropriation for a breakwater and other improvements in their harbor.

The following statistics are appended:

In 1817, about 25 vessels, of very small burthen, navigated Lake Erie; in 1835, more than 275 sloops, schooners, and brigs, of large burthen, navigated this Lake. In 1817, not one steamboat existed upon this Lake; in 1835, more than 20 steamboats, of the first class, were employed on Lake Erie. The number of passengers transported therein, in 1835 has been variously computed from 300,000 to half a million.

The commercial importance of Cleveland is shown by the fact, that in 1825, the number of vessels entering the port of Cleveland, laden with cargoes, amounted to 54—aggregate tonnage, 2060. In the year 1835, 895 vessels, with cargoes, entered the port of Cleveland—the aggregate tonnage of which were 70,750. In the year 1825, one foreign vessel arrived at this port; in the year 1835, 117 foreign vessels. The number of steamboat arrivals, in 1825, was 31; in 1835, 980.

FOREIGN.

The Brussels papers tell us that the Chamber of Commerce at Valenciennes had been deliberating about the formation of the Railway from Brussels to Paris, with a view to the interest of their arrondissement, and they came to resolutions—first, to prefer the direction by St. Quentin to that by Amiens; second, to have the line of Valenciennes considered not as a branch, but as the principal line, &c.

Nuremburg, Dec. 7.

In the morning, at 9 o'clock, the Iron Railroad was opened in the manner named in the programme, M. Binder, the chief burgomaster, opened the ceremony with an address, while the Band of the Regiment of Landwehr played the National Hymn. The monumental stone was uncovered, which has on one side the cipher of the King, with the inscription, "Germany's first Iron Railroad, with steam power, 1835." ("Deutschlands erste eisen-bahn, mit dampfkraft, 1835"): on the other side are the united arms of the two towns, with the inscription, "Nuremburg and Furth." After a short pause, the steam-carriage, with nine carriages for passengers attached to it, all decorated with the national colors, set out for Furth, while countless multitudes of spectators were assembled along the Road. The carriages traversed the Road three times, and were always filled with passengers.—[German paper.]

At Ulm a Company has been formed to construct a Railroad from that city to Karnstadt, by Esslingen.—[German paper.]

CLIFTON SUSPENSION-BRIDGE.

It has at length been determined by the trustees of the proposed suspension-bridge across the Severn, at Clifton, to proceed with the undertaking. The design to be adopted is that of Mr. Brunel, with some new suggestions.

RAILROAD SUMMARY.

New Railway.—According to the *Journal of Vienna*, an architect, whose name is Antonius Pius de Riget, has invented a new species of Railway, which possesses a great many advantages over those now in use or now laying down. The nature of the contrivance is not specified, but it is much boasted of. Though we have no faith in such announcements, the subject may be worth inquiring into by those who are engaged in laying down Railways.—[London Courier.]

London and Greenwich Railway.—Yesterday the engines and carriages of the London and Greenwich Railway Company were again tried in the presence of several scientific gentlemen from Cambridge and other places. Two trains were in readiness at an early hour, and performed the trip between High-street, Deptford, and the Spa-road, Bermondsey, a distance of upwards of two miles, in *four minutes*. The cause of the fall of the two unfinished arches at the extremity of the line in Bermondsey-street, was the removal of the shores by the contractor's workmen. The engineer, on discovering this impropriety, ordered them to be pulled down and rebuilt—the cost of which, about 58*l.* will be borne by the contractor.—[London Courier.]

Another Advance in the Price of Iron.—It will be recollected that, in the beginning of December last, an advance of 1*l.* per ton took place in the price of manufactured iron; another advance of 1*l.* per ton occurred on the 7th January; and we have now to state that a third advance of 1*l.* per ton, on all descriptions of manufactured iron, took place on the 18th instant; making a total advance of 3*l.* per ton, in the course of about six weeks. A meeting of the Welch iron masters took place on the 12th, at which it was unanimously agreed to advance the price of bar iron 2*l.* per ton, making the total advance of 4*l.* per ton since the 1st of September last.—[Biamingham Advertiser.]

RAILROAD STOCKS.

Liverpool and Manchester Railway, ...	100	220	0
London and Greenwich Railway, ...	20	29	10
London and Birmingham Railway, ...	45	110	0
Brighton Railway, . .	5	17	0
Great Western Railway, .	5	20	10
London and Croydon Railway,	2	0	0
London and Blackwall Railway, ...	3	6	5
London and Gravesend, .	1	0	0

We take the following highly interesting document from the New-York Times. It exhibits in its true light the value of our canal system, and shows also the importance of extending that system into every part of the State, in which there are valuable forests of timber, or rich beds of minerals. It also shows the wonderful annual increase of the trade arising from the forests as well as from the cultivation of the soil.

LATERAL CANALS.

The following articles of lumber were

sent down the Chemung, Oswego and Crooked Lake Canals, in 1835, and paid tolls at the offices noticed in the margin, by returns made to the Comptroller's office.

Offices	Feet lumber.	M. shingles.	Feet timber.	No. of staves.	Tolls on Erie Canal.	Gains above expenses & reprs.
At Horse Heads	11,692,761	8,119¼	9,467	1,468,903		
Havana	3,951,832	8,939¼	91,401	415,301	$25,009.57	
	15,621,593	17,139	100,869	1,883,207		
	Deduct this sum from tolls produced on the Erie Canal, being the amount charged by the Comptroller's Report to the general fund, as deficiency in this canal, and as a burthen on the Erie Canal.				23,841.29	
						$1,168.23
	Lumber on the Oswego Canal.					
Oswego	8,682,742	9	106,577	1,166,908		
Salina	11,336,444	290	242,232	791,031	28,623.03	
	20,019,186	299	318,806	1,957,939		
	Deficiency of this canal per Comptroller's Report.				9,028.24	
						19,594.84
	Lumber on the Crooked Lake Canal					
Pen Yan	3,108,103	3,571¼	734,265	975,614		
Dresden	278,311	159¼	no return	14,800	28,142.71	
	3,336,414	3,730	733,265	990,414		
	Def. on this canal, by Compt.'s Rep to pay expenses, &c.				8,243.35	19,899.36
						$40,662.48

Total amount, $40,662.48 added to the tolls of the Erie Canal, on *lumber alone*, the greatest part of which, from its bulk *would never have reached the Erie Canal, but for these lateral canals*. To the above amount of tolls. may be added a larger sum, derived from flour, wheat and potash, exchanged for merchandise, &c.—the trade in which, is promoted by facilities for transportation. Villages springing up at the termination of these canals, as if by magic, whilst the city of New York and *the River Counties* receive from these canals their millions on millions of lumber to supply the yearly increasing demand for this all important article. The amount of tolls to support so important a canal as *the Black River Canal Feeder*, should not be considered one moment, when it is taken into consideration the immense forests of timber, iron ore, copperas and alum that it will float to market—to increase and add to the taxable wealth of the city and the State of New-York.

The Oswego Canal should be credited by the State, but omitted in the Comptroller's report, with the immense amount of *cord wood* it floats *free* of toll to sustain and keep up the salt works at Syracuse and Salina. They could not be profitably sustained without the Oswego Canal. When we view the actual nett toll paid into the canal fund from all our canals, we find it above one million of dollars, and is eleven per cent. nett on the cost of the canals, and we add, is produced by these canals and from tolls derived 9-10ths—from the *soil and forests of our State*, and this too, within the short period of ten years, since the Erie Canal has been completed. How could this immense and increasing revenue be produced, but for *lateral canals?* These canals are considered by many as a burthen to the canal fund, when the reverse is the fact, and it is gratifying to find that the Comptroller is continuing to perfect his statistical information by tables, which will show the trade to and from all the important points and districts on our canals.

That the Black River Canal feeder (for this is its proper name) is *indispensable to supply the enlarged canal* with water, will pay to the State a full and liberal interest on its cost from lumber alone, no one can doubt when the singular fact is noted, by the Comptroller's report of January, 1835.

That the total productions of the forest were - - - - - - - - 344,863 tons
Whilst all other articles of transportation down, were - - - 208,962
Ditto up, - - 114,608
323,570

Tons, - - - - - - 668,433

And this year's report of the Comptroller will show the increase of business in the produce from the *forest* arriving at the Hudson in 1835, to be 153,315 tons; the actual amount, as far as ascertained by the Comptroller's table equals 498,178 tons! for the year 1835—[see table below]—*an amount greater in dead weight, than was carried to, and exported from the port of New York, by all the American and foreign vessels which entered at and cleared from that port during the year* 1833. For proof see the official report of the Collector of New-York, and tables, Railroad Journal of the 10th January, 1835. ALBANY.

Table showing the increase of lumber in 1835, *which arrived at the Hudson, compared with* 1834:

1834.

Boards and scantling,	107,747,900	feet	181,016	tons
Sq. timber, cubic feet,	1,440,515	"	28,810	"
Staves,	55,851.800	"	32,676	"
Shingles, M.	34,045	"	5,719	"
Wood, cords,	34,515	"	96,642	"
			344,863	

1835.

Boards and scantling,	184,150,600	feet	306,917	tons
Sq. timber, cubic feet,	1,495,711	"	29,914	"
Staves,	99,549,100	"	49,774	"
Shingles, M.	51,261	"	8,568	"
Wood, cords,	36,791	"	103,015	"
Produce of the forest,			498,178	tons
Increase,			153,315	"

The following article from the Albany Argus gives a glowing yet true picture of the business of OSWEGO. The great advantages for business which Oswego possesses, are becoming more justly appreciated. It requires not the gift of prophecy to foretel with accuracy its destiny. It will within *ten* years become, if not the second, at least the *third* city of the Empire State.

OSWEGO.

The following statistics of the trade and commerce of Oswego, are derived, as the reader will perceive, from the most authentic sources. The results speak for themselves. They show, both in the extent of its trade and the rapidity of its substantial growth, that it is destined to be one of the largest of the great cities of the Lakes.

Statement of the principal items of business at Oswego, during the year 1835, through the Oswego Canal and Lake Ontario.

Received by way of the Canal.

Merchandise for the country about Lake Ontario, 5,997 tons
" " Upper Lakes, 4,041
10,038 tons

Salt for the country about Lake Ontario, 55,596 bbls.
" " Upper Lakes, 82,020
137,616 bbls.

Water Lime, 5,231
Gypsum, 1,150 tons
Pig Iron, 19,972 lbs.

Received by way of the Lake.

Wheat from the Canada shore of Lake Ontario, 109,381 bushels
" American shore, 239,990
" Upper Lakes, 275,362
624,733 bush.

Shipped by way of the Canal.

Wheat,	76,437	bushels
Flour,	137,959	bbls.
Ashes,	6,049	bbls.
Wool,	62,473	lbs.
Barley,	12,894	bushels
Cheese,	733,479	lbs.
Butter and Lard,	711,823	lbs.
Pork,	1,406	bbls.
Red Cedar Posts,	78,271	pieces
Pig Iron,	495	tons
Whiskey,	2,434	casks
Boards & Scantling,	8,814,581	feet
Timber,	106,574	feet
Staves,	2,266,908	pieces
Bran and Ship Stuffs,	116,450	bushels

Tonnage of vessels owned at the port of Oswego—

In 1833 it was 1467 tons, 24 schrs.
1834 2745 39 "
1835 5000 60 " & 2 stmbts.

of 1836, including vessels now building, and ready to be launched, will considerably exceed 7000 tons, and the number of vessels be about 85.

Report of transactions at the custom-house, at Oswego, from the 1st of April to the 1st of November, 1835.

American vessels entered from foreign countries, 20,871 tons
" ports of the U. States, 58,170
Foreign vessels entered from foreign ports, 65,208

Total amt. of tonnage entered, 153,249

American vessels cleared for ports of U. S.	62,021	
do. foreign ports,	25,873	
Foreign vessels cleared for foreign ports,	65,016	
		152,910
Total foreign and domestic entries and clearances,		306,159

Amount of duties collected, $35,649 02

Comparative statement of the business in the principal articles at the port of Oswego, in the years 1834 *and* 1835:

Received by the Canal at Oswego, for the country about Lake Ontario, in 1834, 4,197 tons merchandise; in 1835, 5,428 tons—increase, 1,231 or 27 per ct.;—in 1834, 44,822 bbls. salt; in 1835, 55,596 bbls.—increase, 10,774 or 24 per ct.

Received by the Canal at Oswego, for the Upper Lakes, in 1834, 871 tons merchandise; in 1835, 4,041 tons—increase, 3,170 or 500 per ct.;—in 1834, 61,604 bbls. salt; in 1835, 82,020 bbls.—increase, 20,416 or 33 1-3 per ct.

Received by the Lakes, from the shores of Lake Ontario, in 1834, 241,760 bushels wheat; in 1835, 349,371 bushels—increase, 107,611 or 40 per ct.

Received by the Lakes, from the Upper Lakes, in 1834, 219,868 bushels wheat; in 1835, 275,362 bushels—increase, 55,494 or 25 per ct.

Shipped by the Canal in 1834, very little wheat; in 1835, 76,437 bushels—increase, 76,437 bush.;—in 1834, 112,023 bbls. flour; in 1835, 137,959 bbls.—increase, 25,936 or 23 per ct.

☞ Notwithstanding two mills of 10 runs of stones were burnt in the early part of the grinding season.

The population of the county of Oswego at the late census, was 38,245—being an increase in five years of 11,401, or about 45 per cent.; and within the same period the population of the village of Oswego has more than doubled, being at the present time, nearly if not quite 6000.

From the Baltimore Gazette.

BALTIMORE AND OHIO RAILROAD.

The following preamble and resolutions, passed in the first branch of the City Council yesterday with but one negative, plainly indicated the favor with which this great and important work, so necessary to the prosperity of this city, is viewed by the immediate representatives of the people of Baltimore—and will remove all doubt, if any were entertained, as to their willingness to respond to the desire of their constituents.—[Chron.]

City Council, First Branch, Feb. 24th.

Mr. Barnes submitted the following preamble and resolutions:

Whereas, The early completion of the Baltimore and Ohio Railroad to the waters of the Ohio is deemed essential to the prosperity of Baltimore, and a large number of property-holders having memorialized the Mayor and City Council for aid to said work, expressing their conviction of the necessity of prompt, liberal and energetic measures on the part of the city authorities in support of said road—and their willingness and desire that the faith of the city shall be pledged to prosecute it to completion—Therefore,

Resolved, by the Mayor and City Council of Baltimore, That it is expedient that the Baltimore and Ohio Railroad be completed to the Ohio river as soon as practicable—and that the Mayor and City Council of Baltimore are willing to pledge the faith of the city to the accomplishment of this all-important object, to any amount required by the property-holders within the city, [upon such conditions, and under such circumstances as may be deemed proper.]*

Resolved, That the Mayor be requested to forward a copy of the preceding preamble and resolution to each of the Senators and Delegates from this city.

The ayes and noes being called for, appeared as follows:

Ayes—Messrs. President, Monmonier, Fenby, Stansbury, Thomas, Yeates, Legrand, Harker, Seldenstricker, Barnes, Mathiot, Tensfield, Scott, Gardner, Fosbenner, Dryden, Russell, Coskerry, King, Wm. J. Cole, Ball, McKinnell.

Nay—Mr. Wm. H. Cole.

* The words in brackets were added, on motion of Mr. Harker.

We have selected from the following Report such portions as contain descriptions of the route and mode of construction,—it being the first official publication of the Company.

TO THE STOCKHOLDERS OF THE WILMINGTON AND SUSQUEHANNA RAILROAD COMPANY.

This being the First Annual meeting of the Stockholders of this Company since its organization, the Directors, in compliance with the provisions of the charter, present to you a statement of their proceedings up to the present time.

The unity of design and of interest which exists between the Wilmington and Susquehanna Railroad Company and the Delaware and Maryland Railroad Company, renders it necessary for the purpose of a complete understanding of the object of this report, that they should be treated here as being, in fact, one and the same Company.

The two Companies were organized by the election of their Directors and Officers in April last. No time was lost in the selection of a competent Engineer and Assistants; and in the final location of the route from Wilmington to Charlestown, in the State of Maryland. In the month of June the contracts were made for grading the road and for the construction of the bridges and culverts. In the beginning of July, the contractors commenced operations along the whole line, and have proceeded with great industry and despatch, and without intermission, except in relation to the masonry, which has necessarily been suspended by the approach of winter.

The ground upon which the location is made, is eminently favorable for the purpose of a Railroad. The greater portion of it is so nearly in a straight line, that the few curves in it are scarcely perceptible. Excepting that which occurs at the departure from Wilmington, which has a radius of 1500 feet and two others of 2000 feet each, there is not a curve on the whole road, which has a less radius than one mile. A great portion of it also is an entire level; the highest grade, which is in Maryland, between the Little Elk and North East, and which is but a short distance in an ascending and descending line, does not exceed thirty-five feet in the mile. The character of the soil or earth has likewise proved highly favorable: no quicksands have been encountered and but a small quantity of rock at one point of the road.

During the six months in which the work has been proceeding, nearly two-thirds of the excavation from Wilmington to the line of the State of Maryland, has been completed; and more than one-half of that, from the Maryland line to Charlestown. The whole amount of excavation in the State of Delaware is 630,000 cubic yards, of which about 400,000 yards have been done. The whole amount in Maryland to Charlestown, is about 950,000 cubic yards, of which about 500,000 yards have been done.

It was determined by the Directors at an early period, that the bridges and culverts between Wilmington and the waters of the Susquehanna, should be constructed of solid masonry; that being a part of the continuous route from Philadelphia to Baltimore, where, in case of any disaster occurring to a bridge, no aid could be dirived from steamboats while the necessary repairs were making. Upon this consideration, it was unanimously resolved by the Directors, to encounter the expense of constructing the bridges of such permanent and durable materials, as would secure them, so far as human prudence could do, against the possibility of such contingencies. The greater number of the culverts have been completed along the whole route, with the exception of the coping. All the bridges, except that over the White Clay Creek, which has not yet been commenced, are far advanced towards completion.

With a view to the important object of a continuous line of Railroad from the city of Philadelphia to Baltimore, the Directors early in the last summer, opened a correspondence with the Directors of the Baltimore and Port Deposite Railroad Company, for the purpose of obtaining a definite understanding as to the intentions of that Company in relation to the location of their road; and having received official information from them, that their road would be brought to the Susquehanna at Havre de Grace, the Directors thereupon resolved to extend this road from the termination of its first location near Charlestown, to the Susquehanna Ferry opposite Havre de Grace, and thus connect it with the Baltimore and Port Deposite Railroad. They accordingly directed a survey of the route from the Charlestown Post road to the Susquehanna Ferry, which was completed in the month of September, and the location fixed at a grade which no where exceeds twenty-four feet in the mile. This extended portion of the road, which is 5 16-100 miles in length,

has been divided into three sections which have been let, for grading and masonry, to contractors, of whom the Directors can speak from former experience, as fully competent to perform the work judiciously. The contractors have commenced the work on one of the sections, and the Directors entertain a confident belief, that the whole work will be completed in time to lay down the rails by the month of August next. The communication across the Susquehanna will be secured by adequate structures on each bank of the river, and a steam ferry boat so constructed as to render the passage perfectly and easily practicable in winter as well as summer. The expense of these structures and facilities will be equally divided between the companies on each side of the river. This extension of the road will, of course, add a considerable item to the original estimate of the cost of their undertaking, but that additional expense will be more than justified by the great importance and value of the object which is to be gained.

Looking to the same important object of an unbroken line of Railroad communication between Philadelphia and Baltimore, the Directors have caused surveys to be made from the depot in Wilmington to the line of the State of Pennsylvania, where it is proposed to form a junction with the Philadelphia and Delaware County Railroad; and they are gratified to have it in their power to state, that a very favorable line has been fixed upon between these two points. The highest grade on the route will not be more than twelve feet in the mile, and with the exception of the curve out of Wilmington, there will be none with a less radius than a mile. The route from Philadelphia to our State line has been surveyed, and a location fixed upon of easy execution. The Directors are now awaiting the action and co-operation of the Pennsylvania Company, which, it is understood, are only delayed by an application now pending before the Legislature of that State, for certain amendments to their charter.

A contract was made in July last with Messrs. A. & G. Ralston, of Philadelphia, for two thousand tons of iron-bridge rail, the whole of it to be delivered in Wilmington by the month of May next. The contract was secured in England, previously to the great rise which the extraordinary demand for that material has lately produced in that country. A contract has also been made on favorable terms, for a supply of all the cross sills or sleepers required for the road. These are to be of red cedar and yellow locust, and are to be delivered at proper points designated along the route in the course of next spring. Contracts have also been made for the construction of four locomotive engines—viz: three from M. W. Baldwin's manufactory in Philadelphia, and one from Bury's manufactory in England. These engines are to be of the best construction, and ready for operation in August next. Arrangements are made for obtaining, in due season, a suitable number of passenger cars; a branch of business which, as well as the manufacture of locomotive engines, the Directors anticipate will be advantageously established and prosecuted in Wilmington. A careful examination by a committee of the board, on the various Railroads from Washington to Lowell, has been made, and such information obtained as will enable the Directors to make a judicious selection in reference to comfort, safety and convenience, on this point.

The report of the Treasurer of the Wilmington and Susquehanna Railroad Company now submitted to you will show the details of receipts and disbursements, in this company since its organization. The capital stock authorized by the charter is $400,000: of this sum $240,000 have been called in, and $167,027 14 have been disbursed. The capital stock of the Delaware and Maryland Railroad Company is also $400,000; of which $200,000 have been called in, and $143,286 04 have been disbursed.

The Directors take pleasure in acknowledging the services of their Chief Engineer, William Strickland, Esq., whose reputation is too well established throughout the country, to require commendation from them; of his Assistant, Mr. John C. Trautwine, and of the superintendant of construction, Mr. James P. Stabler, to whom the immediate supervision of the work has been confided. The subordinate officers engaged in the superintendance of the work, are also fully entitled to the approbation of the Directors.

In closing this report, the Directors deem it pertinent to refer to those circumstances in the character and position of this road, which hold forth the promise, nay certainty, of speedy profit to the stockholders and benefit to the community. In liberality and solidity of construction, it will not be surpassed by any other Railroad in the Union. Every care has been taken to render it solid and permanent, and to place its future operations beyond the reach of accident or contingency. Its position being on the great thoroughfare of the country, lying almost in a straight line between Philadelphia and Baltimore—being the shortest route, and occupying the most favorable ground that can possibly be selected, it must, as a link of the great chain of national Railroad running north and south, receive a full and liberal share of the travel and business on that great channel of internal intercourse. Looking either to the north or the south, and to the increase and extension of the facilities of travel and transportation, by Railroads and Canals, all will be seen to have a common destination, through Philadelphia on the one side and Baltimore on the other, to this as a central and inevitable point. Philadelphia will soon be connected with the eastern extreme of the Union and with the Lakes on the north, by an unbroken chain of Railroads and Canals. Baltimore is connecting herself with the west and the south by the same means. Situated at the head of commerce on the Chesapeake Bay, all the great thoroughfares of the south and the west, centre in that city. The Baltimore and Ohio Railroad, now completed to Harper's Ferry on the Potomac, with one branch to Frederick and another to Washington, already draws within its sphere the great mass of southern and southwestern travel. A Railroad from New-Orleans to Nashville in Tennessee, is in progress: its connection with Baltimore, through the valley of Virginia, crossing the contemplated Railway from Charleston to Cincinnati, and intersecting the Baltimore and Ohio Railway at Harper's Ferry, may confidently be anticipated. When these splendid undertakings shall be realized, who can overlook or set limits to the value and importance of this, the only available link in the great chain of intercourse between Baltimore and Philadelphia?

In behalf of the Directors,
JAMES CANBY, President.

Wilmington and Susquehanna
Railroad Office, Jan. 11, 1836.

REPORT OF THE SANDY AND BEAVER CANAL.

To the President and Directors of
the Sandy and Beaver Canal Co.:

Gentlemen:—In compliance with your request I have the honor to lay before you the following Report of the present state of the work under my direction:—

During the past summer the whole line has been minutely traced, with a view to a permanent location; by this survey the total extent of Canal has been reduced 3 miles, or the distance from the Ohio river at the mouth of Little Beaver creek to the western termination at the Ohio Canal, by the recent examination and location will not exceed 73½ miles.

The Eastern division of the Canal, extending from the Ohio river to a point 2 miles west of New Lisbon, embraces a distance of about 27 miles, of which 17 miles are "slackwater:" for this description of improvement the stream is exceedingly well adapted, the valley being narrow and the banks bold and prominent affording numerous and eligible sites for the locks and dams, and an abundance of good materials for their formation.

The summit or Middle division is about 14½ miles in extent, and the Western division, terminating at the Ohio Canal, about 32 miles. The latter division extends through a country affording the greatest facilities for constructing a cheap and permanent improvement; the valley of the creek is broad and has nearly a uniform declivity from its source to its confluence with the Tuscarawas. On the Eastern division the lockage is 464 feet, and on the Western 205, constituting in all 669 feet. In locating the Western division the level has been kept up from Williams' mill dam to the debouch into the Ohio Canal at the flourishing town of Bolivar, by which arrangement an excellent water power is secured to the Company, affording a head and fall of 26 feet: the owners of the property at the site selected for using the water have liberally ceded to the Company 10 acres of very valuable land for that purpose. Sandy Creek at that point will yield a sufficiency of water, independent of the requisite supply for the Canal, *at all times to work* 20, and for eight months in the year 50 *pair of mill-stones*. This power may reasonably be estimated as worth $6000 per annum. Many other valuable sites for hydraulic purposes have been created or purchased along the route, which, in conjunction with

the one above mentioned, will probably afford the Company a revenue of $7000 per year.

On the Eastern division of the line, 49 sections, or 24½ miles of Canal, 13 dams, and 46 locks, are now under contract: on the Middle division, 21 sections, or 11 miles, including the tunnels and the reservoir mounds on the west fork of Little Beaver Creek and Cold Run: and on the Western division 28 sections or 14 miles, 11 locks, 1 dam, and the acqueduct over the Tuscarawas river, constituting in all 49½ miles of Canal, 14 dams, 57 locks, one aqueduct, and two reservoir mounds now under contract.

The work has been prosecuted in most cases with energy, and is now in a greater state of forwardness than could reasonably have been anticipated, considering that the season was far advanced when it was commenced. About 34 sections or 17 miles of Canal are now completed, and likewise the mason work of two locks, and 144,000 cubic yards of excavation removed from the summit deep cuts: dam No. 2, on the Western division will probably be completed next week.

The foundation of 5 other locks and 2 dams are laid, and 1500 perches of wall built; and a large quantity of stones and other materials for the construction of locks and dams are prepared and on the ground; and I have no doubt all the work now under contract, excepting the tunnels and aqueduct, will be finished in the approaching year.

The work placed under contract is in most instances in the hands of responsible and efficient men, and has been taken on terms exceedingly favorable to the Company.—There is at the present period on the line a force equivalent to 2160 men. The cost of the locks, which are built in the most durable manner of cut sandstone, will not exceed $700 per foot lift, being about 30 per cent. below the ordinary cost elsewhere. The cost of the dams, which are in most instances 14 feet high, will average about $28 per foot linear across the stream; and the Canal, exclusive of locks and dams, generally from $3000 to $5000 per mile.

A contract has been entered into for furnishing the remainder of the hydraulic cement; it is found in abundance contiguous to the line; the quality is equal to any I have seen, and the cost extremely moderate

The contract for excavating the tunnel and approaches, has been taken by energetic and persevering contractors on reasonable terms, the former not exceeding the estimated cost: this work is to be completed by May, 1837. As much has been stated in relation to the adequacy of the supply of water on the summit, it may be proper to remark, that during the past season I commenced and have continued a series of minute examinations of the most prominent streams relied on for a supply: those examinations have thus far fully corroborated the truth of the statements and calculations embraced in the report made you last autumn by Mr. Hage and myself. I feel fully satisfied, that with the aid of the reservoirs that can be constructed on the summit, at a moderate cost compared with their utility, a much larger quantity of water may be introduced into the summit and its dependent levels, than will be requisite for the transit of the immense trade that is destined to seek a market through its channel. The reservoirs now under contract will contain as follows: West Fork reservoir, 130,000,000 of cubic feet; area, 350 acres: Cold Run reservoir, 88,000,000 of cubic feet; area, 250 acres: in addition to which it is proposed to elevate the banks of the Canal so as to retain one foot in depth of available water, and flood several pieces of low ground on its northern or upper side, amounting in all to about 150 acres, which, when full, will furnish about 6,500,000 of cubic feet, making in the aggregate from these sources alone, an available supply of 224,500,000 cubic feet of water, a demand on which *may* be requisite in a dry season for a period of 100 days. By calculation it will be perceived, these reservoirs will afford for that period 2,245,000 cubic feet of water per day, equivalent to a discharge of 1559 cubic feet per minute. If to this sum is added the minimum natural flow of water on the summit as reported to you last autumn, (558 cubic feet per minute,) it will be observed that the flow of available water in a dry period will amount to 2117 cubic feet per minute, or sufficient, after deducting all that the nature of the soil and climate will require for leakage, filtration and evaporation, for the passage of 185 *boats per day*. The West Fork and Cold Run reservoirs are about one mile apart: when filled, the surface of the water in each will occupy the same plane, or be elevated to the same height: it is designed to have a feeder extending from one to the other, so that the surplus water in one can be admitted into the other, if required. A large waste weir is to be constructed on this feeder for the purpose of discharging the waste water when both reservoirs are full. This water, when thus discharged, is conducted into the reservoir on the summit level. The two first mentioned reservoirs will receive the drainage of 24 square miles of country; the summit, *the drainage of 80 square miles*. The usual depth of rain that falls in this section of country can, I am informed, with safety be premised at 36 inches per annum, or equal to a column of that height, being 83,635,000 cubic feet on a square mile, and on 24 square miles 2,107,244,800 cubic feet annually. From experiments made on a large scale elsewhere for practical purposes it has been ascertained conclusively, that 75 per cent. of the rain that falls can be laid up in reservoirs. From this data it will be observed, that the three reservoirs above alluded to may be filled seven times per year. This exhibit will probably satisfy the most sceptical as to the adequacy of the supply of water. As to the immensity of the trade that will wend its way through the Sandy and Beaver Canal to an eastern market, I believe there has never been surmised a doubt: a glance at the map will prove conclusively that a very large portion of the produce of Michigan, Illinois, Indiana, Kentucky and Ohio, which are rapidly increasing in population and wealth, must be wafted through it. The business of that section of the country is now to a great extent accommodated by the New-York improvements, but the completion of the Sandy and Beaver Canal will secure to it a safer transit to and from the seaboard, much shorter, and *navigable six weeks earlier in the spring and three later in the fall* than the one now traversed, being sufficient inducements to secure it. What the extent of that trade will be time alone can develope. On the Erie and Champlain Canals, a very large portion of the business done on the first of which is derived from the country above mentioned, there have been received in tolls in 1829 $759,055, 1830 $1,032,476, 1831 $1,194,610, 1832 $1,196,068, 1833 $1,324,421, 1834 $1,292,955, and there is no doubt that the business of this year will very greatly exceed the last. On the Ohio Canal there was collected in 1832 $82,867, 1833 $136,920, 1834 $151,287, and the amount of tolls received the present year at some of the collectors' offices exhibits an increase of forty-five per cent. over the last.

When the Canal or Railroad authorised by an act of the Legislature of this State at their last session, to be constructed from the western termination of the Sandy and Beaver Canal to the Miami Canal near the mouth of the Auglaise River, shall have been completed, it must add an immense revenue to your work, as it, in connexion with the Wabash and Erie Canal through Indiana, and the contemplated Railroad through Illinois to the Mississippi River, will constitute a continuous chain of Internal Improvement, extending westerly from the Sandy and Beaver Canal 500 miles, and from Philadelphia 1000, into the rich and fertile regions of the west.

The following synopsis of the distance the trade of the country situated west and south-west of the Sandy and Beaver Canal would have to travel from the western termination of that work, in order to reach a market by the various routes now afforded it, or about to be, will fully justify the conclusion that it must seek a passage through it.

Distance, by the Ohio Canal, Lake Erie, New-York Canal and Hudson River, to New-York.

From the Sandy and Beaver Canal to Cleveland,	80	miles.
From Cleveland to Buffalo,	200	"
From Buffalo to New-York,	515	"
Total,	795	miles.

Distance, by the Ohio and Mahoning Canals, and Pennsylvania Canal and Railroad, to Philadelphia.

From Bolivar to Akron,	42	miles.
From Akron to Beavertown,	114	"
From Beavertown to Pittsburg,	28	"
From Pittsburg to Philadelphia,	394	"
Total,	578	miles.

Distance, by the Sandy and Beaver Canal and Pennsylvania Improvements, to Philadelphia.

From Bolivar to Beavertown,	87½	miles.
From Beavertown to Pittsburg,	28	"
From Pittsburg to Philadelphia,	394	"
Total,	509½	miles.

From the rapid increase in business on the New-York and Ohio Canals, it is to be presumed that when the Sandy and Beaver Canals shall have been finished, the tolls on the Ohio Canal will at least amount to $400,000 per annum; and from the foregoing facts and statements it is to be inferred, that two thirds of that trade will pass through the Sandy and Beaver Canal, which would neat the holders of stock in that work, at the rate charged on the Ohio Canal, an income of at least $60,000 the first season.* If to this sum is added the amount that may be anticipated from the liberal grant contained in the amended charter,† which cannot fall short of $150,000, the Company will receive, in the first year after the work is finished, $210,000 in tolls—independent from the large business that may be expected of the country west and northwest of the termination of their work—presenting the novel result of a Canal yielding seventeen per cent. on its entire cost the first year after its completion.

All which is respectfully submitted.

E. H. Gill, Chief Engineer
S. and B. Canal Co.

New-Lisbon, Ohio, Nov. 11, 1835.

* This estimate may seem large, but it must be kept in mind that the Sandy and Beaver Canal will constitute a connecting link between two large and important works, (the Ohio Canal and Pennsylvania improvements) now completed; consequently it has not, like other Canals, to await the growth of business.

† The amended charter secures to the Sandy and Beaver Canal Company all the tolls collected on the Ohio Canal from boats that have passed through the Sandy and Beaver canal for seven years after its completion.

From the Mechanics' Magazine.

STRENGTH OF THE JOURNALS OF SHAFTS.

Lateral strength.

Mr. Roberson Buchanan, in his Essay on the strength of shafts, uses the following rule, which is simple enough, and easy to be remembered: "The cube root of the weight in cwts. is nearly equal to the diameter of the journal." "*Nearly equal*"—being prudent to make the journal little more than less, and to make a due allowance for wearing.

Examples.—What is the diameter of the journal of a water-wheel shaft, 13 feet long, the weight of the wheel being 15 tons?—

$\sqrt[3]{15\times 20}=6{\cdot}7$ or 7 inches.

But the following rules are the most correct, and ought to be used on all occasions:

When the weight is in the middle.

1. Rule.—Multiply the weight in pounds by the length in feet; divide this product by 500, and the cube root of the quotient will be the diameter in inches.

When the weight is between the middle and end.

2. Rule.—Multiply the short end by the long end; then multiply that product by four times the weight in lbs. Divide this product by 500 times the length in feet, and the cube root of the quotient will be the diameter in inches.

When the load is uniformly distributed over the length.

3. Rule.—Multiply the length in feet by the weight in lbs., and one tenth of the cube root of the product will be the diameter in inches.

When fixed at one end, and the load applied at the other.

4. Rule.—Multiply the length of projections in feet by the weight in lbs., and the fifth part of the cube root of this product will be the diameter in inches.*

Examples.—By rule 1—

$$\frac{33600\times 13}{500}=873\ \sqrt[3]{873}=9\tfrac{1}{2}\text{ in. dia.}$$

By rule 3—

$$33600\times 13=436800\ \frac{\sqrt[3]{436800}}{10}=7{\cdot}65\text{ in.}$$

To resist tension or twisting.

It is obvious that the strength of revolving shafts are directly as the cubes of their diameter and revolutions; and inversely as the resistance they have to overcome.

Mr. Buchanan, in his Essay on the strength of shafts, gives the following data, deduced from several experiments, viz: That the fly-wheel shaft of a 50 horse power engine, at 50 revolutions per minute, requires to be $7\frac{1}{2}$ inches diameter; and therefore the cube of this diameter, which is $= 421{\cdot}875$, serves as a multiplier to all other shafts in the same proportion; and taking this as a standard, it gives the following multipliers, viz:

For the shaft of a steam engine, water wheel, or any shaft connected with a first power, - - - - - - 400

For shafts in insides of mills, to drive smaller machinery, or connected with the shafts above, - - - - - 200

For the small shafts of a mill or machinery, - - - - - - - 100

From the foregoing, the following rule is derived, viz:

The number of horses' power a shaft is equal to, is directly as the cube of the diameter and number of revolutions; and inversely, as the above multipliers.

Note.—Shafts here are understood as the journals of shafts—the bodies of shafts being generally made square.

Example 1.—When the fly-wheel shaft of a 45 horse power steam engine makes 90 revolutions per minute, what is the diameter of the journal?

$$\frac{45\times 400}{90}=200\ \sqrt[3]{200}=5\tfrac{8}{10}\text{ inches diameter.}$$

Example 2.—The velocity of a shaft is 80 revolutions per minute, and its diameter is three inches. What is its power?

$$\frac{3^3\times 80}{400}=5{\cdot}4\text{ horse power.}$$

Example 3.—What will be the diameter of the shaft in the first example, when used as a shaft of the second multiplier?*

$$\frac{5{\cdot}8}{1{\cdot}25}=4{\cdot}64,\text{ or }\frac{\sqrt[3]{45\times 200}}{90}=4\tfrac{6}{10}\text{ in. diameter.}$$

* This last does not directly apply to shafts—but it may be useful for other purposes.

The following is a table of the diameters of shafts, being the first movers, or having 400 for their multipliers, upon the foregoing principles.

TABLE.

DIAMETETS OF THE JOURNALS OF FIRST MOVERS.

Horses power.	REVOLUTIONS.									
	10	15	20	25	30	35	40	45	50	55
4	5.5	4.8	4.5	4.	3.7	3.8	3.5	3.3	3.2	3.1
5	5.9	5.1	4.7	4.4	4.1	3.9	3.7	3.6	3.5	3.3
6	6.3	5.5	5.	4.6	4.4	4.1	4.	3.8	3.7	3.6
7	6.6	5.8	5.2	4.9	4.6	4.4	4.2	4.	3.9	3.7
8	6.9	6.	5.5	5.1	4.8	4.6	4.4	4.2	4.1	4.
9	7.2	6.3	5.7	5.5	5.	4.8	4.5	4.4	4.2	4.1
10	7.4	6.6	5.9	5.6	5.2	4.9	4.7	4.6	4.4	4.2
12	7.9	6.9	6.3	5.8	5.6	5.4	5.2	5.	4.8	4.6
14	8.3	7.2	6.7	6.2	5.9	5.6	5.4	5.2	5.	4.7
16	8.7	7.6	7.1	6.6	6.1	5.8	5.6	5.4	5.2	5.
18	9.	7.9	7.5	7.	6.6	6.2	5.8	5.6	5.4	5.2
20	9.3	8.1	7.4	7.2	6.6	6.4	5.9	5.7	5.6	5.4
25	10.	8.5	8.	7.4	7.1	6.8	6.3	6.	5.9	5.6
30	10.7	9.3	8.4	7.9	7.4	7.1	6.9	6.7	6.5	6.3
35	11.4	9.8	8.9	8.4	7.9	7.4	7.1	6.9	6.6	6.5
40	11.7	10.5	9.3	8.8	8.3	7.8	7.4	7.2	6.9	6.7
45	12.	10.6	9.7	9.2	8.7	8.1	7.6	7.4	7.	6.8
50	12.6	11.	10.	9.3	9.	8.5	8.	7.8	7.4	7.3
55	13.4	11.4	10.4	9.8	9.1	8.8	8.4	8.	7.5	7.4
60	13.6	12.	10.8	10.	9.3	9.	8.6	8.2	7.7	7.6

INCHES DIAMETER.

* The diameters of the second movers will be found by dividing the numbers in the table by 1·25, and the diameters of the third movers by dividing the numbers by 1·56.

S. A.

July 25, 1825.

The following communication was in hand before the conflagration, and should have appeared in the January number, but from the confusion into which every thing preserved was thrown, gave it the go by. We will now give it a place, and commence it with the P. S., that we (understanding fully the importance of the *first person*,) and our readers may have the benefit of its reasoning.

We bespeak for it an attentive perusal, and shall be gratified to be made the medium of communication for answers to the following queries, as well as of queries from D. F. and others, in relation to any subject proper for this Magazine.

QUERIES RESPECTING VERTICAL AND HORIZONTAL WHEELS, AND HEATING LARGE BUILDINGS.

P. S.—If you are in want of a caption for the following communication,—as you editors are fond of a title that will attract attention to an article,—you may head it with "*The advantages of the Mechanics' Magazine and New-York Farmer.*" The propriety of which, in a three-fold view, may be thus inferred: If any one is induced by the suggestions herein made, to subscribe to your journals, in the hope of benefitting himself in this way, he will probably find his advantage in it; if he pays his subscription as he should, your advantage will be apparent; if any of your readers answer my questions

to my satisfaction, I shall certainly derive advantage from it. By this, I flatter myself, you will perceive that, although I *have* evinced some ignorance in this, I have been to school long enough to learn the proper grammatical relations of "I, Thou, He;" and albeit, in this enumeration of advantages I have committed the blunder of placing the "first person" last, the transposition is unimportant, as I am satisfied that you will not suspect me of such ignorance as not to know that most importance is to be attached to it.

4th Dec., 1835.

Mr. Minor,—Among the many advantages to be derived by artists and scientific men from such valuable journals as yours, is one, of which they avail themselves so little, that they appear not fully to appreciate it. I allude to the facility they afford of obtaining information on any subject, by questions proposed to the readers of them. In this way they might be made a good substitute for the *converzaliones* so common throughout Europe, and which are the means of diffusing the lights of science so extensively; with this advantage: that a question inserted in them, instead of being put to a select few, would be propounded to all the learned in art or science throughout our widely spread territory.

It is frequently the case that a person is so situated that he may not know where to look for information upon a particular subject, although it may be abundant, or easily accessible to those whose business or reading may have lain in that path.—Such are frequently deterred from seeking information in this manner from the fear of exposing their ignorance; not reflecting that the most knowing were once as ignorant as themselves, and are indebted chiefly to others for their present superiority. Partly with the view of setting an example in this respect, and partly for the purpose of obtaining information that I cannot readily find elsewhere, I shall propose a few questions for insertion in your Mechanics' Magazine and Farmer, giving your readers leave to credit me for as great ignorance as they please, if they will but answer my questions; for which I promise them my thanks, and a willingness to help them out of similar difficulties, if it should lie in my way.

Questions.—Can a stream of water be used to as much advantage, or made to do as much work, upon a vertical or tub-wheel as upon a horizontal one; and if so, what is the best construction for one, and the cost of building it? Will the same quantity of water that is let, in a thin sheet, upon a horizontal wheel, produce the same effect if let in solid column upon a vertical wheel under the same head and fall?

What is the best and most economical mode of heating large buildings—by introducing heated air from a furnace—by pipes, heated by steam, carried around the different rooms, or by similar pipes, filled with boiling water? What is the size necessary for a furnace to heat a room or a house of any given dimensions—what should be the size of the flue for heating the whole house—what that for heating a particular room—what the best construction for the furnace, —and what quantity of fuel (wood or coal,) will be consumed per hour (if the fire be kept up day and night,) upon the hot air plan—and what the cost? What are the respective properties of furnace, boiler, pipes, &c., upon the other plans—the best construction and cost? Are pipes of hot water, which are used to such advantage in warming houses in England, sufficient for the purpose in a country where the winters are so intensely cold as ours sometimes are?

Yours, D*** F*****.

COMPOSITION AND SPECIFIC GRAVITY OF DIFFERENT KINDS OF GLASS.

Ordinary flint-glass, according to Mr. Faraday's analysis, consists, in 100 parts, of silica 51.93, oxide of lead 33.28, potash 13.77, with minute portions of other substances. A specimen of the same kind of glass, manufactured for telescopes by the late M. Guinand, yielded the same chemist, silica 44.3, oxide of lead 43.05, and potash 11.75. Mr. Faraday found the specific gravity of M. Guinand's glass to be about 3.616, that of ordinary flint-glass 3.290, that of plate-glass 2.5257, and that of crown glass 2.5448.

Glass has usually been considered, without much actual inquiry into the subject, to be strictly a chemical combination of its ingredients, and in all respects a very perfect artificial compound. This, however, is far from being the truth, as will appear from the following facts. That the alkali in common glass of all kinds is in a very imperfect state of combination, many circumstances concur to evince. For example, Mr. Griffiths has shown, that if a small quantity either of flint-glass, or of plate-glass, be very finely pulverized in an agate mortar, then placed upon a piece of turmeric paper and moistened with a drop of pure water, strong indications of free alkali will be obtained; and that if the pulverization be very perfect, the alkali can be detected in other kinds of glass, containing far smaller quantities of it. This proves, that in whatever state of combination the alkali may be, it is still subject to the action of moisture. That flint-glass is by no means a compound resulting from very strong chemical affinities, and that the oxide of lead which it contains is as imperfectly combined as the alkali, has been shown experimentally by Mr. Faraday, and also appears from the tarnish which is produced on its surface by exposure to sulphuretted vapors, owing to the combination of sulphur with the lead. Glass which has long been exposed to the weather, frequently exhibits a beautiful iridescent appearance, and is so far decayed, that it may be scratched with the nail. The glass of some bottles of wine which had lain in a wet cellar near the Bank of London upwards of 150 years, examined by Mr. Brande, was soft, and greatly corroded upon the surface, in consequence of the partial abstraction of its alkali. After reciting some of these facts, and others of a similar description, Mr. Faraday observes, "Glass may be considered rather as a solution of different substances, one in another, than as a strong chemical compound; and it owes its power of resisting [chemical] agents generally, to its perfectly compact state, and the existence of an insoluble and unchangeable film of silica, or highly silicated matter, upon its surface." See Mr. Faraday's Bakerian Lecture on the manufacture of glass for optical purposes; Phil. Trans. 1830, pp. 46—50.—[Parke's Chem. Cat., by Brayley. (Arcana, &c., 1835.)

RUTTER'S HEAT PROCESS.

Dr. Daubeny brought before the meeting the economical employment of coal-tar in connexion with water as fuel, according to the method lately suggested by Mr. Rutter.* A discussion then arose as to whether the water in this case acts chemically or mechanically, or both, in facilitating the combustion of the tar. Mr. Macintosh stated that by repeated experiments he had found that coal-tar gave no more heat when burned than an equal weight of *splint* coal, the kind preferred, where a long continued heat is required. Mr. Low also stated, that from long experience he could affirm, that the use of water along with coal-tar was productive of no benefit whatever, and that 3 gallons, or 33 lbs. of coal-tar, give an equal amount of heating effect, fully, to 40 lbs. of coke, made from the Newcastle coal of the Hutton seam. From the discussion on this subject, which was protracted for some time, it appears to be established—1. That tar may be used as fuel, but that it does not give much more heat than the same weight of the best coal. 2. That when mixed with water, it flows more easily through tubes, but does not appear to evolve more heat than when used alone.—[Jameson's Journal.]

* Originally suggested by Capt. Morey, of New-Hampshire.

From the London Mechanics' Magazine.

VENTILATION OF STAGE-COACHES.

Sir,—Permit me to offer to the public, through the medium of your widely extended Magazine, a hint or two from an old traveller, on the subject of stage-coach ventilation. Many others as well as myself have doubtless been annoyed by the *aerophobia* of many who travel by our public carriages, and the pertinacity of such persons in keeping the windows closed, for fear, as they say, of catching cold. Such persons have yet to learn that colds are more frequently the consequence of closely confined air in a badly ventilated apartment, than by free exposure to the wind and weather. Some people seem to regard fresh air as poison, and do all in their power to exclude it; for my own part, I think it is the only one of the numerous blessings of Providence that cannot be taken to excess.

The mode of ventilation I would suggest, is simply this, that the sashes of mails and other stage-coaches, instead of being glazed, as at present—the panel formed by a pane of glass—should be made with wire-gauze, such as is now extensively in use for window-blinds. The vehicle would by this means be amply ventilated without annoyance to any one by currents of air; and, in case of rain, the sashes might be kept up without the choice of evils at present experienced, either to be wet through or suffocated.

An Old Traveller.

AGRICULTURE, &c.

From the Farmers' Register.

ON THE USE OF LIME AS MANURE.

By M. Puvis.

Translated for the Farmers' Register from the Annales de l'Agriculture Francaise, of 1835.

Various qualities of Lime.

22. It is necessary for the farmer to know the nature of the lime which he uses. It may be pure, or mixed with silex, argil, or magnesia. *Pure lime* is the most economical, the most active, that which can produce the most effect in the least quantity.

Silicious limestone is used in greater quantity. The lime from it receives, as does the foregoing, the name of *hot lime*, and there is little difference in the application, except that more of the latter is wanting.

The *argillaceous lime* is the same as the hydraulic lime, or the *poor lime* of builders. It appears that the first two kinds are more favorable to forming grain, while the latter favors more the growth of straw, grasses, and leguminous crops. It is better for the improvement of the soil, but a heavier dose of it is required.

Magnesian lime acts very powerfully, but exhausts the soil if given in a large dose, or if it is not followed by alimentary manure in abundance. It has exhausted some districts in England, and entire provinces of America,* and it is to this kind that seem due most of the complaints made against lime.

By chemical processes the farmer may make himself sure of the nature of the lime which he uses.

Pure lime is commonly white, and is dissolved without any thing being left, in nitric or muriatic acid.

Silicious lime is often gray, and leaves a sandy residue, [after solution,] which is rough to the touch.

Argillaceous lime is obtained from stones which have a clayey odor and appearance: it is commonly yellow—and leaves, after the solution, a residue which is mostly an impalpable powder [*et qui prend en masse*,] which may be formed into a mass when wet.

Magnesian lime is made from stone commonly colored brown or pale yellow; it forms a white cloud in nitric acid, diluted with water, and used in less quantity than enough for saturation.

Of second Limings.

23. When the limed field returns to the state in which it was before the operation, when the same weeds re-appear, and the crops lower in product, it is time to renew the application of lime. It may be conceived that the time of the second liming depends on the amount given in the first. When the dressing has been light, it is necessary, as is done by the Flemings and the Manceaux, to recommence entirely, or to the extent of the first dressing: when it has been heavy, the next may be diminished by one-half. Besides, in this matter we should take counsel of the state of the soil, and of experience, because there are some lands which demand, and can use heavier doses of lime than others.

Quantities applied.

24. The quantities of first as of second dressings of lime, vary with the consistence of soils: they ought to be small on light and sandy soils—and may, without ill consequences, be heavy on clay soils.

The dose ought to vary according as the soil is more or less pervious to water, or as drained well or ill by its texture. Small applications to soils from which the superfluous water does not pass easily, are but little felt; but if the dressing is heavy, and the ploughing deep, the lime aids the draining, and adds to the healthy state of the soil. It may be conceived that the quantity of lime ought also to be increased with the annual quantity of rain that falls—because in proportion to that quantity ought the openness of the soil, and its fitness for draining, to be extended.

Nevertheless, the practices of the departments of the North, and of La Sarthe, seem to indicate the average dressing which suits in general for land: thus the liming of the North, which every ten or twelve years gives to the soil 40 hectolitres of lime to the hectare, or a little more than three hectolitres a year, agrees with that of La Sarthe, which gives eight or ten hectolitres every three years. The first plan gives at one dressing what the other distributes in four: as both make a like average, it may be thence inferred that the earth demands annually three hectolitres of lime to the hectare, [3 2 3 bushels to the acre,] to sustain its fecundity. But as neither the soil nor the plants consume all this quantity of lime, it is to be believed, that at the end of a greater or less length of time, the soil will have received enough to have no more need of it for a certain space of time.

Manner of treating Limed Lands.

25. After having, by liming, given the soil a great productive power, having put it in condition to produce the most valuable crops, which are often also the most exhausting, it is necessary to husband these resources—to give manure in return for the products obtained—to employ as litter, and not as food, the straw, now increased by one-half—to raise grass crops from the soil now fitted to bear them with advantage—in short, to modify the general plan, and the detail of the culture according to the new powers of the soil, the prices of commodities, and to local conveniences.

However, it is not necessary to hurry the change of the rotation. Such an operation is long, difficult, very expensive, and ought not to be executed but with much deliberation.

Effects of Lime on the Soil.

26. The effects of lime, although similar to, are not identical with those produced by marl; and the qualities of soils limed, differ in some points from those of natural calcareous soils. The grain from limed land is rounder, firmer, gives less bran, and more flour, than that from marled land: the grain of marled land is more gray, gives more bran, and resembles that made upon clover, though it may be preferable to the latter. The grain of a limed soil is more like that from land improved with drawn ashes. Limed land is less exposed to danger from drought than marled land, on soils naturally calcareous. The crop is not subject to be lodged at flowering time, when the sowing was done in dry earth.

27. In limed earth, weeds and insects disappear. The earth, if too light, acquires stiffness, and is lightened if too clayey. The surface of the argilo-silicious soil, before close and whitish, is made friable, and becomes reddish, as if rotten: it hardens and splits with drought, and is dissolved by the rains which succeed. This spontaneous loosening of the soil facilitates greatly the labor of the cultivator, the movement of the roots of the growing plants, and the reciprocal action of the atmosphere upon the soil, which remains open to its influence.

All these new properties which the limed soil has acquired, doubtless explain in part the fertilizing means which calcareous agents bring to the soil: but we think it is still necessary to seek some of these causes elsewhere.

28. Lime, according to the recent discoveries of German chemists, seizes in the soil the soluble humus or humic acid, takes it from all other bases, and forms a compound but slightly soluble, which appears, under this form, eminently suitable to the wants of plants. But as this compound is not soluble in less than 2000 times its weight of water, while without the lime the humus is soluble in a volume of water, less by one-half, it would follow that, in consequence of lime, the consumption of this substance, and the productive power of the soil would, in like proportion, be better preserved. Since the products of the soil increase much from the liming, while the humus is economised, since these products borrow very little from the soil, which remains more fertile while thus yielding greater products, it follows that the principal action of the lime consists, at first, in augmenting, in the soil, and in the plants, the means of drawing from the atmosphere the vegetable principles which they find there, and next, in aiding, according to the need, the formation, in the soil or the plants, the substances which enter into the composition of plants, and which are not met with ready formed either in the atmosphere or in the soil.

The researches upon these various points are curious, important, interesting to practice as well as to science—and will lead us to explain, by means not yet appreciated, the action of lime upon vegetation.

Absorption by plants of the principles of the atmosphere, in the vegetation on uncultivated soils.

29. Saussure has concluded, from his experiments, that plants derive from the soil about one-twentieth of their substance; and the experiments of Van Helmont and of Boyle have proved that considerable vegetable products diminish very little the mass of the soil. But this fact is still better proved by the observation of what passes in uncultivated soils.

Woodland that is cut over in regular succession [*taillis*] produces almost indefinitely, without being exhausted, and even becoming richer, the mass of vegetable products which man gathers and removes, and of which the soil does not contain the principles. If, instead of woodland thus partially and successively cut over, we consider upon the same soil a succession of forests, and, for greater ease of estimation, resinous forests, we find for the products of the generation of an age, forty to fifty thousand cubic feet to the hectare. This product is less than that of the resinous forests of many parts of the country, and yet it is nearly equal in bulk to half of the layer of the productive soil itself: it represents an annual increase of 24,000 weight of wood to the hectare—and which is produced not only without impoverishing, but even while enriching the soil, by an enormous quantity of the droppings and remains of all kinds.

These products which do not come from the soil, are then drawn from the atmosphere, in which plants gather them by

* The author has been deceived by exaggerated accounts of injury from liming in America. It is probable that wherever it occurred, it was caused by the usual ignorance of the action of lime: from erroneously considering it as alimentary, and directly fertilizing manure, and after applying it, wearing out the soil by continued grain crops. Such effects are spoken of by Bordley.—[Ed. Far. Reg.]

means of particular organs designed for that use. These organs are the myriads of leaves which large vegetables bear—aerial roots, which gather these principles either ready formed in the air, or which take up there the elements, to combine them by means of vegetable power. But these aerial roots exert quite a different and superior energy in gathering the constituent principles of plants in the atmosphere, to that of the roots in the ground—since the former furnish nearly the whole amount of the vegetable mass, while the latter draw but very little from the soil.

30. Plants may well find in the atmosphere the greater part of the *volatile* principles which compose them—the carbon, hydrogen, oxygen, and azote. But it is not so easily seen whence they obtain the *fixed* principles of which their ashes are composed. These products could not exist ready formed in the soil—for the saline principles contained in the ashes of a generation of great trees, which would amount to more than 25,000 weight to the hectare, would have rendered the soil absolutely barren, since, according to the experiments of M. Lecoq of Clermont, the twentieth part of this quantity is enough to make a soil sterile. We would find a similar result in accumulating the successive products of an acre of good meadow. It is then completely proved that the saline principles of plants do not exist ready formed in the soil. They are no more formed in the atmosphere, or the analyses of chemists would have found them there. However, as the intimate composition of these substances is not yet perfectly known, their elements may exist in the atmosphere, or even in the soil, among the substances which compose them.

Neither can it be said that these salts may be derived from the atomic dust which floats in the air; for this dust is composed of fragments organic and inorganic, carried especially to the plants themselves, and then, in estimating this atomic matter at the most, we will scarcely find in it the hundredth part of the saline substances contained in the vegetable mass produced. We ought then to conclude that the saline substances of plants are formed by the powers of vegetation, or of the soil.

31. In like manner as with the saline principles, the lime and the phosphates of ashes ought to be due to the same forces, whether that the roots take up their unperceived elements in the soil, or that the leaves gather them in the atmosphere. This consequence results evidently from this fact—that plants grown in soils, of which the analysis shows neither lime nor phosphate, contain them notwithstanding in large proportion in their fixed principles—of which [or of the ashes] they often compose half the mass.*

Absorption of plants, in vegetation on cultivated soils.

32. Vegetation on uncultivated soils operates under conditions altogether different from those of the cultivated, so that the results receive modifications which it is important to examine.

Nature produces, and continues to produce, all the vegetable mass in spontaneous growth, without any other condition than the alternation and succession of the species. In vegetation on cultivated land, by bringing together the same individual plants which are to grow abundantly on a soil and in a climate which, in most cases, are not those which nature had designed, there are required besides the general condition of alternation of the species, frequent tillage of the soil, and means to repair its losses, that the culture may be productive, and be continued. However, with these new conditions, the force of absorption of plants on the atmosphere still furnishes the greater part of the vegetable principles in soils not limed—and still more in limed soils.

To form a precise idea, we will take it in the land of the writer, its culture and its biennial rotation. As the same qualities of soil are found elsewhere, as no particular circumstance increases or impairs its products, there would be found similar results, for the same qualities of soil, with a different culture. The inferences which we will draw from ours, will apply then to all others.

On our soil of the third class, [or worst quality] fallow returns every two years, with a biennial manuring of 120 quintals to the hectare. This mass contains more than four-fifths of water, which should not be counted as manure, and consequently the substance which serves for the reparation of the soil is reduced to 24 quintals. We reap, in rye, straw, and buckwheat, after the year of fallow, a dry weight of 40 to 50 quintals on an average. If it is supposed that all the manure is consumed, or employed in forming vegetable substance, still the soil would have furnished 18 to 20 quintals more than it received, and which excess would be due to the power of absorption, whether of the soil, or of the plants, on the atmosphere.

On land of middle quality, which yield a crop every year, with a double manuring, that is to say, of 48 quintals of dry manure, in two years, there is a product in wheat, maize, or potatoes, which amounts to from 12 to 15,000 weight, 120 to 150 quintals, of which two-thirds, or 80 quintals at least are derived from absorption.

On soils of good quality, with a manuring of one-third more than the last, which is equal to 64 quintals of the dry substance to the hectare, there are obtained of dry products, in grain, straw, roots, or hay, double of the last, or nearly so, of which three-fourths, or 180 quintals are due to the power of absorption.

Lastly—upon the most fertile soils, (*sols d'exception,*) where manures are useless, the product, often double, or at least half as much more than the last mentioned, will amount to 330 quintals to the hectare in two years. This product would be, as in spontaneous vegetation, entirely due to absorption.

We would have then, to represent the products of two years, in quintals, in the four classes of soil under consideration, the progressive amounts of 42, 130, 240, 360; or, by deducting from these products the weight of the manure, we would have, to represent the power of absorption, the progression 18, 82, 176, 360 quintals. From this is deduced, as the first conclusion, that, supposing the plants have consumed and annihilated all the substance of the manure given, (which is beyond the truth,) plants receive a much greater part of their substance from the atmosphere, than from the soil; and that this power of drawing food from the atmosphere increases with the goodness of quality in soils.

33. The proportion of fixed substances, or ashes, in agricultural products, is 43 lbs. to the 1000, and consequently, in our four classes of land, the quantity amounts to 180, 559, 1032, 1548 pounds. But the soluble saline substances form at least half of these ashes: they are then produced in the two years of the rotation, in the quantities of 90, 279, 516, 774 pounds. But, according to Kirwan, barn yard manure yields 2 per cent. of soluble salts: then the manure given to these soils contained 48, 96 lbs. 128 of saline substances, which being deducted from the preceding quantities, leave the four classes of soils stated 42, 183, 388, 774 lbs. of products in soluble salts, in two years of the rotation, gained solely by the absorbing forces of the soil and of plants.*

34. But, in the same soils, with the same manures and the same tillage, by the addition to the thickness of the ploughed layer of only one-thousandth part of lime, the products, whether volatile or fixed, are increased in a striking manner: the soil of the first named (or lowest) quality reaches the product of the second—the second rises one-half or more—and that of the best (of the manured soils) increases a fourth. Thus, our scale of product becomes 130,200,300 quintals—and deducting the manure, 106,152,236 quintals, for the two years of the rotation. The most fertile soil (*sol d'exception*) cannot receive lime beneficially because it contains it already; these lands all belong to alluvions, where the calcareous principle has almost always been found in greater or less proportion.

35. The product of fixed principles [as ashes] in the three classes of limed soils, would be 559,868,1290 pounds, and in soluble salts, 278,430,645 pounds; and deducting the soluble salts of the manure, the quantities would be 230,334,525. A light addition of lime has then doubled the force of absorption, and almost tripled the quantity of saline principles produced. One of the most remarkable effects of lime consists then, in making a soil produce a much greater proportion of saline principles: and if the experiments of M. Lecoq upon the efficacy of saline substances on vegetation are to be admitted, it would be in part to the phenomenon of their production that lime would owe its fertilizing effect.

36. It results from what precedes, that salts are formed in the soil, or in vegetables: thus we see every day the nitrates of potash and of lime form under our eyes in the soil, or elsewhere, without any thing indicating to us the origin of the potash which is contained. But potash itself again forms spontaneously in drawn ashes, according to the observations of the chemist Gelhen. We see salts also renewed in the artificial nitre beds, with the aid of moisture and exposure to the air. But it is the presence of lime that determines this formation more particularly. The nitrates abound in the ruins of demolished edifices; they are formed in the walls and in all parts of houses situated in damp places; they effloresce on the buildings of chalk in Champagne; they are produced spontaneously in the ploughed lands of the kingdom of Murcia. This effect, which we see that the calcareous principle produces every where, we think it produces in all the soils to which it is given, and where meet the circumstances which favor the formation of nitrates, viz: humidity, vegetable mould, and exposure to the air. But, according to the experiments of M. Lecoq, and others, and the opinion which is established of the old agriculturists, the nitrates are the most fertilizing salts. It would be then to their formation, which it promotes in the soil, that lime owes, in part, its effect on vegetation.

* This fact is explained very differently by the Essay on Calcareous Manures (Ch. VII.) where it is used to sustain the doctrine of neutral soils.—[Ed.]

* The proportions of ashes of different plants, and of their saline matters, vary greatly—and the uniform proportions assumed above, are far from correct, even as averages of unequal proportions. This will sufficiently appear from the following examples extracted from Saussure's table of the products of various vegetable substances. (See Davy's Ag. Chem. Lec. III.)

37. The foregoing proofs of the daily formation in the soil, and by vegetable life, of saline and earthy compounds, taken in nature and on a great scale, are doubtless sufficient: but they may still be supported by the experiments and opinions of able men who have adopted the same system.

And first—in the experiment of Van Helmont, in five years, a willow of five pounds grew to weigh 169, and had caused a loss of only two ounces to the soil which bore it. But the 164 pounds which the willow had taken contained five pounds of ashes, which are due entirely to absorption, since the leaves and the other droppings of five years, which were not saved, would have given at least one pound of ashes, which makes up for, besides, all that which, in spite of the sheet of lead which covered the top of the vessel in which the willow grew, it might have received in the waterings, and from other fortuitous circumstances. Boyle has repeated and confirmed this experiment in all its parts.

Constituents of 100 parts of ashes.

Names of Plants.	Ashes from 1000 parts dry.	Soluble Salts.	Earthy Phosphates.	Earthy Carbonates.	Silicia.	Metallic Oxides.	Loss.
Wheat, in flower,	—	43,25	12,75	0,25	32	0,5	12,25
Do. seeds ripe,	—	11	15	0,25	54	1	18,75
Do. seeds ripe,	33	10	11,75	0,25	51	0,75	23
Straw of wheat,	43	22,5	6,2	1	61,5	1	73
Seeds of do.	13	47,16	44,5	—	0,5	0,25	7,6
Bran,	52	4,16	46,5	—	0,5	0,25	8,6
Plants of maize, (Indian corn,) a month before flowering,	122	69	5,75	0,25	7,5	0,25	17,25
Do. in flower,	81	69	6	0,25	7,5	0,25	17
Do. seeds ripe,	46						
Stalks of do.	84	72,45	5	1	13	0,5	3,05
Spikes, (tassels,) of do.	16						
Seeds of do.	10	62	36	—	1	0,12	0,88
Oats(entire plant),	31	1	24	—	60	0,25	14,75

The proportion of soluble salts, 2 per cent found by Kirwan in barn-yard manure, however correctly ascertained in a particular case, can no more be relied on as a fixed and uniform proportion, or even a true general average, as used by M. Puvis in the estimates above.—[Ed. Farm. Reg.]

Lampadius, in different isolated compartments, some filled with alumine, others with silex, others with [carbonate of] lime, all pure, has made to grow plants, of which, the burning has yielded to analysis like results, and which, consequently, contained earths which were not in the soils which bore them.

Saussure, in establishing that plants do not take in the soil more than a twentieth of their substance, in extract of mould and in carbonic acid, has necessarily established, by the same means, that almost the whole amount of fixed principles do not proceed from the soil.

Braconnot has analyzed lichens, which contained more than half their weight of oxalate of lime—and he has observed others covered with crusts of carbonate of lime, when there was none of this earth in the neighborhood.

Shrader, in burning plants grown in substances which did not contain any earthy principle, has found in their ashes, earths and salts which were neither in the seeds sown, nor in the pulverized matters in which the plants grew.

Lastly—the analyses of Saussure, though showing more of the carbonate of lime in the ashes of plants which grew on calcareous soils, than on soils not calcareous, yet nevertheless, they have formed more than a sixth of the ashes from vegetables on silicious soils—and Einhoff has found 65 per cent. of lime in the ashes of pines grown on silicious soil.* The labors of science then confirm what we have above established, that plants, or the soil, form salts and earths.†

38. The fertilizing effect of fallow, or ploughing, of moving and working the soils prove still more that all these circumstances determine the formation of fertilizing principles, and probably of saline principles, in all the parts of the soil which receive the atmospheric influences.

But salts are also formed in plants. The nitrate of potash, which takes the place of sugar in the beet—the oxalate of potash, so abundant in sorrel—the carbonate of potash in fern, in the tops of potatoes, and in almost all vegetables in the first period of their life—the sulphate of potash in tobacco—the nitrate of potash in turnsole and in pellitory—prove, without reply, that vegetation forms salts, as it forms the proper juices of plants, since the soil contains the one kind no more than the other. But can we say where plants take the elements necessary for all these formations? They can take them only in the soil by means of their roots, or in the atmosphere—in the soil, which would itself take them in the atmosphere, in proportion to the consumption of plants—or directly in the atmosphere by means of their leaves which would there gather these elements. And if the analyses of the soils, and of the atmosphere, show almost none of these elements, it will be necessary to conclude from it, that the substances which analysis has found there, are themselves, or would furnish, if decomposed, the elements of the saline substances, although science may not yet have taught us the means of reaching that end.

39. The formation of lime, like that of the saline principles necessary to plants, is an operation which employs all the forces of vegetation—and these forces, directed to this formation, have no energy left to give a great developement to plants: but when the vegetable finds the calcareous principles already formed in the soil, it makes use of them, and preserves all its forces to increase its own vigor and size.

It would then result, from all that has been said, that lime modifies the texture of the soil—makes it more friable—invigorates it—renders it more permeable—gives it the power to better resist moisture as well as dryness—that it produces in the soil the humate of lime which encloses a powerful means of fertility—that lime increases much the energy of the soil and of plants to draw from the atmosphere the volatile substances of which plants are composed, oxygen, hydrogen, carbon and azote—that the limed soil in furnishing to plants the lime which they need, relieves the soil and plants from employing their powers to produce it—and finally, that lime promotes the formation of fixed substances, earthy or saline, necessary to vegetables. All this whole of reciprocal action and reaction of lime, on the soil, plants and atmosphere, explains in a plausible manner, its fertilizing properties. We would, consequently, have nearly arrived at the resolving of an important agricultural problem, upon which were accumulated all these doubts.

The amount of lime taken up by vegetation.

40. The ashes of plants from calcareous soils, or those which have been made so by manures, contain 30 per cent. of the carbonate and phosphate of lime, which, by taking off the crop is lost to the soil. But the product of limed land of middle quality, is during the two years of the course of crops, about 20,000 lbs. of dry products to the hectare, which contain a little less than a hectolitre of lime in the calcareous compounds of the ashes. The vegetation has then used half a hectolitre a year. But we have shown that there was necessary, on an average, three hectolitres per hectare, each year. Vegetation then does not take up, in nature, but a sixth of the lime which is given profitably to the soil; the other five-sixths are lost, are carried away by the water, descend to the lower beds of earth, are combined, or serve to form other compounds, perhaps even the saline compounds, of which we have seen that lime so powerfully favors the formation. Another portion, also, without doubt, remains in the soil, and serves to form this reserve, which in the end dispenses, for many years, with the repetition of liming.

Of the exhaustion of the soil by liming.

41. "Lime," it is said, "only enriches the old men: or it enriches fathers and ruins sons." This is indeed what experience proves, when, on light soils, limed heavily, or without composts coming between, successive grain crops have been made without rest, without alternations of grass crops, or without giving to the soil alimentary manures in suitable proportion. It is also what has happened when magnesia, mixed with lime, has carried to the soil its exhausting stimulus. But when lime has been used in moderation—when, without overburdening the land with exhausting

* It is presumed, from the context, that these silicious soils, were not the least calcareous.—[Ed. F. R.]

† Van Helmont's experiment, cited first in the list above, like M. Puvis' reasoning in general, furnishes ample proof that most of the volatile parts of vegetables, and the greater part of their bulk, are drawn from the atmosphere—and they are equally defective in proving that earths and other fixed principles are thence derived, or are formed by the power of vegetable life Distilled water is not entirely free from earthy matter, and if it had been used for watering the willow, it would in five years have given some considerable part of the five pounds of solid matter in the ashes. But as we are not told that it was either distilled or rain water, it may be inferred that the comparatively impure water of a fountain or stream, was used for watering the plant, and which would more than suffice in so long a time, to convey the whole increase of earthy and saline matter. The experiments of Lampadius and Shrader are liable to the same objection—and the former to this in addition—that his earths were deemed absolutely pure, when, in all probability, they were not so—and that a very slight admixture of other kinds with each, would furnish the minute quantity that a small plant could take up during its short and feeble existence under the circumstances stated. The results stated of the experiments of Braconnot, Saussure and Einhoff, may be, and probably are, entirely correct—but they are fully explained by the doctrine of neutral soils, and need no support from, and give none to our author's doctrine of the formation of lime by vegetable power.

But though deeming M. Puvis altogether wrong in this, his main and most labored position, and that the proofs cited above, as well as some others in the preceding section, are of no worth, still these pages which present his theory, contain what is of more value. He places in a strong point of view the important truth that the atmosphere is the great treasury of nature, from which nature doubles and triples the amount of all the small portions given to the earth by the industry of man. The author's scale of actual products from different grades of soil is also interesting. It sustains the position assumed in the Essay on Calcareous Manures, that the worst soils are liemd (or made calcareous) to most profit—and that alimentary manures, when needed, are most productive on the best soils.—[Ed. Far. Reg.

crops, they have been alternated with green crops—and that manure has been given in proportion to the products taken off—the prudent cultivator then sees continue the new fecundity which the lime has brought, without the soil showing any sign of exhaustion. No where has there been complaint made of argillaceous soils being damaged by lime; and the productiveness of light soils is sustained, in every case that the lime was used in compost.

In America, where the lime of oyster shells has taken the place of that of magnesian limestone, the complaints of the exhausting effects of lime have ceased.

*Healthiness given to the soil and to the country by calcareous agents.**

42. The unhealthines of a country is not caused by the accumulation of water, nor from soil being covered by water. Places on the borders of water do not become sickly but when the water has quitted some part of the surface which it previously overflowed, and the summer's sun heats the uncovered soil, and causes the decomposition of the remains of all kinds of matter left by the water, and contained in the upper layers of the soil. Thus, ponds are not unhealthy but when drought, by lowering the waters, leaves naked extensive margins, to be acted on by the sun and air. In rainy years, fevers on the borders of ponds are rare.

Epidemic diseases most often arise on the borders of marshes laid dry—in the neighborhood of mud thrown out of ditches or pits—and in the course of bringing new land into cultivation, where the ploughed soil is for the first time exposed to the summer's sun. In the interior of Rome, the vineyards, the gardens are remarkably unhealthy—while the sickliness disappears where the emanations from the soil are prevented by buildings. In the Pontine marshes, they cover the dried parts with water to arrest the danger of their effluvia. It is then from the soil, and not from the waters at its surface, that insalubrious emanations proceed. Waters placed on the surface, always in motion, agitated by every wind, are not altered in quality, and do not become unhealthy: but whenever they are contained in some place without power to receive exterior influences, or to have motion, they are altered in their odor, taste, and consequently injured in relation to health.

Whenever water then, without covering the soil, penetrates the upper layer without being able to run through the subsoil, it remains without motion, and stagnant, within the soil—is changed by the summer's sun, serves to hasten the putrefaction of the broken down vegetable remains in or on the mould, and the exhalations from the ground become unhealthy. Thus are all drained marshes, of which the surface only is dry, while the water still penetrates the subsoil—thus, all the margins of rivers which have been covered by recent inundations of summer, are unhealthy: thus also, (for a great and unhappy example,) the argilo-cilicions plateaux, whenever the closeness of the subsoil does not let the water pass through, produce, in dry years, at the close of summer, emanations which attack the health of the inhabitants.

43. But this unhappy effect appears almost no where in calcereous regions: the margins of lakes and ponds there situated do not produce the same unhealthiness, and even the marshy grounds there are less unhealthy.

The waters which spring out of, or run over calcareous beds, are always healthy to drink. The borers of Artesian wells are anxious that the water which they obtain, to be good, may come out of the calcareous strata which they go through. When the waters which hold carbonate of lime in solution in carbonic acid* run over the surface, they give health to the meadows, in changing the nature and quantity of the products.

Linnæus thought that the unhealthiness of most countries depended on the nature of the water, and was owing to the argillaceous particles which they contain; now these argillaceous particles are always precipitated by the calcareous compounds. For this reason, the waters which stand upon, or run over marl, or calcareous rock, are almost always limpid and clear, because the argillaceous particles have been precipitated by the effect of the solution in the water of the calcareous principle, which is itself dissolved by an excess of carbonic acid.

We are not far from believing then, that throwing rich marl, or limestone, into a well of muddy and brackish water, might have the effect, in part at least, of clearing it, and making it healthy to drink. This remedy, if it should not be as useful as we think, at least could not produce any injury.

Lime, in all its combinations, destroys the miasmata dangerous to life. Its chloride annihilates all bad odors, arrests putrefaction, and in short, has subjected the plague of Egypt to the skill and courage of Pariset. The white wash of lime upon infected buildings, upon the walls and mangers of stables, is regarded as serving to destroy the contagious miasmata of epidemic and epizootic diseases.

Lime destroys the plants of humid and marshy soils, and makes spring those suitable to better soils: then its effect is to give healthines or vigor to the soil, to dry it, and make it more mellow and permeable. The water then is no longer without motion, and altered consequently in its condition. The limed soil then, to the depth it is ploughed, ought to change the nature of its emanations, as well as its products: and if the lower strata or subsoil, send up emanations, these effluvia in passing through the improved layers of soil, where the calcareous agent is always at work, and developing all its affinities, ought also to be modified, and take the character of those of the upper bed. The limed soil then, it would seem, ought to be made healthy.

But what we maintain here by induction, by reasoning, is fortunately a fact of extensive experience. Among all the countries in which lime has carried and established fertility, there is not cited, that I know of, a single one where intermittent fevers prevail—while that they have not disappeared in the country even where an active culture draws good products from the impermeable argilo-silicious soil.

44. To extend the great benefit of healthiness to the whole of a country, it is no doubt necessary that the whole coutry should receive the health-giving agent. However, on every farm, in proportion as liming is extended over its surface, the chances of disease will be seen to diminish—and the healthiness of the country will keep pace with the progress of its fertility.

Result of the use of improving manures on the soil of France in general.

Three-fourths of the whole territory of France, to be rendered fruitful, have need of calcareous agents. If the third of this extent has already received them, (which we believe is above the truth,) upon the other two-thirds, or the half of the whole, the agricultural products, by this operation, would be increased by one-half or more, or one-fifth of the total amount. But agriculture, in enriching itself will increase its power, its capital, and its population, and will naturally carry its exuberant forces, its energy and activity to operate on the greater part of the 7,000,000 of hectares of land now [*en friche*] untilled, waste, and without product. By bringing these lands into cultivation and fertilizing them by liming or by paring and burning the surface, they would be made to yield, at least, one-sixth of the total product. The gross product of the French soil, then increased by a third or more, might give employment and sustenance to a population also one-third greater than France now possesses; and this revolution due successively to the tillage of the soil, to annual improvements keeping pace with the progressive increase of crops, would be insensible. The state would grow in force, in vigor, in wealth, in an active and moral population, which would be devoted to peace, and to the country, because it would belong to this new and meliorated soil. And this great result would be owing simply to applying calcareous manures to the extent of the soils of France which require them!

46. Upon our extent of 54,000,000 of hectares, our population increased to 44,000,000, would have for each, one hectare and a quarter, and would be less confined than the 24,000,000 of inhabitants of the English soil, who have only one hectare to the head; and yet our soil is at least as good, and it is more favored by climate. And then our neighbors consume in their food, at least a fourth or fifth of meat, while only one-fifteenth of the food of our population consists of meat; and as there is required twelve or fifteen times the space to produce meat as bread, it follows that twice the extent of soil is necessary to support an Englishman as a Frenchman. Hence it results, that with an increase of one-third, our population would still have a large surplus product which would not exist in England, with an equal increase of population and equal increase of products of agriculture.

But this prosperity of the country, (yet far distant, but towards which however, we will be advanced daily,) would be still much less than in the department of the North, where a hectare nearly supports two inhabitants. And yet they have more than a sixth of their soil in woods, marshes, or unproductive lands: they have besides, another sixth, and of their best ground, in crops of commerce, which consume a great part of their manure, and which are exported almost entirely. This prodigious result is, without doubt, owing in part to a greater extent of good soil than is found elsewhere;

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* There was no position in the Essay on Calcareous Manures which its author assumed with so much hesitation as the agency of those manures in removing causes of disease. That hesitation did not arise from doubt of the truth of the position—but because of its very high importance, and its entire novelty—its being then sustained but by few known facts furnishing direct evidence, and by no known authority whatever of earlier writers. It is therefore the more gratifying to find in the work now presented, that about the same time, another and far remote investigator of the same subject, by a different course of reasoning, and by different proofs, had arrived at precisely the same conclusion—and that he maintains even more generally than the former work, the important and sure effects of calcareous manures in rendering a country more healthy.—[ED. FAR. REG.]

* As in limestone water, lime with the greatest proportion with which it can combine of carbonic acid, (forming super-carbonate of lime,) is soluble in water. The excess of acid is lost by heat, by exposure to air, &c., and then the lime is in form of carbonate—and being insoluble in water, falls separate to the bottom.—[ED. FAR. REG.]

but it is principally owing there, as well as in England, to the regular use of calcareous manures. As we have seen, more than two-thirds of this country [the North] belongs to the class of soils not calcareous, to the argilo-silicious plateaux, and makes use of lime, marl, or ashes of all kinds.

47. After this great result of increased productiveness, that upon health, although applied to the least extents of surface, would be most precious. Upon one-sixth of our country the population is sickly, subject to intermittent and often fatal fevers, and the deaths exceed in number the births. Well! upon this soil without marshes, calcareous manures would bring a growing population, more numerous than that of our now healthy parts of the country—and as labor would offer itself from every side, these regions, made healthy, would soon be those where the people would be most happy, the richest, and the most rapidly increasing in numbers.

48. If we are not under an illusion, the calcareous principle and its properties upon the soil, form the great compensation accorded by the Supreme Author to man, in condemning him to till the earth. Three-fourths of our soil seem not to produce, except by force of pain and labor, the vegetables absolutely necessary for man. On all sides, and often beneath this surface so little favored, is found placed the substance necessary to the soil, to render it as fertile as the best ground, to enable the cultivator to use for his profit the vegetable mould which it contains and has been accumulating for ages—and to cause the entire soil to be covered by a population active, moral, and well employed. And this precious condiment, this active principle of vegetation, is only needed to be applied in small proportions, to obtain products of which the first harvest often compensates for all the labor and expense. And to complete the benefit, insalubrity, which afflicts the infertile soil, disappears; the new population finds there at the same time strength, riches, and health. There, without doubt, is one of the most happy harmonies of the creation, one of the greatest blessings with which the Supreme Author has endowed the laborious man who is devoted to the cultivation of the earth.

We had marked No. 1 of this series of letters on Sheep Husbandry, before the conflagration; but it was in *ashes* before we could put it in *type*, and therefore, we are compelled to commence with No. 2, which we regret, as we desire to give the series entire. They evince much valuable information upon the subject to which they relate, and should be carefully read by every sheep grower.

From the Cultivator.

SHEEP HUSBANDRY.

No. II.

The common sheep of Spain have coarse light fleeces, being worth from 10 to 12 cents per pound, and reared principally for their flesh.

"The word *Merino* is Spanish, it signifies governor of a small province, and likewise him who has the care of the pasture and cattle in general. The *Merino Mayor* is always a person of rank, and appointed by the king; the duke of Infantado is the present *Merino Mayor*."

The *mayors* have a separate jurisdiction over the flocks in Estramadura, which is called the *mesta*; and there the king is the merino mayor. Each flock consists of 10,000 sheep with a mayor or head shepherd, who must be an active man, well versed in the nature of pasture, as well as in the diseases of his flock. It might be interesting to some to pursue this part of the subject further, but I fear encroaching on the limits of your paper; if it should excite an interest to consult standard authorities and investigation, my present object will be attained.

The word *merino* is now by general usage applied to the fine wooled Spanish sheep.

From the earliest history of Spain, the possession and cultivation of a peculiar breed of fine wooled sheep has been a subject of high national legislation, and although it was carried to an extent greatly oppressive and injurious to some other interests, yet it resulted in preserving and improving their sheep above those of the whole civilized world.

The origin of the fine Spanish sheep, as stated in the preceding number, is yet left for ingenious investigation.

Strabo, speaking of the beautiful woolen clothes that were worn by the Romans, says that the wool was brought from *Truditania*, in Spain. After the conquest of Spain by the Romans, the elder Columella was one of the early emigrants to Spain. For "Spain was at that time highly civilized; and agriculture was the favorite pursuit of all who were not occupied in war." How desirable is it that our country should properly appreciate this great source of happiness, wealth and true greatness.

Mr. Tessier, a distinguished member of the French Institute, and who was commissioned to investigate this subject, says, "all that we know of the *merino* is, that they have a long time existed in Spain; the *merino* is a distinct breed of sheep; as in the class of dogs, the Danish dog, the grey hound, the shag dog, the lap dog, &c. And in the same manner as among dogs, the cross breeds may afford individuals more or less approximating to the species, but never the species itself." Another writer says, "the *merino* differs more essentially from every other kidd of sheep, than the spainiel does from the mastiff. And yet no one has seen any change in either of those species of dogs in the course of generations, or in any climate, except by intermixture of the breeds. I say the *merino* differs essentially from all other sheep, and even from all other quadrupeds of which we have any knowledge, as an annual does from a perennial plant. All quadrupeds change their coats every year, and indeed generally twice a year; the *merino* sheep never changes his coat, on the contrary, it will continue to grow from year to year, and at the end of the third year, the fleece will yield a three years' crop, with little or no diminution. This has been tried in France, Switzerland, and England."

Sportsmen, for the purpose of the chase and the turf, well understand their business, in breeding the greyhounds and blood-horses. Will the deliberate scientific agriculturist be shamefully distanced in the comparison of his pursuit with that of play and recreation? Will he rear a cock that will not fight on his own dunghill? Excite an interest, raise a competition, and any subject at this day will be investigated. Let us observe the course which nature treads.

"God never made his works for man to mend."

I would, with Franklin, conduct the lightning harmless down, but not in folly strive to stay its force.

Mr. Livingston says, "It will be of use to be acquainted with the several breeds of Great Britain and Spain, as a direction to those who may endeavor to import sheep from thence; for though every *variety** of the *merino* is valuable, yet they differ widely from each other in beauty, in form and in fineness of fleece, as may be judged from the prices in Spain, where Leon and Escurial wool sells for 100 cents, while that of Arragon brings only 60 cents, with several intermediate kinds."

The principal flocks of Spain are divided into the (*Transhumanta*), or which migrate from north to south twice every year, and include the greatest number, their route having been regulated from time immemorial by legislation. The privilege of a route ninety paces wide across the cultivated fields, is claimed and maintained by the government for the passage of the public flocks.

Then the (*Estantes*), or stationary flocks.

These are next subdivided into several varieties and denominations, originating either in ownership or locality of production, of which the most prominent are the following, viz:

Those of the Escurial convent are altogether the finest and most perfect of any of the Spanish flocks, combining excellence scarcely admitting of improvement.

Those of the duke Infantado and of the countess Negritti are but imperfectly known in this country.

Those of the Monturio and Gaudaloupe, of those brought to this country, rank next to the Escurial in their most essential qualities.

Those of the Paulaur convent. Of all the Spanish flocks this is the largest sheep, elegant in form, and producing the greatest fleece, but at the same time, coarse, and abounding in jarr and yolk. He has a large dew-lap extending from the chin to the breast. This wool, though not answering the full requirement of the market, nor meeting the nicety of modern machinery; still, however, standing in advance of all crossing with Dishly, Lincolnshire, or other mongrel productions, and of all others are the most rugged and hardy, almost answering the requirement of a *sheepman*, who thinks sheep require no care.

I have seen some fleeces of Paulaur bucks highly fed, weighing, unwashed, twelve and fourteen pounds.

Besides these, there are many other flocks which I shall omit to describe.

The *emigrant merino* will form the subject of the next paper. F.

From the Harrisburg Intelligencer.

IMPORTANT DISCOVERY.

In our last, we noticed the important discovery of Peter Ritner, Esq., of smelting iron ore with mineral coal. It will be a new era in the iron manufacture in this country. The moment we pass the Alleghany mountains, running from northeast to southwest, nearly through the middle of the State, we come into the bituminous coal region. The rocks in this region, reaching to the Rocky mountains, are horizontal, and frequently alternate with iron ore and bituminous coal. This is the case at Karthaus, on the west branch of the Susquehanna, a few miles above the termination of the canal extending to Philadelphia. The process of smelting iron ore with mineral coal, has for some time been known in Europe, and it has been on this account that one kind of iron could be made in Great Britain, and sold in this country under a duty of $30 per ton. Thousands of dollars have been

expended in this State, and hundreds of enterprising men have been ruined, in their experiments to discover this method of making iron. A year or two ago, the Legislature incorporated a company, with an immense capital, to make the experiment, as it was thought to be beyond individual enterprise.

At length, however, Peter Ritner and Joseph Loy, with limited pecuniary means, have erected a furnace on the plan of the coke and iron furnaces of Wales, and succeeded in making the finest iron for foundry and many other purposes.

Mr. Ritner is a brother of the Governor of Pennsylvania.

HEIGHT OF WAVES.—Among other proofs of the incorrectness of the assertion, that no waves rise higher than ten feet above the ordinary level, the following vivid description is given:—"During the hurricane experienced to the Northward of Barbadoes by the squadron under the command of the late Admiral De Courcy, (in July 29, 1805,) the *Centaur*, a seventy-four of the largest class, whilst lying-to, had the small boat (a gig,) which was hoisted up at the stern davits, washed away, as well as the poop-lantern, by an enormous wave, which was elevated *many feet* above the highest part of the ship's hull, as it rushed past with impetuous velocity; the portion which struck the ship cleared the poop-deck of every thing!—On the evening of the second day, whilst the hull of our shattered and unwieldy vessel lay rolling in the trough of the sea, the cry of one of the look-out men, of 'a ship coming down upon us,' made those who were holding on, under the shelter of the weather bulwark, spring from their covert to get a peep of the scudding vessel. We jumped upon a carronade, and, with the greatest difficulty, held on, directing our eyes upwards to the position where the stars of the mid-heaven would have been sought for on a calm and clear night! and indistinctly saw a dark object upon the ridge of the towering wave, which was approaching on the weather-quarter. The next minute, a large ship (the *St. George*, 98,) dashed close past our stern with a rapidity perfectly astounding; and, before the eye could be well turned to leeward, she was almost out of sight. The danger was imminent, and, but for the providential circumstance of the *St. George's* helmsman catching a momentary glimpse of the *Centaur*, under the foot of the former's foresail, our doom, and theirs too it is probable, had been sealed. One *spoke* of the wheel to port saved us, and barely so, for the giant ninety-eight's proximity was alarmingly close, in her desperate flight before the furious tempest! If any dependence can be placed upon our eyesight in broad daylight—when much of the heightened peril of the storm seemed to have lessened with the departure of the night—and from intent contemplation, for some hours, of the successive *seas* as these came rushing and doubling onwards, as it were, to wipe away with one brush of their curling and foaming, the glorious and inglorious works of man, which lay like a helpless log at their mercy—we would say, that if a horizontal line had been drawn from the apex of the loftiest wave to the ship, it would have intersected the mainmast about half way up from the deck; which, making allowance for unavoidable error, would give about fifty feet for the elevation of the wave."—[Nautical Mag.]

FRIBOURG SUSPENSION BRIDGE.—M. Arago, in a paper descriptive of this bridge, read lately to the French Academy, which agrees in all material respects with that contributed some time ago to this Journal by Mr. Terry, C. E. (See vol. xxiii., p. 50;) makes the following comparison between it and the Menai Bridge:—"The only bridge which, for its dimensions, can be compared with that of M. Challey, is the Menai Bridge, built by the late Mr. Telford, and which joins the Isle of Anglesey to England. The largest ships can pass under this bridge at full sail. But the breadth of the Menai Bridge is only 167½ metres, 516 feet—consequently 301 feet less than that of Fribourg. The surface of Mr. Telford's bridge is about 33½ metres, or 100 feet above the level of the sea at high water. That of M. Challey is 51 metres, or 156 feet above the bed of the Sarmi. M. Candolle has taken the city of Paris as a standard, by which to convey an idea of the magnitude of M. Challey's bridge. He supposes a bridge of only one single span, the length of which shall be equal to the railing of the Carousel, or to the distance between the two corresponding carriage entrances of the two galleries, the level of this bridge being somewhat lower than the height of the towers of Notre Dame, or eight metres higher than the column of the Place Vendome, and you may thus have some notion of the height and length of the bridge at Fribourg."

We have much cause to rejoice at the great advance which has been made in Prussia within these few years in the manufacture of machinery. It is not very long ago that, for almost every large machine, we required help from England, and had the greater part from that country. Now an entire change has taken place in this respect, and the great establishment of this kind in Berlin furnishes the most complete and admirable machines at far lower prices than in England. These happy results we owe to the zeal of Privy Councillor Beuth, who, as President of the Mechanics' Institution, and Director of the Department of the Interior, does every thing to favor and improve the construction of machines.—[Frankfort paper.]

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, FEBRUARY 20, 1836. [VOLUME V.—No. 7.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 20, 1836.

☞ New-York, March 10th.—It will undoubtedly be borne in mind by our readers, that the Journal is yet several weeks behind its regular time. This number (7), dated February 20th, is printed on the *10th of March*. We shall be able however in a few weeks to recover the time lost.

We acknowledge the receipt of the Report of the Baltimore and Susquehanna Railroad Co., and that of the Commissioners of the Wabash and Erie Canal; and among several communications, that of A. C. respecting the Portsmouth and Roanoke Road. We are much indebted to him for the information so kindly given, and think that he may safely venture another without fear as to our "taking it in good part."

We would take this opportunity to say to our friend that we will be angry at no one, having the hardihood, the audacity, to send us information; on the contrary, "the smallest favors" in that way are thankfully received: Reports, proceedings, charters, and any sort of intelligence in reference to Canals, Railroads, and Mechanics in general—in return, they shall have our hearty thanks, and as much information as we can give in return.

LEAD ORE.—We have now before us, through the politeness of Joseph E. Bloomfield, Esq., one of the finest specimens of *lead ore* that we have ever seen. It was taken from a bed recently discovered in the town of Rossie, St. Lawrence Co., in this State, which is believed to be inexhaustible and of the richest kind. The specimen before us, it is believed, will yield 75 per cent. of first rate lead.

This discovery adds another to the many powerful arguments which might before be used in favor of the BLACK RIVER CANAL.

The Ogdensburg Times says that the lead mine at Rossie proves to be very rich in quality, and to all appearances inexhaustible; and that, with the labor of four or five men about three weeks, an amount of three hundred tons of ore, or thereabouts, has been uncovered, which will yield from 65 to 75 per cent. of pure lead. The vein stretches across the hills about two miles from the village of Rossie, being from one and a half to three and a half feet wide on the face, and appearances indicate that it extends to a great depth.

Our New-Jersey friends, notwithstanding their dread of monopolies, and in particular of the Camden and Amboy Railroad and Delaware and Raritan Canal, have determined, by their representatives in State Legislature assembled, not to "abate the nuisance;" in other words, the "proposition" of the united Companies to sell out to the State, has been rejected.

Some of those disposed to bring about such an arrangement, express regret that the bill should have been rejected at once, and without some attempt at amendment.

We would call attention to the following advertisement:—

For the Railroad Journal.

BALTIMORE, 16th Nov. 1835.

D. K. MINOR, Esq.

Sir,—The subscriber, having invented an improved Rail-track, and also an improved Railroad Car-wheel, is desirous, through the medium of your columns, to make known the general outlines of his plans, and when his leisure will permit, a more detailed specification of them.

Improved Rail-track.

Various plans have been adopted in the United States for the construction of Rail-tracks, each of which has its respective advantages and disadvantages, and so obvious is it that the advantage which one possesses over the other, is gained by the sacrifice of some principle which it is desirable to maintain, that it is difficult, if not impossible, to decide which is in the whole superlatively good.

Some Engineers contend for the superiority of tracks made entirely of stone and iron, and rest their opinions on the important fact of using no perishable materials. Others believe that tracks made wholly of wood and iron are generally the best, on account of their lesser first cost, and wear of the machinery which plies upon them.

The objections to the former plans are, their unyielding nature, and their liability to short settles. To the latter, their want of stiffness, and the perishable nature of their component parts.

In the construction of Rail-tracks, it is desirable—First, That their bearings should be of uniform solidity; second, That the rails which rest upon them should have their joints perfectly broken, so that the weight of each car passing over them, may at all times be distributed on at least three supports; third, That the foundations should be of unperishable materials, and no part of them above the surface of the ground, so that they may be stable, and not interfere with the formation of a horse-path, where one is necessary; fourth, That there should be in them some spring, but not enough to make a perceptible increase of motive power necessary; fifth, That any wood which is used in their construction should be elevated above the surface of the ground, its durability being decreased one-half by coming in contact with it; sixth, That the verticle pressure of the cars should be nearly over the centres of the bearings and rails, so as to prevent a disposition to tilt; seventh, That the rails should be occasionally tied, so as to counteract the disposition to spread; eighth, That they should be so constructed as to offer the greatest possible facilities for adjustment. Many of the tracks which have been constructed possess some of these desiderata in great perfection; by one of the following description, it is believed they all may be obtained at a moderate expense.

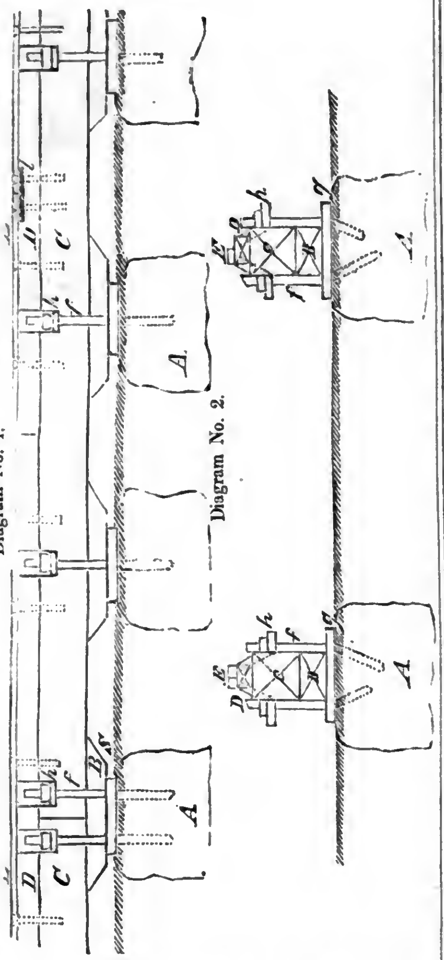

Diagram No. 1 represents a longitudinal, and diagram No. 2, a transverse section of the rail-track. A, A, &c. are stone blocks bedded in sand or gravel, three feet apart from centre to centre lengthwise of the track, and every fifth one extending entirely across the track. Their tops coincide with the surface of the ground. After they have been brought to a bearing with a common maul, they are to be consolidated by raising a given weight a given height, and letting it fall a given number of times on each block; the degree of consolidation to depend on the texture of stone. B, B, &c., locust rests, 1 foot 9 inches long, by 6 inches wide, by 3 or 4 inches deep, the depth to regulate the level of the upper surface of the rails. C, C, &c., 6 by 6 inch southern yellow pine, strong pieces. D, D, &c., 2 by 3 inch seasoned white oak strips. E, E, &c., iron plate rails, spiked with 5 inch spikes to the timber below them. F, F, &c., inch screw bolts, bent at their lower ends and inserted in oblique holes drilled for their reception in the stone blocks, the holes nearest the centre of the track to be 6, and those farthest from it 4 inches deep. G, G, &c., iron plates 10 inches square, by ½ an inch deep, preventing the screw bolts from approaching each other at their bases, and affording a smooth bearing for the locust rests. H, H, &c., iron caps 2½ inches wide by ½ an inch thick, confining the oak strips in their right position on the string, preventing them from splitting, and preventing the screw bolts from separating at their tops. I, I, &c., plates on which the plate rails rest at their joinings, provided with a shoulder equal in height to the thickness of the iron rail, which confines them in their proper position at their joining, and hooks their joints.

It is proposed to consolidate the stone blocks with an engine fixed on a carriage, so arranged as to raise two weights at once, and provided with an *anchor* fixed in advance, to which a cord is to be attached, from a drum on the engine, by means of which the carriage can easily be moved forwards: a further description of the engine is deferred for the present. It is believed that great advantage will result from this mode of consolidating the blocks, and that it is the only mode by which they can be got of uniform solidity. What slight dressing is necessary for the reception of the plates may be done after they are down, and it will be perceived that a variation in their height will only involve the necessity of varying the length of the screws, and the thickness of the locust rests. That uniformity in the size, and shape of the blocks which is common, is rendered unimportant by this mode of construction. A track well laid in this manner, on dry solid ground, can settle but little, if it settles at all, and in case of settles can be restored with facility to its proper position by loosening the screws, and inserting a piece of timber under the locust rests. The *bite* which the screw bolts have on the stone, effectually prevents them from drawing out, yet they can be removed with great ease when necessary. In case heavy iron rails are used, the white oak strips are unnecessary; if the road be much curved, it may be economical to use a heavy iron rail for the exterior, and a plate rail with oak strips, for the interior rail of the curve.

Improved Car-wheel.

Diagram No. 3 represents a double *flanged* car-wheel; *a* is the *cylindrical* part of the wheel, *b* the *cone*, and *c* and *d* the flanges. The object of the double flange is to decrease the liability of cars to run off the track. Each of the flanges we will suppose of the usual depth. Now suppose an obstruction on the rail which would raise the wheel high enough to clear the

first flange, that flange would fall on the top of the rail, and the wheel for a moment would roll on it, but with such an increased diameter as would restore it in half a revolution to its proper position. The effect of this is so obvious and simple, that a further description is deemed unnecessary.

Respectfully,

S. D. STEELE.

In our last we referred to the New-Castle Manufacturing Company. We now give the names of the gentlemen who have the direction and management, and the Agent's circular.

DIRECTORS.

Geo. B. Rodney, President }
John Moody } of New-Castle.
Thomas Stockton }
Charles I. DuPont, of Brandywyne.
William D. Lewis, of Philadelphia.
James Cowper, jr., Secretary and Treasurer.
E. A. G. Young, Superintendent.
John D. Bird, Assistant Superintendent.

Mr. Young, who has charge of the whole establishment, is, we understand, an experienced and successful builder of Locomotive Engines, and an able and skilful mechanic. From his talent and character there can be no doubt, we should think, as to the quality of the work which he shall send forth from the Company's shop.

NEW-CASTLE FOUNDRY AND LOCOMOTIVE ENGINE MANUFACTORY, INCORPORATED BY THE STATE OF DELAWARE, WITH A CAPITAL OF TWO HUNDRED THOUSAND DOLLARS.

The subscriber has the pleasure to announce that he is now ready to receive and execute in the shortest and best manner, and at the most reasonable rates, all orders connected with the business of the establishment. Particular attention will be paid to the manufacture of LOCOMOTIVE ENGINES, which will be warranted equal in every respect, to any others, whether imported or made in this country.

The works consist of Machine shops, upon a large scale, and extensive Foundries for furnishing Castings of every description both in Iron and Brass. They are situated in the south-western section of the town of New-Castle, directly upon the New-Castle and Frenchtown Rail Road, which forms a part of the great thoroughfare from North to South, and upon the bold waters of the Delaware River. This last circumstance gives great advantages over most similar establishments. All manufactured articles may be shipped from this port to any section of the country, even during the severities of an ordinary winter season. Its position the Rail Road, also, renders it easy of access, from every quarter, to those who may wish to visit the Factories. It is the determination of the subscriber to furnish no article but of the very best materials and workmanship.

Besides the Locomotive Engines, the subscriber will manufacture:

High and Low Pressure Steam Boat and Stationary Engines,
Wrought Iron and Copper Boilers, of all descriptions,
Do. Do. Do. Water Tanks,
Sugar Mills, Rollers, &c.
Cotton, Tobacco, and Paper Rollers and Screws,
Jack Screws, Screw and Lever Presses,
Heavy Wrought Iron Work, of all kinds, connected with Factories, Railroads, Steamboats, &c.,
Railroad Work, such as Wheels from thirty inches to five feet diameter, with cast Naves and Felloes, and wrought Spokes and Rims, with any required depth of Flange and width of Tread,
Cast Wheels, (chilled,) of any pattern and size, with Axles fitted, Switches, Frogs, &c., ready to insert,
Brass and Iron Castings, such as Cylinders, Pipes, Fly Wheels, and Shafts, Bed Plates, Kettles, Retorts, &c. &c.
Shipments made, and Insurances effected, (if desired,) without charge of commission.

EDWARD A. C. YOUNG,
Superintendent.

New-Castle, Del., March 1, 1836.

NEW-JERSEY RAILROAD.—Notwithstanding the violent snow storm on Wednesday, the 17th inst., the locomotive "Newark," performed her regular trips through in gallant style. Buy out the Monopoly, or not, the admirable location, and great advantages to be derived from this road through to Philadelphia, ought to be completed.—The "People" *ask* it! Four passenger cars arrived in Rahway, on Saturday, with over over one hundred passengers. The whereabout of the termination of the Railroad presented quite a lively scene.—[Rahway Advocate.]

We learn from a gentleman who arrived in Newark from Trenton yesterday afternoon, that the new locomotive of the N. J. Railroad Co., called the "New-Jersey," traversed the road finely, at the rate of a mile in three or four minutes, notwithstanding the deep snow. A simple machine, invented by L. A. Sykes, Esq., Engineer of this road, placed in advance of the front wheels of the locomotive, operates with complete success as a scraper in removing snow, six or eight inches in depth, with but little interruption. Passengers who left Trenton in the Camden and Amboy Railroad yesterday, an hour in advance of the U. S. Mail line, did not arrive here till this evening.—[Newark Daily Adv., Saturday, Feb. 29th.]

In addition to the above, we are authorized to state, that not a *single trip* has been lost on the above road during the severe part of the winter; and we would further add, that the whole of the work has been done with a single locomotive engine.

This circumstance speaks much for the ingenuity, enterprise, and perseverance of the agents upon the Road, and also does credit to the maker of the engine, Mr. Baldwin, of Philadelphia.

RAILROAD AND CANAL INTELLIGENCE.

NEW-JERSEY.

Much interest is excited throughout the State by the proposed purchase of the Camden and Amboy Railroad and Delaware and Raritan Canal. The subject is now before the Legislature.

MARYLAND.

THE PORT-DEPOSITE RAILROAD COMPANY.—This great and important work, in the consummation of which our city is so deeply interested, is now undergoing an investigation before a Committee of the House of Delegates, with the view of determining whether some other route than the one selected by Mr. Latrobe could not have been occupied with equal advantage.

We regret that the House should have deemed the ceremony of such an examination necessary or expedient, because it would seem to us, that the selection of a route must rest, entirely and exclusively, with the Company, independent of any control, except the expressed restrictions of its charter, or the implied prohibitions of law. The credit due to the charters granted by the State, and which it is the interest of every man to maintain, cannot be strengthened and may be seriously impaired abroad, by such Legislative inquiries.

As the Legislature, however, have commenced, we hope they will bring the matter to an early decision, and leave the corporation to enjoy its franchises for its own benefit and for the good, not only of our growing city, but *of the Nation.* Such is our view of the true end and influence of this Railroad, as a link in the great chain of communication between the North and South.

OHIO.

CINCINNATI AND CHARLESTOWN RAILROAD.—Great rejoicings took place in Cincinnati and the adjoining town when intelligence of the final passage of the Railroad bill reached them.

KENTUCKY.

THE INTERNAL IMPROVEMENT BILL, which was introduced by Mr. Guthrie, and has passed the Senate, provides for a reorganization of the Board of Internal Improvement, by which the services of disinterested and practical men will be secured, and makes the following appropriations:—

For the improvement of the Kentucky river to the Three Forks, by locks and dams,	$200,000
For the improvement of the navigation of Sandy river, and the West Fork thereof,	12,000
For the improvement of the Cumberland river from Laurel Creek to the Tennessee line,	30,000
For the construction of locks and dams in Green and Barren rivers, below Bowling Green,	100,000
For the improvement of the navigation of the Three Forks of Kentucky,	8,000
For slack water navigation on Licking river,	100,000

For the improvement of the navigation of Bayou du Chien, $1,500—for the improvement of the navigation of Panther Creek, $2,500—but one half of said money may, under the direction of the Board of In-

ternal Improvement, be applied to the improvement of two important roads, if deemed expedient,	4,000
For stock in the Lexington and Ohio Railroad Co.—to assist in constructing the line between Louisville and Frankfort,	200,000
	$554,000

In addition to this, the bill places under the direction of the Board of Internal Improvement, all monies arising from the old Bank of Kentucky, and the Bank of the Commonwealth, &c. There can be no doubt, we suppose, of the passage of the bill through the House.

We are unable to say what amount will be appropriated to Turnpike Roads, but suppose it will not fall short of four or five hundred thousand dollars.

MICHIGAN.

DETROIT AND ST. JOSEPH RIVER RAILROAD.—At a meeting of the Directors of the Detroit and St. Joseph River Railroad, held at the Bank of Michigan last evening, it was

Resolved, That this Board will put under contract so many miles of the Railroad, as the means furnished by the Stockholders will permit.

Resolved, That if twenty thousand dollars be added by the citizens of Ann Arbor to the sum already subscribed, it will, in the opinion of this Board, be sufficient, with the sum so subscribed, to construct the Road as far west as Ann Arbor.

Resolved, That the Chief Engineer be directed to commence the construction of the Railroad on some section as staked out between Detroit and Dearborn, forthwith.

FAR WEST.

RAILROAD WEST OF THE MISSISSIPPI.—The people of St. Louis, Missouri, are about projecting a Railroad from that place to Fayette, upwards of a hundred miles west of the Mississippi. The cost, it is supposed, will not exceed $5000 per mile, and great advantages to the trade of St. Louis are expected to flow from the measure, if adopted.

It is thus that our Western brethren are supplying the links of that great chain of Railroad communication, which before the end of this century, will probably be unbroken between the Atlantic seaboard and the furthest limits of habitation in the West.—The Atlantic and Pacific Railroad will one day be the name of that splendid whole, of which the Baltimore and Ohio Railroad is now one of the parts.

ASHTABULA, WARREN AND EAST LIVERPOOL RAILROAD.—We have before us the act to incorporate the Ashtabula, Warren and East Liverpool Railroad Company. The friends of this important work, which is to connect Lake Erie with the Ohio river, by a short, direct and feasible route, will be gratified to learn, by a perusal of the charter, that its provisions are liberal, and such as cannot fail to be satisfactory to capitalists who are desirous of investing their funds in the stock of the Company. We believe this route possesses advantages not equalled, certainly not excelled, by any other between Lake Erie and the Ohio. The whole length of the road is only about 96 miles, passing through a remarkably level country, abounding in materials necessary for the construction of the work. The Southern part of the route, which is decidedly the most difficult, has recently been surveyed by a competent engineer, and found not only practicable, but of easy construction. The following is an extract from the engineer's report, dated at East Liverpool, Columbiana Co., January 16, 1836:

"I procured excellent levelling instruments and all the necessary assistance, and proceeded to level the only Railroad route from the river that is considered eligible within the limits of this county, namely, from East Liverpool by the valley of Carpenter's Run, to the summit between the river and Beaver creek, called Houston's summit; from thence down the valley of Hogle Run, to Fredericktown, near the mouth of the east branch of Beaver, which embraces the whole of the difficult part of the route to the Lake, i. e. that part that is by some considered impracticable.

The final result of said level was more flattering than its greatest friends had anticipated.

I found the fall both ways from the summit to be very uniform, and after deducting 25 feet for a cut, and 45 feet for a bridge at Frederickstown, (both of which can be effected without difficulty,) that the summit can be overcome at 33 feet per mile from the flat at Liverpool, and 31 feet per mile to the creek."

The distance from East Liverpool to Houston's summit is only three and three-fourth miles; and from thence to Frederickstown only four and one-eighth miles. From thence to the Lake ridge the country presents nearly a level surface; and from the Lake to the ridge it has been ascertained that a road may be constructed with an ascent which renders the use of locomotive power on this part of the route perfectly practicable and easy. It will be seen by the advertisement of the Commissioners in another column that books will be opened for subscription for stock on the 31st of March next.

ILLINOIS AND MICHIGAN CANAL.—The following notice shows that this important work is to be commenced and prosecuted with vigor. Chicago—the CITY OF CHICAGO, as it will soon be called—will soon feel its influences. We cannot at this distance see how any portion of the State can oppose such a work.

TO CONTRACTORS.—Notice is hereby given to all persons who may feel disposed to take contracts on the Illinois and Michigan Canal, that the Board of Commissioners have determined to commence that work as early in the spring as circumstances will permit. The Engineers will commence their surveys about the 10th of March, and will have several sections ready for contract by the first of May. It is therefore expected that definite proposals will be received from that date to the first of June. In the mean time the Board invite an early inspection of that part of the route to Chicago, and will afford any information that may be required of them.

All communications will be addressed to "The Board of Commissioners of the Illinois and Michigan Canal, at Chicago."

By order of the Board.

JOEL MANNING, Secretary.

Jan. 20, 1836.

RAILROAD CONVENTION AT WINDSOR, VT.

Pursuant to public notice, a Convention was held at Windsor, Vt., on Wednesday, the 20th day of January, 1836, for the purpose of taking preliminary measures for the construction of a Railroad through the Valleys of the Connecticut and Passumpsic Rivers to the St. Lawrence; connecting with New-Haven and New-York.

At ten o'clock, A. M., above one hundred and sixty gentlemen, from the States of Connecticut, Massachusetts, New-Hampshire, Vermont, and Canada, assembled and took seats as members of the Convention.

On motion of C. Coolidge, Esq., the Convention proceeded to the election of a President; and ELIPHALET AVERILL, Esq., of Hartford, Ct., was chosen, and took the Chair.

On motion, Mr. ERATUS FAIRBANKS, of St. Johnsbury, Vt., and Mr. JOHN C. HOLBROOK, of Brattleborough, Vt., were elected Vice Presidents, and took seats as such.

On motion, Messrs. I. W. HUBBARD and JO. D. HATCH, of Windsor, Vt., were appointed Secretaries.

After the appointment of officers, Committees were appointed to report upon,

1st. The *practicability* of constructing the proposed Road.

2d. The resources of the territory falling within the influence of its route.

3d. Its importance in a national point of view—as a portion of a continuous line of communication through the Union.

4th. For procuring charters not yet obtained, and the uniting with companies already incorporated.

5th. To draft resolutions.

6th. For correspondence and publication.

7th. To ascertain the amount of available water power of the Connecticut and its tributaries, from tide water, and also of the streams descending to the St. Lawrence, in the vicinity of the termination of this Road.

From the reports of the Committees under the 1st, 2d, 3d, and 7th resolutions, we make such extracts as we deem of general interest, omitting all such parts of the reports and proceedings as are common to all similar assemblages.

The report, or *address*, or rather APPEAL, of the Committee under the 6th resolution, to the inhabitants who will be so generally benefitted by the construction of the Road, is so just, so appropriate, and indeed, so

eloquent, and so equally appropriate to many other parts of the country, that we shall endeavor to give it entire in a subsequent number, our columns being, for the present, in consequence of the interruption of the Journal, by the late fire, crowded with interesting subjects long delayed.

C. Coolidge, Esq. submitted the following resolution, which was read and adopted:

Resolved, That Col. James Stevens, of Newport, R. I., Engineer, P. H. Knowlton, of Lower Canada, and Chs. H. Peaslee, Esq., of Concord, N. H., be invited to take seats in the Convention, and assist in the deliberations of the same.

Col. J. Stevens, from the Committee appointed by virtue of the first resolution, made the following report, which was read and accepted:

"The Committee beg leave to report:—

"That, in their opinion, the same is highly practicable; that they have had under consideration the survey of Mr. Hutchinson through the valley of the Connecticut River from Hartford, in Connecticut, to McIndoe's Falls, in Barnet, Vermont, near the mouth of Passumpsic River, a distance of about 220 miles, and the survey of De Witt Clinton, Jr. from thence to Canada line on Lake Memphremagog, a distance of about 65 miles, showing a plan and profile of the country, surveyed for a canal on said route, being the same which is now contemplated for a Railroad. Knowing those gentlemen to be professional engineers of high respectability, your Committee have not hesitated to come to the conclusion, unanimously, that, so far as rise and fall are to be regarded, no unusual obstacle is presented; that, for so great an extent, the route is uncommonly level, and that there is no one point of obstruction in the whole extent that may not be readily overcome, and that without serious expense.

"That, in reference to the soil, in addition to the knowledge possessed by the Committee individually, they have acquired such information as has been within their reach, and feel confident in affirming that throughout the whole route, the earth is feasible and of easy excavation—and that all the materials for constructing a Railroad are found abundant and cheap upon every part of the line.

"Your Committee report, in reference to the expense of constructing said Railroad, on the most permanent and approved plan, similar to the Boston, Worcester, and Providence Roads, that the costs of superstructure, exclusive of grading, will be eight thousand dollars per mile, for a single track, including the turn-outs; and that the grading, on an average, will not exceed five thousand dollars per mile for a double track, including masonry, bridging, engineering, and all contingent expenses. But, considering the abundance of timber in the vicinity of the route, suitable for constructing a Railroad, and the facility of obtaining the same, other plans equally practicable and far less expensive, might be advantageously adopted. The superstructure of the Road with timber, without rubble-stone, might be constructed for six thousand dollars per mile less than the estimates of a Road similar to the Worcester and Providence Roads.

"The estimated expense of a Road, the whole distance, constructed upon the plan first mentioned, would amount to $3,705,000
Upon the last mentioned plan, 1,995,000

Making a saving in expense, of $1,710,000

"It is well known that the surveys of Messrs. Hutchinson and Clinton were made for a then contemplated Canal, and of necessity must have been confined to the streams; but in a survey for a Railroad it is highly probable to your Committee that the route will be varied in many essential particulars.

"Your Committee further report, from the best information they have been able to obtain, that the route from the line of Canada to St. Johns, a distance of about seventy miles, intersecting the Champlain and St. Lawrence Railroad, is highly practicable, and through a level and fertile country, and that from the well known enterprise of the inhabitants of the eastern townships in the Province of Lower Canada, should the now contemplated Railroad be extended to the Province line, a communication would soon be opened from that *terminus* to Montreal, and that the expense of constructing the same will not exceed the foregoing estimate; and they further report, that there is another route in contemplation from the Province line through the valley of the St. Francis to the St. Lawrence, in the direction of Quebec, which is represented to be equally practicable, and affording equal facilities.

JAMES STEVENS,
for the Committee."

Charles M. Emerson, from the Committee raised under the second resolution, made the following report, and the same was read and accepted.

"The Committee beg leave to report:—

"That, from the nature and magnitude of the subject, the materials to be combined, and the great variety and extent of information necessary to do it justice, they found it impossible to furnish, in the short time allowed them, a statemant which would at once comprehend and elucidate the objects of the reference. To form an estimate of the vast and inexhaustible resources of the valley of the Connecticut, its whole surface should be attentively surveyed; full abstracts should be returned from every town, containing the amount of articles purchased for home consumption, and sold for consumption elsewhere; its capacities for improvement and production should be ascertained; its mineral wealth should at least be partially explored; its streams should be accurately guaged, and the power of its waters examined; while its natural advantages, unrivalled in any other section of the country, should be presented and shown to be available. Such an estimate must be the result of patient and industrious inquiry, and, with its details, would fill a volume. Your Committee, therefore, could do no more than approach the threshhold of the duties assigned them, and point out the more obvious features of the route.

"The enterprise contemplated, is, the opening a communication for passengers and freight from the cities of New-York, New-Haven, and Hartford, and collaterally from Boston, with the cities of Montreal and Quebec; creating, through the valleys of the Connecticut and Passumpsic Rivers, a pleasant, convenient and expeditious thoroughfare between the cities of the Atlantic and the St. Lawrence. It contemplates making easily accessible an extensive section of country, abounding in resources for agricultural and manufacturing operations, but whose remote situation from the seaboard markets now render those resources in a degree unavailable. The face of the country receding from the rivers is hilly, but not mountainous—the soil is rich and durable, and as it respects the middle and northern parts, the heights are capable of cultivation quite to their summits. In many points the Connecticut River affords water power in abundance, while its tributaries, almost without exception, are available for hydraulic purposes, at short distances, through nearly the whole course, furnishing sites for long and continuous lines of manufacturing establishments. And perhaps it would not be hazardous to predict, that should the proposed Railroad be completed, the middle and northern sections of the route would, at no remote period, become the great manufacturing mart of this continent.

"It may be here added, that the country to be traversed by the Road abounds in suitable materials for the construction of a Railroad, such as cedar, tamarac, pine, granite, &c., while in the northern part of Vermont, and near the contemplated route, inexhaustible veins of iron ore have been discovered, and companies of heavy capitalists have already commenced the manufacture of iron on an extensive scale.

"It is evident that one great source of revenue to stockholders in the proposed Railroad, must be the transportation of freight. Of the amount of produce and merchandise, which would find their way from the valley itself and the avenues leading thereto, over the Road, the Committee could furnish no satisfactory or accurate estimate, as they had no data before them by which they could be governed with much certainty; but from the known character and physical advantages of the valley, the vast business already transacted therein, the numerous manufactories in operation, and the great quantity of produce exported annually, they feel warranted in giving it as their opinion, that the Road would be well supported by tolls receivable from freight alone, exclusive of the tolls to be derived from passengers. From a report submitted to the subscribers for procuring a survey of the Western Railroad, extending from Worcester to the Hudson River, prepared by their engineer after a long and critical investigation, it appears that the number of inhabitants within the territory to be affected by said road, is not far from 220,000—the amount of freight which in all probability would be transported over the Road would exceed 148,000 tons—while the tolls receivable from passengers, per annum, would exceed $170,000. The present population of the district falling within the influence of our contemplated

Road, will not fall much short of 500,000 inhabitants. In 1830, the three counties in Massachusetts bordering on the river contained 91,394 inhabitants—the four western counties of New-Hampshire 93,755—and the six eastern counties of Vermont, 135,586. The amount of business transacted in the district alluded to, is unquestionably as great in proportion to the number of inhabitants, as that transacted in the territory over which the route for the Western Railroad was surveyed, and taking the above report as a basis, from which some estimate may be made, and giving the same proportion of tonnage to the number of inhabitants within the influence of the contemplated route, there can scarcely be less than 400,000 tons to be transported over the Road. Full returns from a few towns, and partial returns from some others, fully sanction the above estimate, which your Committee believe to be far below the whole truth.

"Much statistical information was communicated by members of the Convention to the Committee, which they had not time to incorporate into a report, and indeed they found it impracticable to do so with reference to any general result; but they selected the following as affording some indication of what may be expected from the entire region. The annual exports and imports from the town of Derby, Vt., containing 1400 inhabitants, and bordering on Canada line, exceed 200 tons—from Barnet, with about 1800 inhabitants, over 370 tons—from Coventry, Vt., with about 800 inhabitants, 166 tons—from Brownington, Vt., with 500 inhabitants, about 60 tons—from Barton, Vt., with 1000 inhabitants, 112 tons—from the manufacturing village of Bradford, Vt., 1500 tons—from Lyndon, Vt., with 1800 inhabitants, 300 tons—from Glover, Vt., with 1200 inhabitants, 120—tons—from two establishments in St. Johnsbury, Vt., whose operations are connected, 500 tons—from one in Brattleborough, 250 tons, and from one in Stratford, Vt., the copperas works, 2200 tons. It is proper to remark, that no returns were received from the large towns on the river, and that the amount of tons exported and imported from and to the same would doubtless exceed the foregoing average. The expenses of transportation to and from the eastern counties of Vermont, will average at least $20 per ton, and the expense per ton, from Hartford, Ct., to Springfield, Mass., a distance of only 26 miles, is two dollars per ton. Some idea, therefore, can be formed from the above facts, of one source of income from the Road.

"In regard to the number of passengers who would probably take this route, your Committee had no facts on which an estimate could be founded, but when we consider, that the population of the district is already great, and fast increasing, that its connection, in a business point of view, with other sections of country is intimate, that its various, grand, and picturesque scenery, and the beauties of the route, would be inducements to parties travelling for health or pleasure, that the water communication with Montreal and Quebec is sealed up five months in the year, rendering this thoroughfare the easiest and most direct to and from the St. Lawrence; no doubts could be entertained, that another large source of revenue would be derived from passengers.

"C. M. Emerson, for Committee."

George T. Davis, from the Committee on the 3d resolution, made the following report, which was read and accepted.

The Committee beg leave to report:—

"The brief space allowed to your Committee for the making of their report, will prevent them from giving more than a general view of the subject committed to them. A great deal, indeed, of the evidence which has been or will be presented to the meeting by other Committees, will apply to this subject also. The territory which the proposed Road will travese, and whose inhabitants will be directly and largely benefitted by it, is three hundred miles in extent; it is, beyond comparison, the most fertile district in New-England; it possesses water power, (furnished by the magnificent river from which it is named, and by the tributaries of that river,) enough, it is believed, to drive all the looms now in operation in the Union; it supports a population equal to one sixteenth of the entire population of the United States; and it is capable of supporting ten times that number, if the facilities which have been given by nature shall be improved and rendered available by the art and enterprise of man. The welfare of so large a population—the development of such great resources, cannot be an unworthy object of protection to a government which seeks, by reasonable attention to the claims of each section, to promote the common prosperity of the whole.

"But there are special as well as general reasons which, in the opinion of your Committee, make this enterprise a matter of peculiar interest to the General Government. This Road will run straight from the seaboard to the frontier of a neighboring government. Should we continue at peace with that government, a traffic and intercourse of the most profitable kind, with the subjects of that government, will receive a mighty impulse from this work, and will have a tendency to secure, by a strong additional bond of mutual interest and intimacy, the present friendly relations between the two countries. This remark will apply with still greater force to the effect which this and other similar works, of which this is but a continuation, will have on the relations of the several States of our Union. Composed, as that Union is, of many sovereignties, spread over so wide an extent of country, and embodying many contending interests, there is much reason why every well-wisher to his country should hail the progress of improvements which, by breaking down the barriers to sectional intercourse, diminish the operation of sectional animosity or prejudice. And your Committee cannot but hope that this enterprise,—though its direct object is merely to meet the wants of the inhabitants of this valley, to increase their intercourse, and to develope their resources,—will, nevertheless, receive aid from the General Government, proportionate to the benefits which, if successful, it is likely to afford to the Union at large.

"All which is submitted per order.

"Geo. T. Davis, for Committee."

Thursday, Jan. 21.

F. E. Phelps, from the Special Committee appointed to ascertain and report the amount of available water-power within the range of the proposed Road, submitted the following report, which was read and accepted:

"Your Committee, to whom was referred the subject of water-power within the Valley of Connecticut River and its tributary streams, as also the water-power within the valleys of the streams running north from the head waters of Passumpsic River, with instructions to report generally as to the probable amount of said water-power, having given to the subject such consideration as the limited time would allow, respectfully report:—

"That, in estimating the water-power, your Committee have based the estimates upon the quantity of water running in the rivers and streams at low water: and inasmuch as the quantity of water passing over the falls upon Connecticut River at low water below Bellows Falls, is considerably greater than the quantity passing over the falls located above Bellows Falls, the average of the whole is set somewhat higher than the quantity passing at that place. It will also be perceived that the surplus quantity of water running at periods of high water, as also the quantity of water running in the streams for two or three months in the spring of the year, are not taken into the account, although in many instances a large amount of power derived from the spring and other high water, is not only available for many purposes, but actually used in the manufacture of lumber and other branches of business requiring only an occasional power.

"For the purpose of bringing the estimate into a convenient shape, and placing it in such a light as to be readily understood, and easily compared with other power of a similar kind, your Committee have estimated the quantity of water by the number of cotton mills it is capable of operating, estimating each cotton mill at 4,000 spindles.

"From the level of the water in the pond above the dam at McIndoe's Falls to the level of tide-water at low tide opposite the city of Hartford, the whole fall in Connecticut River is 449 feet 6 inches—of this 449 feet, 270 feet is estimated at the dams at McIndoe's Falls, Dodge's Falls, White River Falls, Quechee Falls, Bellows Falls, Miller's Falls, South Hadley Falls, and Enfield Falls, and the remaining 179 feet 6 inches is distributed in unequal proportions along the whole extent of the river between the several dams.

"Without taking into consideration any proportion of the 179 feet 6 inches, a considerable part of which could be rendered available by the construction of dams, the Committee have founded their estimates upon the 270 feet fall at the several dams. Supposing the fall required for each set of manufactories to be 15 feet, predicating the estimates upon the quantity of water used at Lowell, and averaging the quantity of

water in the river, your Committee are of the opinion that each fall of 15 feet would furnish sufficient water to operate 20 manufactories or cotton mills of 4,000 spindles each. If this estimate is correct, the available water-power from and including McIndoe's Falls to tide-water, would be sufficient to operate 360 cotton mills—or one million four hundred and forty thousand spindles.

"In the amount of available power in the valleys of the tributary streams, your Committee found considerable difficulty in coming at any satisfactory result. This difficulty arose from the want of correct information as to the fall upon the several streams, and also from want of information as to the quantity of water in each stream in times of drought. After giving to the subject such attention and making such examination as the limited time and means would allow, your Committee come to the conclusion that the water in the Farmington, Westfield, Chickopee, Manhan, Deerfield, Miller's, Ashuelot, West, Cold, Saxon, Williams, Black, Little Sugar, Sugar, Mascom, Quechee, White, Ompompanoosuc, Waits, Wells, Ammonoosuc, and Passumpsic Rivers, together with Connecticut River above McIndoe's Falls, and including about fifty brooks and mill streams, (taking into consideration the great amount of fall in many of the principal of these streams,) would yield a power sufficient to operate 720 cotton mills or 2,880,000 spindles.

"The estimate of the water-power in the valleys of the streams running north from the head waters of the Passumpsic and emptying into Lake Memphremagog, includes the Barton, Black, Willoughby, and Clyde Rivers. From the information furnished by gentlemen living in the vicinity, of those rivers, and well acquainted with the falls in each, the Committee estimated the power as sufficient to operate 120 cotton mills or 480,000 spindles.

"From the above estimates it appears that the available power in the valleys of the Connecticut River and its tributaries, and in the valleys of the streams running into Lake Memphremagog, when measured by the rule laid down above, viz. by the number of cotton mills or spindles it is capable of operating, is as follows:

	Cotton mills.	Spindles.
Connecticut River from McIndoe's Falls to tide water at Hartford, Conn.,	360	1,440,000
Tributary streams, including the increased fall of the stream,	720	2,880,000
The rivers running into Lake Memphremagog,	120	480,000
Making a total of	1,200	4,800,000

"Your Committee are aware of the enormous amount of power which this estimate presents, and are fully sensible that it will occasion surprise in the minds of those who have not examined the subject; but extravagant as it may appear, your Committee are unanimously of the opinion that these estimates are much below rather than any above the actual power.

"To give some idea of the amount of freight which would be thrown upon the Railroad in case this power was used for manufacturing purposes, your Committee would observe that a cotton mill of 4,000 spindles will manufacture about 7500 lbs. of cloth per week. One hundred pounds of cloth requires, from New-Orleans cotton, 112 lbs. of raw cotton equal to 3¾ tons per week—making the import and export from the cotton mill 7½ tons per week, or 390 tons per year. 1200 cotton mills, according to this estimate, would yield 468,000 tons of freight, which estimated at three dollars per ton, would amount to $1,404,000—or more than 25 per cent. interest on five millions of dollars.

"All which is respectfully submitted.

"Francis E. Phelps,
for the Committee."

After the different reports were made and adopted, the following important resolution was offered by H. Averill, Esq., and adopted:

"Resolved, That the Committee of Correspondence be instructed to take immediate measures to secure the services of a competent engineer to survey the route for a Railroad from Hartford, Ct., to the north line of the State of Vermont, through the valleys of the Connecticut and Passumpsic."

We cannot, however, permit this opportunity to pass without expressing our highest satisfaction with the proceedings of the Convention in relation to this most important Road, or as we are in the habit of designating every new Road already or about to be undertaken—"*link in the gran dchain.*" There are in reality but few routes *along* which the inhabitants would be more benefitted than that through the valley of the Connecticut. It is in truth the garden of New-England—and it is inhabited by as hardy, as honest, as industrious, and as intelligent a population as can be found *elsewhere.* Yes, *we challenge the world to produce its parallel!* Why, then, have they so long neglected to improve their own beautiful valley—and thereby retained their sons and daughters around them, to cheer their declining years, and to enjoy the pleasure of improving their native hills and beautiful valleys? Simply, we answer, beacause they are an hardy, and prudent people, who grow wealthy rather by industry than by speculation—and they have therefore been content with the ordinary facilities for transacting business. Times, however, and things have changed, wonderfully changed, within a few years. And the habits and necessities—no, *not necessities*, but *desires*, of the people must also change. *Four* and *five* miles an hour will not answer now a days—nor one or two tons for a load of merchandise, or produce—by no means—it must be *forty* to *one hundred* tons at the rate of ten to fifteen miles per hour, to satisfy those who believe in the "march of mind" of the present day!—Must, did I say? Yes, *must* and we know of no section of the country in which it may—nay, *will*, be accompanied more readily, or more certainly, than by the people of the Connecticut Valley?

We were surprised and highly gratified by the facts stated in the report of the Committee to ascertain the amount of available water power of the Connecticut, its tributaries and the streams running into Lake Memphremagog.

Cradled, as we were, in the *upper* valley of the Connecticut, and having spent many years along its banks, we supposed we knew something of its resources. We were not, however, aware of the extent of power, *unused* and useless power—useless *only* for want of easy and cheap access to it—which it could boast. Our lack of information, however, was from a want of investigation, as we can, on reflection, well believe—and not from the absence of data to arrive at the truth. And we are the more strongly impressed with the importance of this work, and the necessity of early, efficient, and untiring efforts to insure early construction.

In relation to the amount of business which the country will furnish, we do not deem it necessary to say a word, save that there cannot be a doubt—not a *single doubt*, but that it will, immediately on its completion, pay an income of 10 per cent. at least, and this will be greatly increased in five years, at fair rates of toll. This, however, is not its most important feature—this will not be its greatest value; as, on that day on which a locomotive shall pass its entire length, from *tide water* to *Canada line*, and, *of course, to Montreal*,—on that day, we say, every man's property within six miles of its route, will be worth 25 per cent. more than it is *this* day, and in truth and conscience we may say *forty to fifty per cent.*—an increase which would make *three* such roads. Go on, then, say we—go *ahead*—HESITATE NOT.

In the following letter from the Evening Star will be found a very satisfactory account of the Boston and Lowell Railroad.

It will be perceived that in the construction of this work no expense has been spared to insure permanency and solidity.

BOSTON AND LOWELL RAILROAD.

Extract from a letter dated Boston, Feb. 20, to a gentleman in this city.

"I will now proceed to answer your several inquiries relative to the Lowell Railroad, its location, its construction, and the prospect with regard to the value of the stock, &c.

At an early period, after it began to be believed that a Railroad would afford immense facilities for travelling and transpor-

tation, the idea of constructing such a road from Boston to Lowell at once occurred to every person, who was acquainted with the localities, and had any knowledge of the business which would be carried on between the two places. In the year 1830 a favorable charter was obtained from the Legislature. The stock was taken up, and the corporation was organized. The corporation was so fortunate as to secure the services of Patrick T. Jackson, Esq., who was chosen one of the Directors and appointed sole agent for the construction of the road. Surveys were made of every possible route between Boston and Lowell, and careful plans were drawn. Particular surveys were made with reference to the point where the road should enter the city of Boston. After much examination, and a full consideration of all matters which could bear on the question, a definitive location was made, and it is admitted by all, I believe, that the best route was adopted. The agent well knew the importance of having the assistance of an engineer, who possessed not only science, but practical wisdom and experience, and such an one he employed. The agent and engineer at all times acted together with perfect harmony, devoting their time, their *whole time*, and *undivided* attention to the great work. The most accurate calculations were made, the most careful inquiries were instituted in England and in this country as to the best mode of construction. Every matter was fully examined and considered in order to ascertain the exact truth. Every part of the work was constantly watched, and personally inspected. The agent resolved that a Railroad should be built in the best place, on the most solid foundation, and of the most durable materials, and I think he has accomplished his object.

The length of the road from the sea-wall in Boston to the depot on Merrimac street in Lowell, is a fraction short of twenty-six miles. The line is nearly straight. There is but one curve of a less radius than three thousand feet. There are but two points where the ascent is greater than at the rate of ten feet in a mile, and the summit level or highest point above the tide water at Boston is one hundred and eighteen feet only, and that occurs at a place twenty-one miles distant from the city. A fine wide road-bed is graded on the whole line. In no place is the width less than twenty-six feet *in the clear*, and that too on a line ten inches below the top of the rail. There are comparatively few deep cuts, and in all cases the inclination or slope of the bank is at an angle of about 33 degrees only, and if it is found in any place that the earth or gravel on the slopes slides or rolls down, a further removal from the slopes is made instead of placing heavy and expensive walls at the base of the bank, as has been done with very bad calculation and economy on some Railroads, especially when these walls are placed near the Railroad track. At some few points a low wall has been built at the foot of the slope, but in all cases the same is placed at a distance of five feet at least from the track of the road. There is, therefore, all the way, room enough. There is no contraction. There is ample space for the snow to be deposited, when removed from the track, and there is sufficient room to move and work in case of accident. Large drains have been made by which the water is carried off, and as soon as the drain on the side of the second track is completed, the whole road will be thoroughly drained and kept perfectly dry. The track of the Railway now in use is laid, except for a short distance, on a trench-wall, sunk 2½ to 4 feet below the surface, according to the character of the soil, and 2½ feet thick. On these walls rest stone blocks and binders, generally six blocks and two binders to each length of rail, (being five yards,) and the rails are fastened to them.

In a recent report, made to the directors of this road by the agent, he makes the following remarks, to wit: "It is asserted by some that wood is better than stone, even at the same cost. The reason assigned is, that wood being elastic, will yield to the pressure of the carriages passing over it, and cause the motion of them to be more easy. It will be admitted that the more level and straight the lines of the Railroad are, the better it is. It must, therefore, be true, that the supports should be as solid and unyielding as possible, in order that these lines may be preserved. The experience gained on the Lowell road has confirmed the agent in the opinion, that where the rails are laid on a firm foundation, with stone supports placed so near as to prevent any bending of the rail between them, so that there will be no yielding, no elasticity, there will be less jar and irregularity in the motion of the engines and cars, fewer accidents, and of course less wear and tear in the carriages and on the road, than there would be if rails were laid on a foundation and supports which, being elastic, would yield to the pressure of the weight passing over them." Much care has been taken to remove all clay from the road, and there is very little, if any, danger of the rails being in any degree moved or affected by the frost. The rails are placed at a proper height, and it will rarely happen that the snow will fall in such quantities that it cannot be easily brushed off by the broom before the engine, or removed by the snow plough, so as not to interfere with the rail. The flanges are never in danger of striking the frozen earth, and very rarely of touching any ice near the rail. Notwithstanding the unusual severity of this winter, the cars have run with great regularity. They have been interrupted by the snow but a very few times. The whole distance is run with great uniformity in about an hour and a quarter. It has been run in an hour.

Great pains have been taken to prevent any thing, which may obstruct or annoy, from entering on, or crossing the Railroad. In all cases, where it was necessary to have any crossing from one part of a farm to another, the same has been carried over or under the Railroad; and this course has also been taken on the public highways with the exception of a very few places, and at those points gates have been erected and men are stationed to open and shut them, when the engines and cars arrive and pass. Sufficient fences are built on each side of the road throughout the whole distance: so that the entire road is made perfectly secure from all external cause of obstruction or annoyance.

The second track has been commenced, and the work will be prosecuted with all convenient despatch. On some other Railroads, as soon as a small piece was completed, the cars were set in motion, which course, though it served to amuse and astonish at the moment, yet interfered with the work, and ultimately became a source of great additional expense and trouble. But the agent of the Lowell road kept on the even tenor of his way, and when one entire track was completed the whole distance, and sufficient engines and cars to accommodate the public were obtained, he opened the road for passengers, and as soon as all things were ready, and the tracks were laid at Lowell to the several factories, the transportation of merchandise was commenced.

The annual expense of the Lowell road will be less than has been anticipated. The *wear* and *tear* of the road, and of the engines and cars will be comparatively small. During the last summer, two engines passed over the road, each three times every day, and did not lose a single trip. There is hardly a limit to the number of cars, freighted with passengers or merchandise, which may be drawn with a single engine over this road. I am informed that one engine will carry from fifty to one hundred tons with ease.

There is a tract of land belonging to the corporation, containing about twelve acres, situated on the Cambridge side of Charles river, a small part of which is used for a depot for merchandise and for buildings to accommodate cars and engines, and the residue is to be sold. There is also a tract on the Boston side, appropriated for all the wants of the corporation. To both of these tracts, vessels may come up and load and unload. A five range of brick warehouses are now building by another corporation on each side of the Railroad track at the terminus in Boston, with suitable accommodations for lowering and hoisting goods, to and from the merchandise cars. Great facilities will be afforded for the transportation of merchandise to and from the Lowell factories.

Another advantage which this road has at present over any other, certainly in this part of the country, I will now mention. The sagacious founders of the town of Lowell, who acted under a certain corporate name, having secured all the water power created by the falls on the Merrimac river, at this place, and having purchased all the land on which factories could be built, soon established an extensive machine shop, and took much pains to bring together a great number of skilful artificers. Whenever they concluded to sell sufficient water power for one or more factories to a new corporation, they sold the land also on which to build the same, and contracted to erect the buildings and to furnish all the requisite machinery. At this machine shop has been built all the machinery for the several factories at Lowell, and for many other factories about the country. Here, too, all the

repairs required by the machinery at any of the establishments are made,—and all this work is furnished at short notice, and according to a proper scale of prices established by the Directors, being such as shall afford a reasonable and fair profit only to the concern.

This establishment, of which Major Whistler now has the chief direction, under its wise regulations is of vast importance to all the factories at Lowell. Another department has lately been added, viz. for building locomotive engines, cars for passengers and merchandise, and for doing the repairs on the same.

First rate locomotives have already been built here, superior, as I am assured from good authority, to any which can be imported from England. Several tenders and cars have also been built, and if any repairs are required on engines, tenders or cars, they are run directly into the shop, where each and every part of the same can be easily inspected, and all defects or injuries are detected and repaired; and all these things are accomplished at reasonable prices. The Railroad stands in the same relation to the machine shop that the factories do. The Railroad corporation has all the advantages of this excellent establishment without the risk, expense, outlay of capital, or trouble, which would attend the setting up of a machine shop for the accommodation of the Railroad only. I consider this machine shop as adding several per cent. to the value of the capital stock of this Railroad.

This stock yields at the beginning about eight per cent. per annum. The capital is fifteen hundred thousand dollars, which is fully adequate for completing the Railroad with the second track, and procuring all necessary engines, tenders, cars, fixtures, &c., and the income must certainly increase. I think it more certain than Bank Stock. It is owned mostly by sagacious capitalists. Those who are most familiar with the history of the road, its location, its mode of construction, its capabilities and prospects of income, have become owners of large quantities of the stock. I see no reason why the result of this enterprise should not be equal to that of the Liverpool and Manchester Railroad."

REPORT OF THE CITY DIRECTOR OF THE BALTIMORE AND SUSQUEHANNA RAILROAD COMPANY.

To the President of the First Branch of the City Council of Baltimore:

Sir,—In compliance with an order of the First Branch in the following words, this report is respectfully submitted.

Ordered, that the Director on the part of the city in the Baltimore and Susquehanna Railroad Company report to this Branch, the relative position of that Road to the public improvement, in the State of Pennsylvania, and what advantage, if any, the position of said Road occupies in relation to the western waters, by reason of its connection with the Pennsylvania works and any other projected communication with the western waters.

From my recent connection with the Road, it will be readily perceived, the very great disadvantages I labor under in making up an opinion, even satisfactory to myself, much less such an one as will be of much utility or benefit to the Council.

In regard to the first part of your order, respecting the relative position of the Road to the Pennsylvania public improvements, I have been able, as the map accompanying will show, to furnish the information desired. I have also submitted a table from No. 1 to 8, showing the distances of the different routes contemplated, both by Railroad and Canal, from the Maryland waters to the Ohio River; also the distance from Philadelphia by the Pennsylvania routes to the Ohio River.

You will at once perceive, by casting your eye over the map by the very great advantages that accrue to Baltimore by the Susquehanna Railroad, independent of those that will necessarily follow by a connection with the Pennsylvania works of Internal Improvements already completed. Although not embraced in your order, I may be permitted to call your attention to the fact, that this Road is destined, ere long, to open as rich a harvest to the enterprising people of Baltimore, as that contemplated by a connection with the Pennsylvania works, for besides the improved communication which Pennsylvania has formed directly with the west, she has opened other channels along the Susquehanna Valley, which, by no very extensive prolongation, will form for her, connections with the Erie Canal, and through it with the great northern lakes. From Williamsport, which is on the west branch of the Susquehanna, and on the line of her State improvements to Elmira or New Town, in the State of New-York, the country has been surveyed by Major Bache, United States Topographical Engineer, who, in his report made to Congress, states that a Railroad from Williamsport to Elmira, may be executed without having to contend with any very extraordinary difficulties, or those requiring expenditures beyond other works of the same description. Elmira is at the head of the Chemung Canal, through which it has a communication with Seneca Lake, which is connected by a short Canal (20 miles,) with the Erie Canal. The same authority goes on to state, that it is in contemplation to connect the Internal Improvements of New-York and Pennsylvania, by uniting the Pnnsylvania Canal, at Williamsport, with the Chemung Canal at Elmira. When this takes place, a choice of markets will at once be open to the products of this wide extended and fertile district of country. Baltimore will then be placed in a situation to compete with her powerful neighbors, New-York and Philadelphia, for the immense trade that must necesrarily flow through this channel.

Although New-York can boast of her more ready access, at al seasons of the year, to the ocean than Baltimore, yet she would have to contend with a difference of distance of one hundred and ten miles in favor of Baltimore, and should the Railroad reach the point contemplated on the Susquehanna, it will be a difference of about thirty miles in favor of Baltimore over Philadelphia. In addition to that, we afford a whole line of Railroad from Harrisburg to Baltimore, while a portion of theirs will be by Canal. What a vast field is here presented to our enterprising merchants! for it is not only the trade of the rich and fertile country bordering on the Susquehanna, she has by this Road opened to her,—although that is a prize worth contending for,—when we consider the vast body of rich flats on the Susquehanna, when its various branches pass the Genesee country, and the ease with which the produce of the Genesee River can be brought to the navigable part of the Canestoe, it will appear, as a writer says, treating of the country, "that the quantity of Hemp alone which may be collected at Tioga or Painted Post, will be incalculable."

The flats on the Genesee and Canoscrago creeks alone, cannot be estimated at less than eightly miles in length, and two in breadth, forming a body of land of about eighty thousand acres, and every acre about eighteen feet deep of black mould, where one hundred bushels of corn has been raised to the acre from time immemorial.

But there is still a more valuable prize open to Baltimore by this Road. Those who have not made it their business to inform themselves of the advantages of this route to the far west, can have no conception of the rich harvest that is opening to them. Let the eye for a moment trace on the map a wide and extended country embracing whole States and territories, and those filling up with a rapidity unparalleled, composed, as that population is, too, of the hardy and enterprising yeomanry of our country; washed, as this fertile country is, by the mighty inland seas, Lakes Superior, Huron, Michigan and Erie. Illinois is also awakening to her best interest, by opening a communication, either by Canal or Railroad, from the head of navigation of the Illinois River to Lake Michigan, Congress having granted every alternate section of the land on the line of the contemplated improvement for that purpose. Nature, indeed, has nearly herself completed the work, for one of the head streams of the Illinois rises within ten miles of Lake Michigan, and boats of five tons burthen have already, at certain seasons of the year, passed through it to the lake.

This river falls into the Mississippi at the town of Alton, and passes through the largest body of rich land of equal extent in the known world, and I think the prediction not extravagant that the Illinois will bear upon its bosom, one day, fully as large an amount of the valuable products of the rich valley of the Mississippi, as the noble and beautiful river that gives name to one of the States of this happy Union, the Ohio. It also opens to us a direct communication, by Railroad, and Canal, and steamboats, with New-Orleans. If Baltimore is only true to herself, a large portion of the trade of this extensive country may be made to flow into her bosom; for you will observe that the natural channel for it to take is through the lakes; and the Falls of Niagara offering insurmountable obstacles to its further progress by the lakes, it is compelled to seek the Erie Canal, and then the competition to secure it must be between New-York, Philadelphia, and Baltimore. That we may put in a claim for a large portion of it has before been fully shown, arising

from the advantages of our local relations to this country, compared with those of the two other cities mentioned.

What a field is here opened to Baltimore, what a stimulant to arouse her to exertion, to know that she is placed in a situation to enable her to contend, and that successfully too, with her proud rival, New-York, for this valuable trade.

Recurring again to your orders, you will observe on the map presented, as well as the table accompanying it, that all the advantages of the main line of Internal Improvements in Pennsylvania, resulting to Philadelphia, must, in a greater degree, operate in favor of Baltimore, so that for all the purposes of intercourse with the west, Baltimore is more favorably located than either of her rival sisters, Philadelphia and New-York; and what is still better, all those advantages are comparatively of small cost to us, and such is our connection with the improvements of Pennsylvania and New-York, that it will be impossible for them to make any improvements affording greater facilities for either of their commercial emporiums to the west, without Baltimore having the full advantage of them, and that, too, without the expenditure of a single additional dollar. The Susquehanna Railroad Company have already funds in hand sufficient to complete the Road to its destined point.

Now, whether from the fact of this Road placing us on an equal footing with Philadelphia and New-York, it would not be better for us to husband up our resources, to exert all our energies in supplying our market with an assortment of merchandise equal to our two rivals in trade, and to be able to offer the same indulgence to our customers; for unless you can offer the same inducements to merchants from the west and south to make their selections of you, it will be in vain; all your attempts to secure their custom, though you offer them a road to the west through every avenue of your city, for they will only use them for travel and for the conveying of merchandise purchased in other cities. And indeed, who is there among us that has not witnessed with regret the large amount annually of merchandise passing through our city, belonging to men too who first gave us their preference, but finding the assortment incomplete, went to the north, made their purchases, and sent their goods back by your own doors to the west.

Will this course of things not continue even if you should make fifty Railroads and Canals to the west, unless you offer such advantages as to make it an object with them to stop with you? unless you do this, you may purchase their produce and New-York and Philadelphia will get the money, you may buy, and they will sell, and I think it will require no very great stretch of reasoning to show which will be the gainer or loser by such a trade. No city, I believe, could sustain itself long by buying alone. As you are furnished with a map and table of distances by the different routes to the west, I must leave it to the wisdom of the Councils to decide the value of each, either, or all the contemplated works of Internal Improvement to the Ohio River.

S. BRADY.

P. S. The Susquehanna Railroad, if nothing turns up to prevent, will be open for travel to York in the course of twelve months.

Route to the Ohio River.

No. 1.

	Miles.
Baltimore to Harper's Ferry, Railroad,	80,500
Harper's Ferry to Cumberland, Railroad,	125,000
Cumberland to Youghagenny River, Railroad,	63,700
Youghagenny River to Brownsville, Railroad,	48,300
Brownsville to Wheeling, Railroad,	70,250
Total distance from Baltimore to Wheeling, Railroad,	387,750

No. 2.

Baltimore to Brownsville, Railroad, as above,	317,50
Brownsville to Pittsburg,	50,00
Total distance from Baltimore to Pittsburg,	367,50

No. 2½.

Baltimore to Harper's Ferry, Railroad,	80,50
Harper's Ferry to Cumberland, Railroad,	125,00
Cumberland to Youghagenny River, by Railroad, with a grade across the mountains, not exceeding 50 feet to the mile,	76,70
Youghagenny River to Brownsville,	48,30
Brownsville to Wheeling,	70,25
	400,75

No. 2¾.

Baltimore to Brownsville, as above	330,50
Brownsville to Pittsburg,	50,00
	380,00

No. 3.

Baltimore to York, Railroad,	57,00
York to Columbia, do.	12,00
Columbia to Holidaysburgh, Canal,	171,75
Holidaysburgh to Johnstown Portage, Railroad,	36,75
Johnstown to Pittsburg,	104,00
Total distance from Baltimore to Pittsburg,	381,50

No. 4.

Baltimore to York, Railway,	57,00
York to Middletown, do.	17,50
Middletown to Hollidaysburg, Canal,	154,50
Hollidaysburgh to Johnstown Portage, Railroad,	36,75
Johnstown to Pittsburg, Canal,	104,00
Total distance from Baltimore to Pittsburg,	369,75

No. 5.

Philadelphia to Columbia, Railway,	81,75
Columbia to Hollidaysburgh, Canal,	171,75
Hollidaysburgh to Johnstown, Railroad,	36,75
Johnstown to Pittsburg, Canal,	104,00
Total distance from Philadelphia to Pittsburg,	394,24

No. 6.

Georgetown to Harper's Ferry, Canal,	61,06
Harper's Ferry to Cumberland, Canal,	125,00
Cumberland to Youghagenny run, Railroad,	63,80
Youghagenny run to Brownsville, Canal,	70,25
Total distance from Georgetown to Wheeling,	368,25

No. 7.

Georgetown to Brownsville, as above,	298,00
Brownsville to Pittsburg, Railroad,	50,00
Total distance from Georgetown to Pittsburg,	348,00

No. 8.

Richmond to Covington, Canal and Railroad,	212,00
Covington to Ohio River, at mouth of Kenhawa,	218,00
Total distance from Richmond to Ohio River,	430,00

In the following Report we have only selected such items of repair as occur in positions worthy of note. The repairs in general are,—

Docking, to protect the banks from wash.

Removal of deposits and deepening the bed of the Canal.

Removing slides, and protecting slopes in deep cuts.

Gravelling and raising tow paths.

Substituting stone for wood in locks, &c.

ANNUAL REPORT OF THE CANAL COMMISSIONERS, TO THE LEGISLATURE OF THE STATE OF NEW-YORK.

The Canal Commissioners, pursuant to chapter nine, title nine, article second, of the first part of the Revised Statutes, respectfully submit their

ANNUAL REPORT.

The navigation on the Canals was commenced on the fifteenth of April, and continued, with but little interruption, until the latter part of November. The last winter was uncommonly cold, and the frost remained in the ground later in the spring than usual, making the repairs to the Canals difficult and expensive, compared with other seasons. The Canals, however, were put in a condition to accommodate the great

and increasing business upon them, and so continued until they were closed by ice.—The weather, in the month of November, was mild and favorable for business, until after the twentieth, and the change was so sudden and unexpected as to prevent a great amount of property reaching its places of destination—to the great injury of its owners, and forwarders, and of the loss to the State of the toll upon it. Notwithstanding the early and unlooked for closing of navigation, more business has been done, and a greater amount of toll has been received on the Canals than in any former year.

The Commissioners will proceed to give a general statement of the principal repairs that have been made upon the Canals since the time included in their last annual report.

ERIE CANAL.

A new culvert has been constructed, to discharge the water from the weigh-lock at Albany into the Hudson river; of stone laid in hydraulic cement, one hundred and fifty feet in length, seven feet wide at the bottom, four and a half feet high, arched and covered with earth. The foot of the lock has been rebuilt and a culvert gate added, to facilitate the discharge of water. When the water in the river was high, it set up to this lock and prevented its use. To remedy this inconvenience, new irons to suspend the bed or cradle, on which boats rest, have been procured, made with screws to adjust the cradle to any desirable height. These irons, it is calculated, will answer for a weigh-lock after the canal is enlarged; and believed to be capable of sustaining a weight of one hundred and seventy tons.

From the head of the four locks above the Cohoes Falls, and including the first lock west of the aqueduct at the Little Falls:

During the past season the piers that support the trunk of the lower aqueduct across the Mohawk river, have been secured from the action of the frost, and the running ice in the river, by enclosing them with frames of timber, planked on the sides.—The work appears to have been done in a substantial manner, and the piers may be considered secure while the timber retains its strength.

On several of the short levels, and at other places below the locks, the force with which the water is discharged from the locks has broken the walls, and displaced the stone which had been put on the face of the bank as a protection. Timber on the top of the wall at some places, and docking at others, is found to be a good repair, and better than a wall of the ordinary description. For this purpose, 307 rods of Canal have been secured in the manner described.

On this section there have been erected 29 new bridges; several have been repaired and the covering renewed. The almost constant use of the paddle gates, renders this an expensive item in repairs, and last spring, 42 paddle gates and 10 culvert gates were put in the locks.

One breach has occurred on this section of the Canal in the last season. It interrupted the navigation about ten hours, and was repaired at an expense of about $200.

From the head of the locks at Little-Falls to New-London:

Much expense was incurred in clearing out the bottom of this line of Canal, principally on that part between the head of the lock at Frankfort and the city of Utica, a distance of about nine miles. This being the east end of the long level, and no important feeder nearer than Rome, it was often depressed, when the lockages were frequent, to the great inconvenience of navigators. The removing of the deposites from the bottom, and in several places excavating below the original bottom, have in a great measure removed this inconvenience.

The decayed state of the aqueduct at Rochester permitted a considerable quantity of water to filtrate through the joints, which had a tendency to hasten the decay of the stone in the parapet walls and arches. To obviate this, the trunk was lined with plank last spring, and it had the desired effect. The unfavorable operation of last winter and spring, on the stone in the aqueduct, produced a visible change; and so threatening was the aspect of one of the arches, that it was deemed necessary to raise a bent of timber under it, to render it secure. This arch is on the west side of the water course of the river, and the bent is secure from its floods.

Measures have for some time been in a state of preparation to rebuild the aqueduct, and the work would have been put under contract last spring, had it not become necessary to suspend the proceedings, until the question of enlargement was decided. The Commissioners are aware that the failure of this important appendage to the Erie Canal, in the season of navigation, might produce distressing consequences. This event is not expected the coming season; but it is thought that a proper regard for an uninterrupted navigation would justify the expense of procuring materials for a trunk of wood, in case the aqueduct should fail. These materials are in a state of preparation, to be delivered in the spring; and if the condition of the aqueduct then should render it necessary, the timber will be framed, the plank jointed, and every thing put in such a state of readiness as to occupy but a short time in fitting it for use.—If the event for which this preparation is made should not happen, but little damage would ensue, as the timber and plank could be disposed of, or used elsewhere on the Canal.

During the last season of navigation three breaches have occurred on this section of Canal. They caused but little interruption, and were repaired for $265 21.

The line from Lockport to Pendleton has, as usual, required heavy expenditures.—During last winter 8,283 cubic yards of earth were excavated preparatory to the reception of timber and plank, as a foundation for a heavy wall to sustain the lateral pressure of the bank. For this purpose there has been used 8,316 feet of timber, and 33,264 feet of plank. Stone wall to the amount of 6,720 cubic yards has been laid on this foundation, and as a guard against the action of the frost on the wall, 1,642 cubic yards of gravel was placed behind it.

This part of the canal is reported to be in a better condition than it has been for several years past, though the superintendent entertains some fears that the winter and spring may have an unfavorable influence on the navigation of next season, and the expense of repairs next spring.

The contracted channel of the Canal from Lockport to Pendleton, has for several years been insufficient to pass conveniently the quantity of water necessary to supply the Canal to the Seneca river. In order to force through this channel the desired quantity of water, the dam at the mouth of the Tonewanta creek has been maintained through the season of navigation six feet above the bottom of the Canal. This has an injurious effect on the low lands adjoining the stream.

The contemplated enlargement of the Canal should be commenced at this place, at an early period, in order that an adequate quantity of water may be sent forward from Lake Erie, the country redeemed from evils which have been mentioned, and the annual expenses for repairs diminished.

Repairs, other than those mentioned in this report, have been made upon this Canal, which, in the aggregate, amount to a large sum; but if stated singly, would appear of too trifling a character to find a place in an annual report. Great expense was incurred the last winter and spring, in removing obstructions from the bottom and sides of the Canal; and it is believed that a better and less interrupted navigation was maintained the last than in any previous season.

Pursuant to the act in relation to the Erie Canal, passed May 11, 1835, the Commissioners submit the following Report:

After the passage of this act, all proceedings under the act to provide for the improvement of the Canals of this State, passed May 6th, 1834, were suspended, except the payment of damages that had been appraised, and the construction of waste-weirs and races to carry water around locks.

A meeting of the Canal Board to take tnto consideration the act entitled "An act in relation to the Erie Canal," was held at the Comptroller's office, Canal Room, on he 30th June last, and on the 3d day of July, it was resolved by that Board, that the Canal Commissioners proceed without delay, to cause surveys and estimates to be made of all the improvements contemplated by said act. Pursuant to said resolution, surveys and estimates were made of the entire line of the Erie Canal, which were submitted to the Canal Board, at an adjourned meeting held for that purpose, on the 20th day of October; at this meeting, the question as to the dimensions to which the Canal and locks should be enlarged, was passed upon; some further surveys ordered, and an adjourned meeting was directed to be held on the 23d day of November. After this last meeting, it was too late in the season to commence the surveys with reference to location for locks. The proceedings of the Canal Board will be detailed in a report to be made by that Board, accompanied by the report and estimates of the engineers appointed to make the surveys.

The plan of a new aqueduct at Rochester was so intimately connected with the ques-

tion of enlargement that its re-construction was unavoidably suspended until the necessary surveys were made, and the question of enlargement decided. The importance of this work, and its decayed state, rendered it proper that there should be no unnecessary delay. A new location for the aqueduct has been decided upon by the Canal Board, and sealed proposals have been received for its construction, and also for culverts and excavation in the bed of the river, and excavation and embankments at each end of the aqueduct. No contract has yet been entered into for the construction of the aqueduct: the other work is under contract, and it is expected that a contract will soon be entered into with some of the persons proposing for the construction of the aqueduct.

The reasons for changing the location of the aqueduct will be detailed in the report of the Canal Board, and the report of the engineers before referred to.

The Commissioners intend that the surveys shall be commenced as early in the spring as the weather will permit; and as fast as the location of the locks can be made, to put them under contract. This proceeding will be extended from Albany to Syracuse.

The two first locks west of Palmyra, two of the three locks at Lockville, and one at Lyons, are in such a dilapidated condition as to render a reliance upon their use for any considerable length of time, very uncertain; and there can be no doubt as to the propriety of substituting new ones. It is intended to put these under contract as early next season as the necessary examinations can be completed, to be finished in the fall of 1837 or 38, as the appearance of the old locks next spring shall seem to render necessary.

The new locks on the line will be made on locations suitable for the enlarged Canal, and constructed on the plan of the enlarged locks. This rule will be adopted in reference to all new structures, as far forth as its application will be deemed beneficial to the State.

With a view to the improvement of the Erie Canal, the Commissioners have divided the line into four sections; to each of which they have assigned a chief engineer. Section No. 1 commences at the city of Albany and extends to the east end of the Rome summit, and is assigned to John B. Jervis: section No. 2 extends from the latter place to the west bounds of the village of Jordan, and is assigned to Holmes Hutchinson: section No. 3 extends from the latter place to, and includes the feeder from the Genesee river, and is assigned to Frederick C. Mills: and section No. 4 extends from the latter place to the termination of the Canal at Buffalo, and is assigned to Nathan S. Roberts.

The re-surveys, as has been before stated, will commence on all these sections early next spring, with the view of designating the exterior bounds of the Canal at as early a period as may be consistent and practicable. It is probable that in all the cities and villages the line may be permanently located in all the next season. This is deemed important, in reference to improvements which are constantly making at these places, and a special direction will be given to the surveys in reference to this object.

So far as the surveys made last season have developed the practicability of enlarging the Canal and executing a permanent work, without materially interrupting the navigation, nothing has appeared insurmountable, or more difficult than a cursory examination of the subject had indicated.—It is, however, a difficult, and in some respects, a fearful undertaking. The interference with private property, the immense expenditure, and the circumstances under which the work must be executed, will impose greater responsibilities, and require more mental and bodily exertions, than in the construction of an entire new work.—Experience has so far simplified and systematised the course of proceedings in the construction of new Canals, as to render the duty comparatively easy.

To plan and arrange the execution of the work appertaining to the enlargement of the Canal and a new set of lift locks, so that the parts which may be done during the season of navigation, and those which must be done in the winter, can be clearly delineated, in order that a basis may be furnished for a specific contract, will be no easy matter.

The economy of executing a public work depends very much on the manner in which the necessary arrangements are matured, previous to the execution of the contracts, in order that all work may be put at specific prices.

Great pains should be taken to perfect all the plans and locations; to point out the different kinds of work, and the circumstances under which it must be done; to enable the person offering for contracts to propose specfiic and intelligent prices, and to secure the navigation of the Canal from the chance of interruption. Under such circumstances the person proposing is enabled to fix proper prices, and can have no reasonable excuse, if from competition or any other cause, he is induced to enter into contracts for an inadequate compensation. This often occurs, and is the source of unpleasant embarrassments in the execution of a public work, as well in regard to its faithful performance as its progress. If the plans and locations are not well matured, it necessarily leads to alterations during the progress of the work, and generally imposes on the contractor extra expenses, for which he should be fairly and fully indemnified.—For these expenses the contractor has no prices, and generally no provision in his contract that indicates the rate of compensation. This state of things often excites the cupidity of a contractor, from an inordinate desire for gain, or to cover losses under a bad contract, to claim an allowance unjust and improper. Work, of the description which has been mentioned, is often done under circumstances which renders it difficult to ascertain the expense; and to liquidate accounts of this kind is always very embarrassing. It is, however, proper to remark, that notwithstanding all practical circumspection is exercised, the necessity of altering plans and changing locations sometimes occurs, for causes which canno be foreseen.

There have been instances where contractors have failed in paying laborers in their employ. A great portion of the laborers on our public works are foreigners, who are not aware of the protection afforded them by the laws of our country. They are generally poor and destitute, relying on their wages for their daily subsistence of themselves and families. The laborer, in all situations, is "worthy of his hire," and to withhold it under such circumstances, is exceedingly cruel and unjust.

In undertaking the extensive improvements on the Erie Canal, it may be deemed expedient to incorporate a provision in the contracts, giving the Commissioners some control over this matter.

The failure of contractors to pay their men, aside from its gross injustice, has a very unfavorable effect on the progress of the work, and enhances its cost. It affects the character of the work, and the interest of all the contractors. These laborers cannot readily ascertain the character and solvency of the contractors, and if one contractor fails in paying his men, it creates a fear and suspicion, which affects all.—The information passes from one friend to another, it spreads beyond the borders of the State, exerts a great influence in preventing laborers from coming to a public work, where they are not honestly paid.

The prohibition of sub-contracting will do much to remedy this evil.

CHAMPLAIN CANAL.

Last summer the Saratoga dam was bracketed before the usual time for low water. The brackets were of plank, 17 inches high: the pond readily filled, and the water in it was at all times during the season of navigation, above top water line in the Canal below the guard lock; but boats were frequently aground on the bottom of the Canal below Johnson's bridge. This was occasioned in part by bars formed in the Canal at narrow places, by the irregular supply of water that could be passed through the lock to feed the Canal when the lockages were frequent, and by some parts of the Canal in rock cutting, below the guard-lock not having been excavated to bottom. To remedy this inconvenience, it is intended during the winter, to remove the bars, excavate the bottom and sides of the Canal in the narrow and shallow places, and construct a water-way to pass water round the lock to feed the levels below it.

The discharge lock at Saratoga is founded on quicksand. The water passed under and along the sides of it twice last summer. A part of the embankment was taken out and replaced with better materials; but there have since been leaks discovered, and it is believed that the safety of the work requires that a thorough repair should be made before the opening of navigation.

In a time of low water in the Hudson river last summer, the water in the pond above the Fort-Miller dam, was lower than the top water line in the Canal. A set of reverse gates were constructed in the feeder south of the guard-lock, to retain the water in the Canal to its proper elevation. Un-

less the dam is raised, it will be necessary to construct another set of gates, to use the feeder for navigation at times of low water in the river.

The sliding bank at Hinman's Point requires protection. The bank is principally of clay, resting on slate rock, inclining towards the river, which washes the embankment. Piles cannot be driven to afford any security on account of the rock. It will therefore be necessary to place a pier of wood at the foot of the embankment, firmly resting upon and securely bolted to the rock and filled with stone.

Piles have been driven to secure the towing-path from sliding south of Stuart's. It will be necessary to extend this work next season. A new trunk is required for the Fort-Edward aqueduct.

An additional paddle-gate, three feet square, has been put in the Fort-Edward lock, to facilitate the lockages; and a slide-gate has been put in the sluice by the side of the lock, to pass water from the feeder to the level below it. The walls of this lock have moved inwards, and at some points are but thirteen feet two inches apart. From this, and the imperfect state of the masonry generally, it has become necessary to rebuild it before the commencement of navigation.

The waste-weir at Smith's basin and the one near Holmes', on the summit level of this Canal, have been rebuilt of permanent stone masonry. The bridges over them are formed of large flat stone, covered with gravel, resting on stone abutments and piers, from three to four feet apart; slide and roll-gates are inserted in a frame work constructed immediately below the piers, connected with and well secured in the abutments at the ends, and supported at the centre by a stone buttress. The water wastes over the frame and preserves the timber from decay. That at Smith's basin is now in use. At the other place, the old waste-weir is to be taken out, the space filled with earth, the towing-path straightened, some embankment to be removed from the front of the new weir, and docking put in at the ends of it.

The repairs contemplated in the last annual report of the Commissioners, to the locks at Whitehall, were not made last spring on account of unfavorable weather for work of that kind. The materials are on hand, and if the weather is favorable, the work will be done next spring.

Breaches have frequently occurred in the embankment, and dry wall constructed for the protection of the Canal above these locks. The expense of repairing breaches, the contracted width of the Canal at this place, and the importance of maintaining an uninterrupted navigation, require that a substantial plan of improvement should be adopted.—the public works at this point are limited on one side by Wood creek, and by one of the streets of the village on the other. The utmost extent of ground that can be occupied for the Canal, without encroaching upon the channel necessary for the creek, or taking a part of the street, is too circumscribed to admit of making an embankment of earth for the whole distance. It will therefore be necessary to continue a wall of cemented stone masonry, from the present wall at the head of the locks, about 210 feet, and make an embankment of earth, protected on the outside by a slope wall about 700 feet in length. If this was done, a waste-weir necessary to regulate the water on this level, might be built in the wall above the locks, to discharge water into the bed of the creek.

At the head of the Glen's Falls feeder, a guard lock of hammered stone has been built on the north side of the old lock of wood, that had become unfit for use. About 350 yards of earth and 400 of rock are to be excavated, to complete the entrance at the head and foot of the lock. This work is in progress and will shortly be finished.

A breach occurred in this feeder on the 26th of July last, in the high embankment above the village of Glen's Falls. It was repaired at the expense of about three hundred and fifty dollars.

The locks on the feeder are of wood; there are thirteen, numbered from 8 to 20 inclusive. Seven have received repairs the past season.

The navigation on the feeder is greatly delayed for want of sluices, or water-ways to pass water round the locks to feed the Canal. The water has to be passed through the locks, and cannot be drawn in sufficient quantities, when they are much used for passing floats. Much inconvenience has resulted from the contracted width of the feeder at several places, particularly at the village of Glen's-Falls, where the largest amount of tonnage, transported in boats, is loaded and unloaded. About 1,600 floats have passed through these locks the last season.

The Commissioners, in their last annual report, at page 22, stated that an examination of the Glen's-Falls feeder had been made by Holmes Hutchinson, Esq. His report will be found appended to their report and marked D. The Legislature is respectfully referred to these reports. They were made under the expectation that legislative direction would be given in relation to this feeder. After the adjournment of the Legislature, without acting upon this subject the Commissioner having charge of this line of Canal did not think he was authorized to make the improvements recommended in the report of Mr. Hutchinson, in the course of ordinary repairs. He submitted the question to the Canal Board, and they advised him by resolution, to suspend the rebuilding of the lift locks on the Glen's-Falls feeder, until the Canal Commissioners have an opportunity to submit the question as to rebuilding said locks, to the Legislature.—The Commissioners are of opinion that they do not possess the power to make the improvement recommended in the report of Mr. Hutchinson, under the authority given them to make ordinary repairs, for the reason that it would be necessary to make an additional appropriation of land; and that the Canal Board have not the authority to direct them to be made as extraordinary repairs, because the estimated expense exceeds thirty thousand dollars.

In the month of December last, Frederick C. Mills, civil engineer, was requested by the acting Commissioner to examine the Champlain Canal, Fort Edward dam, and Glen's-Falls feeder. He has made the examinations required, and reported the result. In his report in relation to the Glen's-Falls feeder, he says, "If the plan for improving this work, suggested in the report of Holmes Hutchinson, civil engineer, be adopted, which, from the cursory examination I have been permitted to make, I would recommend, or in case the feeder is barely maintained for the purposes of navigation, it is believed to be the superior economy to reconstruct the present locks, as they decay, of hammered stone masonry, laid in hydraulic cement."

The business upon this feeder is said to be increasing; and it is deemed important to a large section of country, that it should be continued in a navigable condition. To do this, it is necessary that the work of rebuilding the locks, should be commenced within a short time.

The Commissioners are of opinion that the feeder should be improved upon the plan generally, as recommended in the report of Mr. Hutchinson, perhaps varying in some of the details: but they submit the question to the Legislature, and respectfully ask their direction as to the manner of its repair or improvement.

(To be continued.)

Railroads in Winter.—It has been often urged as an objection against Railroads, that they cannot be kept open in winter, in consequence of the obstructions occasioned by great falls of snow. As if to furnish a satisfactory experiment upon this point, it has so happened that the present winter has been of unusual severity, and the quantity of snow that has fallen has probably been greater than has been known for many years. It is, therefore, with great pleasure that we understand scarcely any interruption to the travel upon the Railroads leading from this city has taken place, and that the practicability of keeping them open, during the severest winter, has been satisfactorily established. We have not heard, indeed, that the Washington or Ohio Railroad has been suspended for a single day, although undoubtedly the time of arrival and departure may have been occasionally varied. We perceive from the Boston papers, that, even in that climate, where the snow storms are so much more frequent than with us, and where the snow lies so much longer, no serious interruption to the use of the Railroads has occurred. There have been only six days, since the commencement of the winter, in which the train of passenger cars have not run through the whole distance from Boston to Worcester, and only eighteen days in which the whole four trips per day have not been regularly performed. In the meantime, the harbors, rivers, and Canals, far and near, have been frozen up and entirely useless.

Bath and Weymouth Railway.—Messrs. Hopkins and Sons, Civil Engineers, of Plymouth, intend forthwith to produce a prospectus of a Railway from Bath to Weymouth, *via Ilchester*, at which latter place there is to be a branch Railway to Bridgewater, thereby uniting with that from Bristol to Exeter, and thus forming a communication from Weymouth to Bath and Bristol, which places will be in direct communication, by Railway, with Gloucester, Cheltenham, and Birmingham, as well as Liverpool.—[Jersey Star.]

AGRICULTURE, &c.

SHEEP HUSBANDRY—NO. III.

The Emigrant Merino.—There does not appear to be among those who write and converse on the Saxony and Merino sheep, a distinct and definite understanding of the subject. By most people they are regarded as distinct races of sheep; and designated by many imaginary distinctions.

To whatever region the Spanish Merino has emigrated, he is to be identified with the original, like the greyhound. Thence arises the inquiry, where has he been preserved in the greatest purity? held in the highest estimation and cultivated with the most care? in Saxony, France or America! And when we talk about *old fashioned Merino sheep*, it must at the same time be understood, that one variety of the parent stock is four times as valuable as others, and that this necessarily influences the emigrant, and determines his value. Then comes the consideration of individual peculiarity and excellence, which forms the basis of improvement, and the preservation of his purity.

The first emigration of the Spanish merino with which we have any acquaintance, was to Saxony; whose history has been partially narrated in the first number.

The second was to France, in both instances under circumstances of sovereign or state patronage. This second I shall furnish principally from a transcript of the writings of others.

"When France became a manufacturing, as well as an agricultural nation, it was perceived how great an injury she sustained by being dependent on foreigners for all the fine wool which she employed, and it was well understood how great would be the advantages which she would derive from the production of it within herself.

"This subject occupied the serious attention of Colbert, whom nothing escaped which might tend to the advantage and greatness of his country—he projected a change in the system which prevailed. Succeeding ministers attempted without effect to put his designs in execution.

"It was not until the year 1766, that Daniel Charles de Trudaine, an able minister, employed the surest means of succeeding, and thus freeing the kingdom from the tribute which it paid to procure fine wool. After his death, his place was supplied by his son, who followed the plan laid down by him. Daniel Charles de Trudaine had addressed himself, not to cultivators of land, whom narrow views and prejudices are too apt to deter from adopting whatever they have not seen practised by their forefathers, but to Daubenton, an able naturalist, who instantly perceived the possibility of what was proposed, and proved it by satisfactory experiments."

"It having been ascertained by a variety of experiments patronized by the administration, and conducted by enlightened agriculturists, that the Merino sheep might be acclimated in France without any change in their wool; application was made by Lewis sixteenth to the King of Spain for permission to export from thence a number of Merinos. This was not only granted, but orders were given by the Spanish monarch that they should be selected from the finest flocks in Spain. In the year 1786 four hundred rams and ewes arrived in France under the care of Spanish shepherds. Fortunately for France, the improvement in sheep, begun under Lewis the sixteenth, was continued through the revolution, in which almost every other useful institution was involved in ruin. A committee of agriculture was formed in the Convention, and under their protection the amelioration of the Merino flocks happily progressed. From this originated the celebrated Rambouilet flock. From this, the writer says a number of rams and ewes are annually sold, after the finest are picked out to keep up the original stock. And notwithstanding the annual sales from the national flocks, the price of rams is daily increasing."

So particular have the governments of Saxony and France been, to preserve these flocks from degenerating, and to effect every possible improvement, that they have at different times sent experienced shepherds into Spain, to select from their choice flocks superior individual rams, for which, in some instances, they have paid enormous prices, to preserve the necessary change without breeding in and in.

In such high consideration was this subject held by the successive administrations of the French government, that a commission was issued to the institute, to appoint a committee to prepare a treatise on sheep; which was executed, and distributed gratuitously, with that characteristic liberality of the great nation, which has done so much in science, and in arousing the dormant energies of the human mind, to a positive exaltation of character.

Mr. Gilbert, a member of the French national institute, in describing the Rambouilet flock, says, "but which certainly does not yield in any circumstance to the most beautiful in point of size, form and strength; or in fineness, length, softness, strength, and abundance of fleece. The manufacturers and dealers in wool, who came in numbers, to Rambouilet this year (1796) to purchase, unanimously agreed to this fact, at the very time that they were combining to keep down the price." He further states, that the average weight of the fleeces of the bucks, when washed and scoured, exclusive of tags and belly wool, was six lbs. In this country, for the market, we do not scour; only wash, and roll up the whole fleece. The amount of fleece is very much dependent on feed. He says, "the comparison I have made with the most scrupulous attention between this wool, and the highest priced, of that drawn from Spain, authorizes me to declare that of Rambouilet superior."

The Electoral flock of Saxony, and the Rambouilet flock of France, are of the same rank and degree—selected improved Merino. How is it then, when Saxony wool takes the precedence of Spanish wool in the market, that Rambouilet does not come in competition with Saxony? Spain and Saxony are pre-eminently fine wool growing regions; but neither of them extensively manufacturing; they grow for exportation. France, on the other hand, grows prime wool, which is consumed by her own unrivalled machinery.

In the third instance, he crossed the Atlantic for the new world, and landed on our shore. Here he was greeted with an enthusiasm bordering on distraction, and which can now hardly be realized. In the year 1802, the Hon. Robert R. Livingston of this State, with a discriminating patriotism meriting national reminiscence and gratitude, sent from Spain two couple of select Spanish Merino sheep, the first ever brought to this country.* Subsequently by himself, Col. Humphrey, Gen. Derby, Consul Jarvis and others, the country was supplied with Merino sheep.

Manufactories were now established, and the production of fine wool promised to be a lucrative business. But these prospects were soon dissipated, and upset, by the versatility of our own government. And the choice Merino buck fell from the exalted sale of $1,400 to the degraded estimate of 2 or 3 dollars. In the year 1813 I paid $150 for a Paulaur buck, and $100 each for six ewes. In the year 1827 I bought the remnants of some choice Escurial flocks, which had formerly been purchased at $200 each, for $2.50 each. And such was the depressed price of wool, that I purchased in the year 1826, cash payment at auction, a package of full blood Merino wool, at 25 cents per lb., and after keeping it two months, I sold it on a credit of 90 days, for 24 cents per lb.

This extreme vascillation of public sentiment, prostrated the whole interest. Many individuals were involved in total ruin; and small proprietors abandoned the concern. A few, relying on the sufficiency of their own pecuniary resources, on the intrinsic worth of the animal, the estimate of the whole civilized world, for centuries, of its value, only awaited a more protracted exit. From all this, it is plain that there was almost an entire abandonment of the Merino in this country.

The result of scientific investigation is, that a conclusion cannot be come at without the whole sheet of facts, embracing the subject in all its connexions.

The establishment of facts by experiments involves almost infinite nicety; requiring the whole amount of human discrimination --unshackled by subsisting theories, preconceived notions, and pride of popularity. An opinion is a mere nullity, separated from the considerations necessary for its formation. And the experience of every day exhibits the imperfection and fallacy of experiments and opinions. Not only the preceding narrative, but the most scrupulous investigation, will concur in the establishment of the subsequent statement.

The Spanish Merino has hitherto furnished the best material for the fabrication of fine woollen clothing; and as a natural consequence and matter of fact, has rendered all Europe tributary to her production.

This sheep being transported to Saxony and France, and there received as an acquisition, its peculiar character duly appreciated, nursed with care, preserved in its purity, proved in its excellence—must stand pre-eminent.

Sheep are a defenceless and delicate animal, the prey of wolves and dogs, and subjects of disease; therefore in a domesticated state, requiring the protecting and fostering care of man. And in following the destinies of their itinerant master, are necessarily subjects of acclimation.

The Spanish Merinos, with their gradations, have passed this ordeal in our country. The Saxony Merino have not in point of time been allowed the same courtesy and indulgence.

Who then, permit me to ask, who, in defiance of the light of science, and the experience of the world for a century, will be disposed to retrograde? Now what shall we do with this chimney corner and barn yard phrase, "*old fashioned Merino?*" I am as fond of antiquity as any one else, but I am unwilling to indulge this taste, at the sacrifice of a distinctive perception of things.

F.

*We beg leave here to state, that the FIRST Spanish sheep were sent to this country in 1801, by M. Delessert, of Paris, one only of which, Don Pedro, figured in the first volume of the Cultivator, page 183, lived to reach land. Don Pedro was kept some time in Ulster county, and afterwards by Mr. Dupont, in the State of Delaware.

Wool, the coat of the sheep, will be the subject of the next No.

P. S.—Permit me to commend the letter of Leonard Jarvis, Esq., in the last Cultivator, from the New-York Farmer, written with much ability and great fairness. It is from such sources that we are to take information. For scientific examination and investigation cannot be profitably prosecuted in an obstinate and controversial way.

"But man we find the only creature
Who, led by folly, combats nature;
Who, when she loudly cries, forbear—
With obstinacy fixes there." SWIFT.

From the New-England Farmer.

ATTENTION TO STOCK.

Care and skill are as indispensable as industry to success in the pursuits of the husbandman; and diligence will be of little use, if not directed by knowledge and good sense. An apparently trivial mistake, or want of attention to little but indispensable things, may rob labor of a great part of its efficacy, and seem to show that there is some mistake in the wise saying that "the hand of the diligent maketh rich." In fact, it is vain to *work hard* unless we *work it right*. This is the reason that the stock of some hard working farmers always appear in poor condition, notwithstanding they may be liberally supplied with fodder of the best quality.

Cattle must not only be well fed, but must have their food in due season; and likewise good water at command, and dry lodging. "Nothing," says an old English writer, "in winter, beats out cows and oxen, or makes them pitch [fall away] more, than their being WET ON THEIR BACK AND LOINS; for cattle carrying their hides wet, day after day, is as bad to them as it would be to us to wear wet clothes. The same injury arises to poor straw fed cattle, working in wet weather; one day's work in such case injuring them more than three of equal labor in dry weather."

"Cattle well *summered*," says Mr. Lisle, "are half *wintered;* that is to say, cattle going to their winter's quarters in high condition, will preserve a good plight throughout the winter; whereas such as have been fed upon short commons during the summer, and go to hay in a weak condition, are liable to become worse or even to drop off in the winter, particularly if it be unfavorable. Very young cattle and old cows are the most dangerous stock under these circumstances." Mr. Lawrence, in commenting on this paragraph, says, "to the above well grounded position may be added: Cattle well wintered are half summered; they are able to encounter either extreme of rank and surfeiting, or low summer keeping with greater safety than weak half-starved cattle."

It is very proper, and indeed almost indispensable, that every farmer should keep an account of the time when his cows are driven to the male. Mr. Lawrence says—"The period of *gestation* with the cow having a bull calf is, according to my own account, *two hundred and eighty-seven days*, or forty-one weeks, with the variation of a few days, either way; a cow calf comes in about a week's less time." Mr. Lisle says, that a "cow should be dried within two months of her calving, as to milk longer most necessarily impoverishes both cow and calf to a greater amount than the value of the milk."

Monk's *Agricultural Dictionary*, an English work of reputation, gives the following recipe for drying cows, which it is intended to fatten, or which have approached so nigh to the time of their calving, that it is thought improper to milk them any longer.

"Take an ounce of powdered alum; boil it in two quarts of milk till it turns into whey; then take a large handful of sage, and boil it in the whey till you reduce it to one quart; rub her udder with a little of it, and give her the rest by way of drink; milk her clean before you give it to her; and as you see need requires it, repeat it. Draw a little milk from her every second or third day, lest her udder be overcharged."

The same writer asserts, that "those cows which give the greatest quantity of milk are most profitable for suckling calves, for rich milk is not so proper food for calves as milk which is less valuable for dairy purposes. Milk which contains a large proportion of cream is apt to clog the stomachs of calves; obstructions put a stop to their thriving, and sometimes prove fatal. For this reason, calves should be fed with the milk which first comes from the cow, which is not so rich as that which is last drawn."

We have had the testimony of a very judicious practical cultivator to confirm the assertions in the paragraph last above quoted, who informs us that he has ascertained by actual and repeated experiment, that those cows which give the poorest milk for the dairy are the best for suckling calves.

"No, calf, lamb, or other animal," says Mr. Leslie, "should ever be caught *by the tail*, as it strains and inflames the loins and kidneys."

The first calf of a heifer is said to be the best for rearing; and the reason assigned is, that the dam is not reduced by milking her while she is with calf.

From the Genesee Farmer.

TRANSPLANTING FRUIT TREES.—This is commonly considered as one of the most difficult operations in the culture of fruit trees; but if properly performed is very rarely attended with any difficulty or risk. It is a very common opinion that a transplanted tree must of necessity continue nearly stationary in its growth for a year or two after the operation, or at best make but comparatively little progress. A tree, however, *properly* transplanted, will experience very little check in its growth, and often apparently none. Hence, the very great importance of the operation being well understood. Much has been written in explanation of the theory of successful transplanting; but we merely intended here to give a brief description of the practice which experience has proved to be uniformly attended with success, and the most obvious principles on which it is founded.

There are two great points to be observed in removing trees from the soil; first, to preserve the spongioles uninjured; and secondly, to prevent evaporation, by which the tree becomes dry, and if carried to excess, beyond recovery.

1. *Preservation of the Spongioles.*—These are the minute spongy extremities of the finest fibrous or branching thread-like roots, through which, as mouths, the tree receives fluids and other nourishment from the soil, and not through the surface and sides of the roots, as is sometimes supposed. As these spongioles are exceedingly delicate in their organization, a very slight degree of violence injures or destroys them. The more carefully, therefore, trees are removed from the soil, and the more entire the fibrous roots, the greater will be the number of uninjured spongioles remaining, and better will the tree be supplied with nourishment after it is planted again in the soil. And hence the absurdity of the practice, which has been recommended by some writers, of cutting off most of the small fibrous roots, because they cannot be easily replaced in their natural position in the soil.

2. *In order to prevent evaporation*, the roots should never be suffered to become dry, but as soon as removed from the ground, they should be enveloped in some damp substance; wetted straw serves well for a temporary protection. But when intended to be conveyed to a distance, and there is a probability of their being several days out of the ground, damp moss should be employed in packing about the roots, as straw is liable to ferment, if kept in a wet state. Previously to packing them in the moss, it is an excellent practice to immerse the roots in soft mud or a mixture of the soil and water, so as to coat their surfaces, after which dust or dry sand is sprinkled copiously over them to complete the coating.

The *holes* for receiving the trees should be dug large—not less than five or six feet in diameter, at the very least, and eighteen inches deep. The hard and sterile subsoil should be thrown out, and its place supplied with rich mould or muck. Where the holes are dug in ground in grass, the turf which is removed from the surface may be inverted in the bottoms. If manure is placed in them, it should be well rotted, and should never be allowed to come in contact with the roots, but should be placed in the bottom, at the surface, and in the more remote parts. The tree should in general be set a little deeper than it originally stood, but not more than two inches; the roots should be spread out horizontally in all directions, so as firmly to brace the trees when they become large; moderately moist and finely pulverized earth should then be gently shaken in about them, so as not to disturb the position of the fibres, until the whole is filled. Care should be taken that all the interstices among the roots are perfectly filled, so as not to leave the smallest cavities; and throwing in the earth in large quantities should for this reason be especially avoided. In order that the soil may be gently packed on every side of all the roots, it is very useful, when the soil is inclining to dryness, to pour in a quantity of water as soon as the roots are covered, and then the remainder of the earth shovelled in, which latter prevents the surface from becoming hard by baking. After the operation is finished, a stake should be set in the ground leaning towards the tree, to which it should be tied by a band of matting or of straw, to brace it firmly in an upright position.

Placing the tree leaning a little towards the south or southwest, or with the most projecting branches in that direction, will prevent the trunk being injured by the action of the rays of the sun in hot summer afternoons, an evil which is sometimes so serious as to cause the death of the tree.

Autumn is ordinarily the best time for removing trees; more time is then afforded than in the hurrying season of spring—besides which the earth becomes more settled about the roots, and new spongioles are produced in place of those which may have been destroyed, especially if the operation is not performed till late in autumn. Better trees also may be obtained in autumn than in spring after nurseries have been culled. But if tender kinds be transplanted in the fall, and particularly if they be removed to a colder section of the country, they will, from their mutilated state, be more liable to injury from frost. To those,

therefore, who live remote, and are unable to obtain such trees for early planting in the spring, or those who live in the colder regions of the country, we would recommend to procure their trees in autumn, and bury the roots and a part of the stem and branches in a trench dug for the purpose, the roots being packed closely together, and the branches resting in an inclined position upon the earth; which operation is technically termed by nurserymen, *laying in by the heel*. In this way they may be effectually protected from injury from the frosts of winter.

Nothing is more common than to loose trees by transplanting; but there is no necessity for such a failure; if trees are transplanted with proper care, there will be an almost absolute certainty of their living. If, when they are taken from the earth, care is taken to remove the roots entire—to keep them fresh—and in replacing them in the soil, to pack finely pulverized earth well about the roots, preserving them in their natural position, there can be little danger of success.

But it is not only necessary the trees should *live*, but they should thrive also; and for this object, it is indispensably requisite that they should have a large deep bed of loose soil for the roots to penetrate. If the ground is of a hard or heavy nature, the holes must be made large and deep, and filled with the proper materials, for if the roots are confined in small holes dug in such ground, they will succeed little better than if planted in a small box of earth.

Extract from a young Baltimorean visiting England on business connected with the New-Orleans and Nashville Railroad.

London, Dec. 7, 1835.

Dear Sir,—The Railroad fever is raging to a greater extent here than with us; the papers are all teeming with projects to connect places where only a few hours can be saved, which strongly tends to convince us of the importance of a speedy connexion, by means of steam power, between Boston and New-Orleans, which would create a saving of almost weeks. It is almost incredible the extent to which steam is used here; in Manchester alone there are twelve hundred engines in active operation, and one is at a loss to determine how England ever could have sustained herself without that which she is now so completely dependent upon. The greater portion of our time has been spent among the Iron manufactures in South Wales, some of which are conducted on a most stupendous scale; there is one establishment that employs five thousand men, and consumes weekly five thousand tons of coal; and from what I have seen of the whole country, I think the march of improvement is equally as progressive as our own.

A New Paper-Hanging, of a splendid description, has just been manufactured by Mr. De la Rue, the embossed-card manufacturer, who has been for many years at a considerable expense in bringing it to perfection. The pattern is embossed; in metals it is remarkably rich, particularly so with a flock ground. I was favored with a view of a room that has been recently hung with this new paper, at the manufactory in Bunhill-fields, and was very much struck with it. The pattern was embossed in gold, with a dark green flock ground, and the effect produced was magnificent. Another pattern is in imitation of a very richly embroidered shot-silk. A specimen of this paper has been submitted to his Majesty, who was very much pleased with its splendid appearance. The price varies from 1s. 8*d*. to 2*s*. per yard; and in metal, from 2*s*. 6*d*. to 3*s*. 6*d*. per yard, according to the pattern.—[Mr. Laxton; Archit. Mag.]

Emancipated Slaves.—A few days since, an aged gentleman from Pawhattan county, Va., arrived at Rochester, accompanied by ten negroes, from six to forty years of age, formerly his slaves, whom he had voluntarily discharged from servitude, and was conveying to a farm he had purchased for them in the neighborhood of Buffalo, on which he intended to settle them.

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, Editor.] SATURDAY, FEBRUARY 27, 1836. [VOLUME V.—No. 8.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, FEBRUARY 27, 1836.

☞ All accounts due for the Journal previous to *January last*, and also for the *current* year, have been inclosed in a previous number, to each subscriber—and we *should have said*, as we intended to say, in the number containing them, that some *errors* will probably be found, in consequence of the late disaster, which we are *particularly desirous* to correct, and therefore request those gentlemen, who detect errors, to give early information, with such particulars as will enable us to correct them properly, and to know to whom, if to any one, payments have been made.

In order to avoid similar difficulties hereafter, and that both parties may know how the account stands on the book, we shall publish a list of those from whom payments *have been*, and may hereafter *be*, received, for the *current* year. By this course, subscribers will be able to correct omissions on our part, and at our cost of postage, if we omit to give them credit.

☞ Those of our subscribers who have forwarded No. 6 of Vol. 4, in compliance with our request, will please accept our thanks for their kind attention. We have received as many as we require to complete the few sets on hand.

Illinois and Michigan Canal.—We are as much pleased to publish the following notice "by authority," as we were, when we first saw it, as a matter of information to our readers.

TO CONTRACTORS.

NOTICE is hereby given to all persons who may feel disposed to take Contracts on the Illinois and Michigan Canal, that the Board of Commissioners have determined to commence that work as early in the spring as circumstances will permit. The Engineers will commence their surveys about the 10th of March, and will have several Sections ready for contract by the first of May. It is therefore expected that definite proposals will be received from that date to the first of June. In the mean time the Board invite an early inspection of that part of the route to Chicago, and will afford any information that may be required of them.

All communications will be addressed to "The Board of Commissioners of the Illinois and Michigan Canal, at Chicago."

By order of the Board.

JOEL MANNING, Secretary.

January 20, 1836. 8-6t

☞ For the information of our readers and others, we will observe that we shall be gratified to publish, at any, and all times, similar notices to the above, 6 or 8 times, for *five dollars*, which may be remitted *with* the advertisement, and no questions asked.

The distillation of palatable and fresh water at sea has been effected by P. Nicole, of Dieppe, by simply causing the steam arising from boiling sea water in a still to pass through a stratum of coarsely powdered charcoal, in its way to the condenser or worm tub.

PORTSMOUTH AND ROANOKE RAILROAD.

The following letter contains a correct account of the advancement and progress of the Porthmouth and Roanoke Railroad.

Richmond, Va., Feb., 1836.

Dear Sir,—I was informed by a friend recently from New-York, that you wished to have some account of the Portsmouth and Roanoke Railroad—and that you expressed some surprise at not having heard of it since the Report of the Engineer in 1833. It is true the Company have made but little noise. They weighed the difficulties, examined the way, and, like the adorable princess, Parizade, turning a deaf ear to discouraging voices, have marched silently and courageously up to their object.

In little more than two years, they have overcome difficulties considered by many insurmountable: they have crossed the great Dismal Swamp; they have spanned the Blackwater, Nottoway, and Meberrin rivers, with their deep alluvial low grounds; hills have been cut away, forests have been felled, and sixty-two miles of the road completed—which, for levelness, straightness, and faithful execution, is unsurpassed, I will venture to say, by any similar work in our country.

The remainder of the road, comprising fifteen miles, and a bridge across the Roanoke river at Weldon, will be finished in the course of the summer. The bridge is 1760 feet in length, resting on 12 stout stone pillars, some of them upwards of 60 feet above the foundation; the floor is placed about 4 feet below the top of the framework, the railroad track in the centre, and so arranged that common road waggons may pass over it, or on either side of the rails.

The Company have now two locomotive engines running, one of Berry's make, and one of Stephenson's. The coaches are no

the three-bodied plan (of Green); the cars are all roofed, and provided with locks and keys—they are different in appearance from any I have seen, and are said to be on an improved plan. Between the present point of termination and Halifax (which you know is on the main mail route), the distance is 25 miles. This is accomplished in *Kendall* four-horse post-coaches, and, agreeably to the Companies' advertisement, you can leave Halifax at 3 A. M. to-day, and either breakfast to-morrow in Baltimore, or dine in Philadelphia. It is believed that this route cannot fail to command the whole southern travel. Turn to your map, Mr. Editor, if you please, and follow the line of the Camden and Amboy Railroad to Philadelphia—thence by the Delaware and Newcastle Railroad—or by the Wilmington and Port Deposite Railroad—and the Chesapeake Bay to Norfolk—or, if you prefer it, pursue the line of the contemplated Railroad from Philadelphia to Cherrytown, on the Eastern Shore of Virginia, and across the Bay to Norfolk—thence by the Portsmouth and Roanoke Railroad to Weldon—thence by Railroad to Wilmington, N. C.—and thence by steamboats 120 miles to Charleston, S. C. Think you we will be presuming too much, when we claim for the Portsmouth and Roanoke Railroad the importance of a *link?* No, sir, we will not be content with this hackneyed recommendation—I would you should consider this road, what in fact it is, a CORD of the *great circular chain* of improvement described by the Baltimore and Washington Railroad—the Potomac River, as far as Potomac Creek—the Richmond and Fredericksburg Railroad—the Richmond and Petersburg Railroad—and the Petersburg, Gaston, and Raleigh Railroad, and the Raleigh and Columbia, or Raleigh and Charleston Railroad. Now, sir, will you bear with me one moment, while I present a comparative view of the cost of these two lines of improvement? Take Baltimore as the starting point, and follow the line of the last mentioned route, and we have, first—

For the Baltimore and Washington Railroad, - - -	$1,500,000
Steamboat from Washington to Potomac Creek, - - -	100,000
Railroad from Potomac Creek to Richmond, - - - -	1,000,000
Richmond and Petersburg Railroad, - - - - -	550,000
Petersburg, Gaston, and Raleigh Railroad, - - - -	1,500,000
Raleigh and Charleston Railroad, (240 miles,) - - -	2,400,000
	$7,050,000

Cost of railroad and steamboat navigation from Baltimore to Charleston, via Washington, Richmond, Petersburg, and Raleigh.

We will now proceed on the route by Norfolk and Portsmouth.

For steamboats on the Bay, -	$200,000
Portsmouth and Roanoke Railroad, - - - - -	650,000
Roanoke and Wilmington Railroad, - - - - -	1,000,000
Steamboat from Wilmington to Charleston, - - - -	100,000
Cost of Railroad,	$1,950,000

and steamboat navigation from Baltimore to Charleston, via Norfolk, Portsmouth, Weldon, and Wilmington, N. C. Here is a result of *five millions one hundred thousand dollars* in favor of the route by the Portsmouth and Roanoke Railroad. Can *capitalists* hesitate one moment in which to invest? Is there any who doubt as to which route the traveller will give the preference?

I could add other facts equally as striking, such as greater economy and despatch in the travel by the Portsmouth line; and I have said nothing about the great Western Railroad which the Company have in contemplation, up the Roanoke by Danville to Evansham, and thence to intersect the Charleston and Cincinnati and the New-Orleans and Nashville Railroads. The importance of this work, not only in connexion with the Portsmouth and Roanoke Railroad, but as a medium of communication between Philadelphia and New-York, with the West and Southwest, I may at some other time attempt to point out—when I see if Mr. Editor receives this in good part.

I am, Sir,

Yours, very respectfully,

A. P.

We would invite the earnest attention of our readers to this clear and able document.

We are glad to see that, abandoning the contracted view of the subject taken by some, Mr. Mack places the matter on the broad ground of general utility,—asking for the advancement of the measure as favorable to the best interests of the State—insist. upon it as the only means of self-defence against the many rival improvements in Pennsylvania and Maryland.

The interesting nature of this report will, we are convinced, notwithstanding its length, obtain for it a careful perusal.

REPORT

Of the Committee on Railroads, on the bill from the Assembly, entitled "An Act to expedite the construction of a railroad from New York to Lake Erie," &c.

Mr. Mack, from the standing committee on railroads, to whom were referred the bill from the Assembly, entitled "An Act to expedite the construction of a railroad from New York to Lake Erie," the memorial of the mayor, aldermen and commonalty of the city of New York; the resolutions of the mayor and common council of the city of Brooklyn; and the petitions of sundry inhabitants of the counties of Westchester, Delaware, Genesee, Allegany and Cattaraugus, in favor of the passage of said act, with a remonstrance from the county of Orange, and so much of the Governor's message as relates to the same subject—

Reported:

The bill authorizes a loan of the credit of the State to the New York and Erie Railroad Company, of $3,000,000; for which amount stock is to be issued, bearing an interest of four and a half per cent. per annum, and redeemable any time after 20 years; for the payment of the interest of which, and the ultimate redemption of the stock, the said road and its appurtenances, and its tolls and income are pledged.

From the examination the committee have been enabled to give to the subject, they feel bound to accompany the bill, which has been submitted to their consideration, with an acknowledgment of their conviction, that the work which it is designed to aid is justly characterized by his Excellency, the Governor, as an "extensive and useful enterprize:" They accord, also, with him, in the views he has expressed, that "the magnitude of the undertaking the public benefits it will confer, and the deep interest felt by the inhabitants of the section of the State, through which this extensive line of communication is to pass," have induced "the company again to ask the aid of the Legislature," to facilitate and hasten its accomplishment.

A work of such magnitude, extending from the commercial metropolis, a distance of 480 miles, through the interior of the State to the inland seas, and connecting with those navigable waters which stretch through the boundless valleys of the fertile west, cannot fail, when completed, to produce the most important and beneficial results. It will infuse joy into the hearts of thousands of our fellow citizens, who, with honest and persevering toil, are contending against local disadvantages, excluded from a participation in the benefits of that invigorating system of internal improvements which has been proudly cherished as the emanation of enlightened minds, and the progressive source of the general prosperity. It will develop new resources of wealth and enterprize. It will impart a new stimulus to individual industry. It will check the tide of emigration, now flowing westward, beyond the limits of our State, and render the southern and western portions of our State desirable resting places to the hardy pioneers from the east. Their forests will be subdued; their population increased; their soil cultivated; and extensive agricultural improvements induced, where the energies of the husbandman have been hitherto depressed, by an inability to compete with those favored sections which have possessed, through the medium of the canals, more cheap and expeditious avenues to market.

The numerous petitions which are before the committee, most of which accompanied the bill from the Assembly, furnish evidence that in this light the project is regarded by the people of those counties through which the road is designed to pass, and of those favorably situated for connecting with it, by lateral railroads or canals, now in progress or in contemplation. Public feeling, indeed, appears to be deeply seated, and rapidly extending, in favor of this great and important enterprize. The number, the language, and the spirit of the petitioners, are commensurate with the vast object they have in view, and evince a zeal and perseverance which will not stop short of its accomplishment. They ask, what as citizens, as freemen, they have a right to ask—the aid and countenance of the State, in a most laudable endeavor. They expect, what they have a right to expect, that the representatives of an enlightened and patriotic people, of which they, themselves, constitute so large a proportion—that the administrators of a government, instituted for the general benefit—will yield a kind and respectful, if not a favorable, response to their petitions.

But, it is not upon the ground of extensive local advantages and improvements to be secured, nor of the just expectations and claims of those of its citizens who have hitherto derived few benefits from the vast expenditures of the general funds for the construction of public works, that the call upon the State, to promote the immediate completion of the undertaking, is alone predicated. It rests upon a broader basis. It appeals, not only to a spirit of reciprocity, as between the various sections of a great community, but to those elevated views and feelings which cherish, with a just pride, the high character, the influence and prosperity of the State, as a prominent member of the Union.

This State possesses a soil unsurpassed in strength and fertility, and adapted to almost every species of agricultural production. Its manufacturing facilities are unrivalled, and the treasures of its mountains and its forests have scarce begun to be developed. But to its commercial enterprise and advantages is it most materially indebted for its

unparalleled progression in population, wealth, influence and prosperity.

The city of New York, commanding one of the finest harbors in the world, and possessing a population peculiarly active and enterprising, has been the great mart of the Union for commercial operations, both foreign and domestic. Nor have the constituted authorities of the State, by the improvement of natural and the construction of artificial channels of communication, been unmindful of the means which were requisite to secure to its commercial emporium this desirable pre-eminence.

But the spirit of improvement is abroad—it is active and progressive. Its operations cannot be confined to narrow and sectional limits—to particular modes and methods—or restrained by that contracted policy whose views are bounded by the present. Other States have been stimulated by our examples. In a spirit of emulation, laudable in itself, and which it becomes us rather to counteract than to complain of, they are pressing forward for the prize which we have so long enjoyed.

"The memorial of the mayor, aldermen and commonalty of the city of New York," in favor of the passage of the bill now before your committee, emanated from a body of citizens whose experience, sagacity and vigilance entitle their views to respect, is, upon this point, and many others connected with the subject, worthy of serious consideration. It sets forth forcibly, and, as your committee conceive, truly, "that the construction of the proposed road has become indispensably necessary to this metropolis, in order to preserve and extend the lucrative commerce it has heretofore enjoyed with the populous and increasing territories of the west: that the existing channels of intercourse, rendered useless by the severity of our climate for a large portion of the year, have become in a great degree inadequate to that object:" and "that the energetic and persevering exertions of the canal and rail-road companies, chartered and powerfully patronized by the Atlantic States south of this port, to divert from the city and State of New York the great and expanding commerce of the western communities, demand immediate and corresponding efforts on our part to provide without delay new and additional facilities of commercial communication between this city and the interior." The memorialists express their entire confidence in the projected rail-road, and that it "has become an object of transcendant importance to the public, not only in maintaining the commercial advantages of this city, but also in affording to the large and increasing population within the interior of our own State the means of rapid, cheap, and regular communication with the seaboard." And, among many just and important considerations urged, and for which they refer to the memorial itself, the following has impressed itself with peculiar force upon the minds of the committee: "That in view of the position occupied by the State of New York in respect to the adjacent members of the National Union, the accomplishment of this work will become of paramount importance, by securing in time of war the means of rapid communication through our own territory for the military forces of the republic, and at all times the expeditious passage of the public mails and consequent diffusion of commercial intelligence."

The young, enterprising and rapidly increasing city of Brooklyn, similarly located, and relying for its prosperity upon the same commercial advantages and business sources as the city of New York, has responded to the foregoing views in the recent resolutions of its mayor and common council which were referred to the committee.

Your committee are, however, aware that many of the public works now in progress in the western States, and to accomplish which the governments of those States have made such large and liberal appropriations, are designed to connect with the works of this State, and that most of them have been originated with the direct object of an ultimate connection with the New York and Erie railroad. But there are others, particularly those of Virginia, Maryland and Pennsylvania, which are in their conception and progress purely of a rival character.—The streams of the western valleys, and the canals of Pennsylvania, Ohio, &c. are navigable for several weeks earlier in the spring, and later in the fall, than the canals of this State, and the railroads of those States, rapidly increasing in numbers and extent, may be used at all seasons of the year. To those western waters, to those channels of communication which we have regarded as the outlets and tributaries of our commerce, Pennsylvania, and Maryland, and Virginia, are pressing forward with rapid strides. To this great object the energies and resources of Pennsylvania have been especially directed. Aided by a gigantic moneyed institution, with which she has formed a recent alliance, her efforts are continued and increased, with a determined zeal, if not with a sound discretion. And however disreputable and ultimately dangerous we may deem the means to which she has resorted to accelerate the accomplishment of her object, we should not close our judgment to the conviction, that unresisted, they are adequate to the end in view.—"Money is power," and when auxiliary to ambitious designs and inveterate rival interests, can only be successfully counteracted by the persevering efforts of honest enterprise, of virtuous and patriotic energies. We may raise the voice of indignation, we may point the finger of reproach, but these expressions will avail us little. If the government of this State, to which the people have been taught to look for aid in these matters, remains indifferent, or worse than indifferent, to the rivalries that threaten us; if it not only refuses to lend or contribute its resources, but withholds its countenance and encouragement from the patriotic exertions of its citizens, what must be the natural, what the inevitable, consequences?

But, fortunately, as your committee believe, this State is not called upon to put forth any extraordinary exercise of its power, or to make any corresponding appropriation of its resources. The way is plain, and free from difficulties or dangers. It demands but the improvement of natural advantages. It claims but the exercise of that spirit of liberality and patriotism which have hitherto prevailed in our councils. The New York and Erie railroad, not merely in its ultimate, but by its *speedy* completion, covering as it will *the whole contested ground*, cannot fail to secure the anticipated advantage of those improvements which other States in the spirit of kindness and reciprocal intercourse are extending towards us, and to counteract the tendency and design of those works, the original object of which was to draw from this State its deeply cherished commercial advantages. Passing for seventy miles through the valley of the Delaware, traversing the broad valleys of the Susquehanna and its tributary streams, touching upon the head waters of the Allegany, and connecting with that noble expanse of inland waters, Lake Erie, at a point where its navigation within this State is for the shortest period obstructed by the ice of winter—this railroad must not only be the medium through which incalculable amounts of merchandize will pass from the city of New York to the far, the fertile and rapidly populating west, but must render tributary to it those channels of communication which would otherwise divert the trade from our southern and western counties, supplying through those channels the northern and middle counties of Pennsylvania with the merchandize, the salt and plaster of this State, and drawing to our markets in return much of the coal and other products of those regions.

Without, therefore, entering into further detail or illustration at present, the committee repeat their conviction, that this enterprize, from its magnitude and extent, and the important results which must flow from it in a commercial, physical and moral point of view, is worthy of the recognition and patronage of the State, as an important branch of its system of internal improvements. And they concur with his Excellency the Governor, that "the mode and amount of the assistance which the State ought to contribute towards the accomplishment of this work, deserves our mature deliberation, uninfluenced by any other views than such as are inspired by a comprehensive regard for the public good."

In relation, however, to the "mode" of this assistance: the friends of this project originally and zealously urged, that as a legitimate public improvement, the work ought to be undertaken by, and constructed at the expense of, the State. Had they persevered in this object, it is by no means improbable they would have eventually succeeded; for it cannot be believed that with an application so just extended before it, the Legislature would have authorized in preference the further expenditure of twelve or fifteen millions of dollars for the purpose of enlarging the Erie canal. But our constituents and fellow citizens who were the applicants in this case, ever ready to sacrifice their own wish to enlarged considerations of the general good, yielded to the objections which met them, that the treasury was impoverished, and that the State could not, until the obligations incurred for the construction of the canals were discharged, engage in a work of such magnitude, without incurring an increased and oppressive debt, and subjecting the people to taxation. The naked favor of an act of incorporation was finally granted to them, and a hope was held out and entertained, that the State would subscribe adequately to the stock. But, when a consummation of this hope was sought for and expected, they were met by the plausible if not reasonable objection, that it would be manifestly improper, and a dangerous precedent, for the State to become a copartner with an incorporated company.

As a dernier resort, therefore, those who have cherished a deep interest in the speedy accomplishment of this important work, have solicited assistance from the State, in the mode which the bill from the Assembly provides. And whatever opinion the committee may entertain as to the preference to which either of the first mentioned modes might, under other circumstances, be entitled, they consider that point as having been decided by our predecessors; and that it would be ungenerous and unjust to array the merits of exploded propositions to prejudice or defeat the only one which now remains to be adopted.

The principal points, then, which appear to remain for the consideration of the committee, are.—

1. Whether the company, which has been authorized to construct this work, and by whom and in whose behalf the proposed aid has been asked, has organized and progressed in good faith; whether its proceedings have been thus far judicious, and such as to justify a confidence that it intends to persevere in the undertaking, as rapidly as its pecuniary means will warrant, and with a view to, and a prospect of, its ultimate completion?

2. Will the entire road when constructed, or the several divisions thereof as required by the bill to be completed, be of a sufficient value, and yield an adequate revenue, to secure the State against liability to pay the interest, and against ultimate loss upon the proportionate amounts and the aggregate sum for which the credit of the State is proposed to be loaned?

The documents accompanying and referred to in the Governor's message, and others which the committee have had an opportunity of examining, furnish the material facts upon the first branch of inquiry,

From the report of the directors of the company filed in the office of the Secretary of State on the 12th January, 1836, which is verified by the oaths of the president and comptroller of the board, it appears that 23,621 shares of the capital stock (amounting to $2,382,100) have been subscribed, upon which instalments have been paid to the amount of

	$223,760 00
Interest on the sums deposited,	2,604 00
Total receipts,	$226,364 00
Paid out for various purposes,	36,621 38
Balance on hand, deposited at an interest of 5 per cent.,	$189,742 62

Since the report of Judge Wright, the engineer appointed by the State to survey the route of the road, which was communicated to the Legislature at its last session, the company have appointed him their chief engineer; and in August last associated with him in consultation two engineers of great experience and reputation, viz: *Moncure Robinson*, of Pennsylvania, and *Jonathan Knight*, of Maryland. To this board of engineers the surveys, and profiles, and the general plan of the whole work, were submitted. They also proceeded to view a difficult point of the proposed work, and their conjoint report, (which accompanied that of the directors above mentioned,) "in the belief of the directors, is entitled to full confidence in every respect."

In November last, the directors put under contract a comparatively difficult section of their road, extending from Calicoon creek to the village of Deposite, in the valley of the Delaware, a distance of about 40 miles. This section was taken by twenty six contractors of approved responsibility, several of whom had already commenced the execution of their respective portions of the work. These contracts amounted to $313,572, or $7,742 per mile, and exhibit a saving in the expense of graduating this section of $52,736, or 16 1-2 per cent. below the estimate as submitted (in Judge Wright's report) to the Legislature.

In closing the above mentioned report, the directors state, "that they have carefully and attentive-

ly examined the route of their proposed road, and compared its facilities of execution with those presented by other works of similar character, and by that examination, and especially by the results which they have recently obtained by actual experience, as is above stated, of the cost of graduation, they have become fully convinced that the whole work can be completed upon the plan recommended in the report of the board of engineers above referred to (including vehicles to the amount of five hundred thousand dollars) for a sum not exceeding, and probably falling considerably short of, six millions of dollars; that the road when finished will admit of the use of locomotive engines throughout its whole extent drawing loads of at least forty tons nett, and at a rate of speed which will reduce the time of passage within forty hours from the Hudson river to Lake Erie; and that if the necessary funds shall be secured without undue delay, the whole work can easily be completed and put in operation within five years from this date."

In their "first annual report" to the stockholders, Sept. 1835, the directors give a more detailed account of their previous operations, the surveys and estimates of the engineers, the general outlines and features of the road, and the ultimate advantages and income to be derived from it. The entire cost of a single track, from the Hudson to Lake Erie, with the vehicles and other necessary apparatus, including $525,482 for contingencies beyond the estimates of the engineers, is stated at $6,000,000, requiring a nett revenue of $360,000 to produce an interest of six per cent. per annum upon the investment. "The final accomplishment (they say) of this enterprise has only become a question of time;" and the assistance of the State is deemed necessary to satisfy the expectations of the people in reference to it, to hasten its completion, and the more speedily and certainly to secure the extensive commercial advantages and public benefits which must result therefrom. And they add: "The board of directors, upon whom has devolved the responsibility of conducting this important work, believing it to be the only mode of rescuing the interests of this city from the danger in which they are placed and feeling that the exigency of the case demands their best efforts, PLEDGE THEMSELVES TO THE STOCKHOLDERS AND TO THE COMMUNITY, *to spare no exertions on their part to carry the enterprize steadily onward to a successful issue.*"

With these facts and declarations before them—with a personal knowledge that many of the directors and stockholders of the company are gentlemen of worth and intelligence, whose characters for pecuniary responsibility, business probity and moral integrity, are above suspicion or reproach—the committee cannot entertain a doubt, that the stock as stated has been subscribed, and the road commenced in good faith. And they believe that full confidence may be reposed in the directors faithfully to expend all moneys which may be entrusted to them for the purpose, and in the intentions and persevering efforts of the company to prosecute the work with all practicable and prudent despatch to its final completion.

In respect to the probable revenue of the road, or of its various portions when completed, upon which reliance may be placed to meet the payment of interest, and finally to reimburse the principal of the stock loaned, the committee are aware that it is a point upon which there have been, and may still remain, honest differences of opinion. Works of this description are generally productive in proportion to their extent and utility. If they their facilitate travel and commercial intercourse, and are in these respects without competition—if they furnish new, cheaper and more expeditious channels for the conveyance of agricultural productions and manufactured articles to and from market—and embrace a range of territory in which these productions are numerous, or may be materially increased—their utility is established, and a profitable return inevitably follows. But by what rule of mathematics can we measure the benefits or the income of any projected work of internal improvement, in a young, a fertile and increasing country like this? We may reason from analogy—we may judge from comparison—we may find in the experience of the past a guide to direct us in our anticipations of the future: but the resources of nature, which chance, or the industry of man may develop—the inventions and improvements which genius and enterprize may accomplish, and the results which may follow them—are not to be determined by the rules and principles of the exact sciences: they are not to be scanned by prophetic vision, or to be comprehended by human foresight and sagacity.

When the Erie Canal was projected, and commenced, its enemies were more confident in their predictions against, than were its friends in their anticipations in favor of, its productiveness. The advocates of this great work were at a loss for data upon which to found their estimates of revenue; and the statements upon which they ventured have fallen far short of constituting a just basis for the reality. Had this canal been adequate, and had its effects been, to accommodate only the business of the country in its then existing state of improvement, and the natural and unaided increase of its population and resources—had not its construction operated like a charm to develop the resources, excite the enterprize and increase the population, wealth, and agricultural products of the territories through which it passed, far beyond what was anticipated or predicted,—it would not to this day have yielded an income sufficient to pay the interest on the cost of construction and the expense of keeping it in repair. The sources of its revenue have been principally those of its own creation. The benefits which it has so widely and liberally dispensed have returned upon it, and a proportionate income is the natural result.

To assert that the New York and Erie Railroad will prove equal in commercial importance, in general utility, and in consequent revenue, to the Erie canal, may be assuming for it a higher character than it merits. But that its prospects in these respects are not inferior to those claimed for that great work in its incipient stages, would not be an unreasonable position.

Your committee have examined briefly the general features of the road, in illustrating its character as a public improvement. They will recur to these features, as applicable more particularly to the subject of revenue.

By the maps and profiles of the surveys, it appears that "more than four-fifths of the whole line of 483 miles lies immediately upon the banks of rivers and their tributaries: that one uninterrupted section of *one hundred and twenty-five miles long* is situated on the margin of the Susquehannah and its principal branches; another, of *eighty-three and a half* miles, along the Alleghany and its tributaries; one of *sixty-nine* and another *thirty-nine* miles along the Delaware and its principal confluents; and that other minor sections along the smaller streams, including nineteen miles in the valley of the Ramapo, make up a total amount of at least *four hundred and twenty miles*, in which the route of the road obtains the advantage of following the margin of water corses. Of the remaining portions of the line, embracing in the aggregate about sixty miles in length, where the route crosses the valleys of the streams more or less transversely, about thirty miles are comprised in different sections within the counties of Sullivan, Orange, and Rockland, about twenty miles between the head waters of the Delaware and those of the Susquehannah and Chenango and the remaining ten miles in the descent to Lake Erie."

From this topographical view of the route of the road, it will be seen that it embraces a range of country of most favorable aspect, whether taken in reference to the facilities it presents for a cheap construction of the work, or to its capacity of contributing to the revenue of the road in the transportation of persons and property.

The question of the mechanical capacity of the work to transport in large masses the products of the country with cheapness and rapidity, appears to be abundantly settled on the consultation of eminent engineers, whose report is among the documents referred to by his excellency the Governor. The favorable result obtained upon that consultation, furnishes abundant evidence of the capacity of the road, and is summed up by the board of directors in their annual report as follows: "*That loads of sixty tons gross, (or, deducting the weight of cars forty tons nett,) may be drawn in a single train from the Hudson to Lake Erie, and at an average speed of from twelve to fourteen miles to the hour; that with the rate of speed augmented one half, a locomotive engine will nevertheless suffice to transport two hundred passengers and their baggage; that no stationary engine will be requisite on any part of the work; and that one, or at most, two auxiliary engines only will be requisite on the whole length of the line.*"

As it is, therefore, sufficiently demonstrated that the road, when constructed, will be capable of transporting property and persons in large quantities, and with great expedition, the question again recurs, what amount of business it may reasonably expect, and what amount of revenue will be derived therefrom?

The route of the road traverses no less than ten of the counties of this State, viz: Rockland, Orange, Sullivan, Delaware, Broome, Tioga, Steuben, Allegany, Cattaraugus and Chautauque, embracing about one-third of the territorial area of the State, and already numbering a population of 293,408 inhabitants; and this, too, without including the large portion of the wealthy and populous county of Ulster lying in the vicinity of the route. And it is not unworthy of notice that the progress in population of that important division of the State, and especially in that section lying between the Delaware river and lake Erie, has been within the last five years more rapid than in any other portion of the State of equal extent. The tide of emigration, which for twenty years had swept by them, seems now, in spite of unequal legislation, to be turning into those secluded counties, demonstrating how unfounded are the prejudices which would deny to this wide spread portion of our territory the capability of sustaining a prosperous and increasing population.

Adjacent to the tier of counties thus traversed by the line of the road, lies that flourishing inland district, embracing the populous counties of Otsego, Chenango and Cortland, situated midway between the route of the Erie canal and that of the Erie railroad, and occupying the lands around the head waters of the Susquehannah. And to those who may have been led to believe that the district traversed by the Erie railroad lies in a high, cold and mountainous region, it will be useful to state, that the average level above the tide of the three counties last mentioned lies several hundred feet higher than the average level of the road. Proceeding westwardly, the route approaches the immediate vicinity of the counties of Tompkins, Yates and Livingston.

The population of the extensive district embraced in these six intermediate counties, now amounts to 206,206 inhabitants; and it will not be deemed extravagant to estimate, that at least one half of this number will contribute to the business and revenue of the road. It may also be reasonably expected, that during that portion of the year when canal navigation is closed, considerable portions of the counties of Cayuga, Seneca, Ontario and Genesee, will seek facilities of intercourse with the seaboard by resorting to this channel of communication.

It will further be observed, that the line of the road, which is generally from 80 to 100 miles south of the Erie canal, frequently approaches very near to the eight northern counties of the State of Pennsylvania, comprising an extensive district, which has hitherto suffered like the southern counties of this State, from their difficulty of access to market; but which now exhibit, by their recent and rapid progress in population, the effects of the expanded system of improvements of that State. There can be no doubt, but that this portion of territory, animated in its industry by the expenditures incurred in the construction of the public works of that commonwealth, will, in common with the adjacent counties of our own State, make rapid strides in the development of its resources and the increase of its population; and that the inhabitants of those eight northern counties of Pennsylvania, now exceeding 100,000, will, within ten years, be more than doubled in number.

Without, however, indulging in any anticipations of the immediate increase in wealth and population, which must inevitably follow the disbursement of $6,000,000 in the construction of the work, the population of the districts, which will at once contribute to the business and revenue of the road, may be estimated as follows:

In the 10 southern counties of this State, as above stated,	293,408
In the 6 middle counties, (one half,)	103,103
In the 8 northern counties of Pennsylvania,	100,000
Total,	496,511

The pursuits of this population are mostly agricultural. They send to the seaboard the products of their fields and forests, and receive, in exchange, the various fabrics and materials comprised, under the general term, "merchandize." As a general rule, the consumption of merchandize, (as the term is here explained,) by any given population capable of exporting products, is in the ratio of at least 25,000 tons to every 500,000 inhabitants; and the products (or exports) by which this merchan-

dize shall be purchased, on account of their superior weight in proportion to their value, will constitute a tonnage of at least 4 to 1, in comparison with that of the imported articles.

The *imports*, therefore, of the great communities included in the foregoing estimate, now numbering 436,511 inhabitants, even without allowing for their inevitable and rapid increase during the progress of the work, will not be less than

Imports, ...	25,000 tons.
And their corresponding *exports*,	100,000 "
Total,	125,000 "

It will be apparent, that this chain of communication, connected, as it will be, on the one hand by the Chenango Canal, the Ithaca & Owego Railroad and other lateral communications now in contemplation, with the salt, lime, and plaister districts of our State; and on the other, by the public and private works now in active progress in the northern counties of Pennsylvania, with the anthracite and bituminous coal, and the iron of that great mineral region, will secure and accelerate a vast amount of commerce along the middle division of its line, purely internal in its character,—contributing, at the same time, to unite in harmonious connexion the two great canal and railroad sections of our State, and affording to both the means of beneficial and profitable intercourse.

The amount of this interior transportation, not connected with the seaboard, and to be conducted upon the gentle grades, fortunately presented on the very divisions of the road where these bulky articles will need to be conveyed, may safely be estimated at not less than 50,000 tons. Making, with the preceding items, an aggregate of 175,000 tons.

When it is considered that the total tonnage last year of the Erie Canal exceeded 600,000 tons, it will be admitted that the above estimate of 175,000 tons is by no means extravagant. Indeed, the committee deem it much within the limits of truth; and in proof thereof, refer to the fact, that the transportation last year on the Baltimore & Ohio Railroad, reaching only 82 miles into the interior, and extending the means of transportation to a population not exceeding 150,000 in number, amounted to 72,634 tons.

But the most striking feature, in illustration of this part of the subject, remains to be presented. It is one to which the committee have already adverted, but which they feel justified in presenting more at large, under a deep conviction of its magnitude and importance, not only in respect to the pecuniary revenue of this great work, but also to its effects upon the commerce of our State and its metropolis, with the vast communities lying beyond our western borders, and rapidly peopling the great valley of the Mississippi. The committee allude to the Allegany river; and they cannot but wonder, that public attention should not have been sooner attracted to the commercial importance of that valuable stream, as a channel through which to control the immense trade of that portion of the west watered by the Ohio and its tributaries.

During this investigation, the committee have become fully satisfied that in the Allegany river the State of New York possesses a source of internal navigation unequalled during its continuance for cheapness, security and expedition; that its waters, gathered among its sources in Pennsylvania, become swelled by the various branches it receives within our limits to a deep, smooth and capacious river, flowing over a pebbled bottom, unobstructed by rocks or sand bars, with a swift, though uniform descent from our State line 192 miles to the great western emporium of Pittsburgh; that the navigation of this stream remains open frequently into mid-winter, and during this present year was not closed until after the 20th of January; that it invariably opens within the first ten days of March, and often before that time, and always remains open and perfectly available for the purpose of descending navigation for at least six, and frequently for ten or twelve weeks in the spring; and, finally, that merchandize placed on its banks may be delivered in the warehouses of Pittsburgh in three days from the State line, and at an expense not exceeding fifteen cents per hundred pounds.

It must be apparent how important it is to this State, and particularly to the merchants of our commercial metropolis, to have this navigation, aptly termed by our neighbors of Pennsylvania *"the key of the Mississippi,"* placed within their control. Opening as it does into the immense basin drained by that mighty river, it will enable our own metropolis to pour through its deep, safe and rapid channel in the early spring, the supplies for a population already exceeding three millions of human beings.

It is indeed difficult to fix bounds to the pecuniary value of such an avenue of trade, augmenting, as it must to a vast extent, the commerce and riches of our capital. It may, however, be safely computed, that of the 150,000 tons of merchandize annually sent from the different points on the seaboard into the great valley of the Ohio, at least 30,000 tons will find its way through this expeditious, cheap and early channel of conveyance.

It is also fortunate, that in the vicinity of the Allegany river, nature, in lavishing her bounties upon our favorite State, has placed the finest, the most extensive and valuable supply of pine lumber existing in the United States. This will afford the locomotive machinery and vehicles employed in transporting the merchandize from the city of New York to the banks of this river, a constant, steady and profitable trade, equal in amount to the ascending tonnage.

How far the connexion of the road with the waters of lake Erie, most important in many points of view, will contribute to its sources of revenue, the committee will not now undertake to estimate.—They will refer but to one other source, too considerable in its amount to be omitted. When the speed and facilities of travel which railroads afford are considered, together with the interesting fact, that by this route passengers may travel from the seabord to lake Erie in *forty hours*, and when the several links in the great chain of communication now constructing in the western States shall be completed, from Lake Erie to the Gulf of Mexico in *four days*, and from New York to New Orleans in *six days*, there can be no doubt that this road will become an immense thoroughfare for the transportation of passengers. It will be difficult to anticipate the number of persons who will annually be conveyed upon it, or the revenue to be derived from this source of income. If, however, it be true, as asserted, that 200,000 persons annually pass by the present modes of conveyance between Albany and Utica, we have some data upon which to found an estimate, and it is not unreasonable to compute that 100,000 persons will annually pass over this great avenue of intercourse when it shall be completed.

But it was not the design of the committee to present a general detail of estimates, or of the sources of revenue. They have embraced, to a greater extent than they originally intended, those prominent facts and features which seemed requisite to guide their own conclusions, and to lead the Senate to examine this interesting and important branch of the subject. And they now present, with full confidence that it will fall short of, rather than exceed, the results to be ascertained by experience, the following summary estimate of the revenue of the road, derived from the foregoing data:

Nett profit arising from the transportation of 25,000 tons of merchandize sent into the interior from the seaboard, at $4 per ton, ...	$100,000
— of 100,000 tons of products sent to the seaboard in return, at $2.50 per ton, ...	250,000
— of 50,000 tons of interior transportation on the middle sections of the line, at $1 per ton, ...	50,000
— of 30,000 tons of merchandize sent to the Allegany river, for exportation down the Ohio valley, at $8 per ton,	240,000
— 30,000 tons of lumber, &c., in return, at $4 per ton, ...	120,000
— of 100,000 passengers, at $3 each, .	300,000
Total, ...	$1,060,000
The above sums are estimated as the clear profits of transportation, after deducting the current expenses, including the wear and tear and repairs of vehicles. The cost of repairing the railroad itself will vary from $250 to $300 per mile for each track. If the single track only is laid down, the amount at $300, for 460 miles, (to which length the road has been reduced by recent improvements in the line,) will be	138,000
Leaving a nett revenue of	$922,000

But if an additional track is constructed, (as it is not improbable the increase of business may require within five years,) then the expense of repairs will be increased $138,000 annually, but will be met by a corresponding increase of revenue.

And when it is considered that the nett revenue of the Erie canal, open only seven months in the year, and affording no facilities for the rapid conveyance of passengers, amounts to more than a million of dollars, and that the profits earned by the 10,000 persons engaged thereon in transportation, cannot be less than an additional sum of $500,000 annually, it will not be deemed unreasonable to conclude that the Erie railroad, when completed from the ocean to the great western waters, open and available with but few days of interruption throughout the whole year, will yield the nett revenue of $922,000, above stated. If so, it must afford adequate security to the State, for the proposed loan of its credit, to the full extent.

Nor is the security of the proposed loan dependent upon the completion of the entire road. The bill is strongly precautionary, in its provisions.—It authorizes the issuing of two millions of the State stock, in amounts proportioned to sections of the road which are required first to be finished; and with the laudable and double purpose of securing the State from loss, and ensuring the ultimate and speedy completion of this great and beneficial improvement.

It provides,

1. That $600,000 of the stock shall be issued to the company, when it shall have constructed a single rail-way from the Delaware and Hudson canal to the intersection of the Chenango canal, (near the village of Binghamton,) a distance of 146 miles, and requiring an expenditure, according to the estimate of the engineers, of $1,646,826.

2. That the amount of $700,000 shall be thus issued, when a section is finished in the same manner, from Binghamton to the Allegany river, a distance of 181 miles, and requiring a further expenditure of $1,322,989.

3. That the amount of $300,000 shall be thus issued, when a section shall be finished in like manner from the Allegany river to Lake Erie, a distance of 79 miles, and requiring a further expenditure of $640,547.

4. That the amount of $400,000 shall be thus issued, when a section shall in like manner be finished from the Hudson river in Rockland county, to the Delaware and Hudson canal, a distance of 77 miles, as the route of the road runs, and requiring a further expenditure of $1,064,156.

[These several items of expenditures, amounting in the aggregate to $4,674,518, are independent of the sums of $300,000 for engineering and expenses, $500,000 for cost of vehicles and apparatus, and of $525,482 added for contingencies, which, with the items above stated, make the entire cost of the road, with a single track complete, (and graduated for a double track,) including vehicles and other necessary apparatus, $6,000,000.]

And,

5. That a *single track* being thus completed for the whole distance, and two millions of stock issued, the remaining amount of $1,000,000 shall not be advanced until a *double track* shall be constructed from the Hudson river to Lake Erie, requiring, by the same estimate, a further expenditure of $1,857,000.

The first division above stated commences at a point about 35 miles west from the village of Newburgh, on the Hudson river. It traverses the valley of the Delaware, reaches the valley of the Susquehanna near where that river emerges from the wealthy, populous and productive county of Otsego, a short distance below the mouth of the Unadilla, down the valley of which the contemplated Utica and Susquehanna railroad will pass, and intersects the valley of the Chenango and the Chenango canal, at the flourishing village of Binghamton.—Connected at one extreme with the Hudson and Delaware canal—passing through a territory productive in many articles of agriculture, and the vast resources of which in the productions of the forest furnish so important an item of tonnage, and the country that produces which consumes a greater amount of merchandize in proportion to its population than a purely agricultural district,—your committee cannot doubt—they will not so depreciate the enterprise and resources of that section of the State, as to doubt, that a railroad passing through such a district for a distance of *one hundred and forty miles*, will yield a revenue sufficient to pay the interest at the rate of 4 1-2 per cent. per annum, upon $600,000, (which is $27,000;) or that an expenditure of *one million six hundred and forty thousand dollars* in the construction of such road, would not be adequate security for the ultimate repayment of that amount.

The second division above stated, commencing at Binghamton, extends the road from the Hudson and Delaware canal to the Allegany, the importance of which point, both as respects its commercial advantages and the question of revenue, your committee has heretofore endeavored to illustrate. If their views and estimates in reference to this point of communication, and the intermediate territories, are correct, nothing more need be advanced by them upon this branch of the subject. The other divisions comprise the two extremes, complete the great chain of communication, and secure the important results which the committee believe must flow from the consummation of this great work.

They will remark, however, that many short railroads, and short sections of extensive works, have within themselves proved productive. The section of 82 miles of the *Baltimore and Ohio railroad* which was then completed, produced last year a *nett revenue* of $108,000. The *Boston and Worcester* railroad, which is 40 miles in length, produced a nett revenue of $95,000. The *Philadelphia and Columbia* railroad, 80 miles in length, competing at the same time with the Schuylkill and Union canal, and good turnpike roads, produced a nett revenue of $97,000. And the *Ithaca and Owego* railroad, 29 miles in length, which will intersect with the New York and Erie railroad at Owego, under all the disadvantages of its unfinished condition, produced the first year a nett income more than sufficient to pay the interest upon any proportion of the proposed loan which would rest upon any section of the same miles in length of the New York and Erie railroad.

In every point of view, therefore, whether the work be considered as a whole or in detail, it cannot fail of being adequate security for the amount for which the bill provides that the State, by the loan of its credit, shall become responsible.

But it may be asked, if the anticipations of revenue from this work are well founded, why is the aid of the State required for its construction? Why do not capitalists subscribe for the stock, and prosecute the work as a profitable investment? The answer is this: Wealth is so equally diffused in this country that few possess a large surplus capital, and a project involving an expenditure of 6,000,000 of dollars is well calculated to cause men of moderate resources to hesitate. The field of enterprize is far more ample than the means to improve it; and objects of investment well known, and proved by experience to be profitable and safe, are continually presenting, sufficient to absorb all the surplus wealth of the country. No work of internal improvement of magnitude has been prosecuted in this country by individuals or incorporated companies, without the aid of the General or State Governments. To undertakings of this description, Congress has authorized subscriptions, and extensive tracts of the public lands, the common property of the people, and large sums from the national treasury have been appropriated to aid the construction of roads and canals in the western States and territories. But the bounties thus dispensed have been four-fold returned to the treasury, by the increased wealth and population of those territories, requiring vast amounts of foreign merchandize, upon which import duties were collected, and by the enhanced value imparted to the public domains.

The State of Maryland has loaned the public credit to the Chesapeake and Ohio canal company to the amount of two millions of dollars, and to the Susquehannah railroad company for one million of dollars. The State of Virginia, by large loans and subscriptions to various canal and railroad companies, has contributed efficiently to the prosecution of works of internal improvement within her territory.

But this policy is by no means a new one, in the history of the legislation of this State; nor do your committee deem themselves called upon to defend its propriety, when applied to objects of unquestionable utility. The loan to the Hudson and Delaware canal company forms the only precedent worthy of consideration. The distinguished citizen who then presided over the fiscal department, and who is the present able and patriotic Governor of the State, in a favorable report relative to the security for that loan, submitted to the Legislature January 27th, 1829, after observing that individuals of much private worth had embarked their fortunes in that great enterprize, and were struggling with their last difficulties, remarks: "The Comptroller would be extremely unwilling, by an excess of caution, to increase, if his reserve could in crease, these difficulties, or delay the completion of a work, which, if advantageous to the spirited individuals embarked in it, must be so to a portion of the citizens of this State who have not exposed themselves like these individuals to the hazards of the undertaking. On the other hand, his duty to the State urges him to great circumspection in giving encouragement, by speculative opinions, to the investments of its funds, or the assumption of burdens upon expectations that are not likely to be fully realized. While he would be solicitous to guard the State from hazard and ultimate loss, by lending its money to unpromising adventures, he would be willing to see it seconding individual efforts in undertakings that improve the condition of any portion of its citizens, and exalt its character for public spirit and hardy enterprize." (*Assembly Jour. 52d sess.* 1829, *p.* 216.)

With these enlarged and liberal views, your committee fully concur. They are applicable to the case before them; but without intending to disparage the work to which these views were applied, which has been and must continue to be one of much commercial utility, they cannot forego the suggestion, how infinitely more important, in a public point of view, is that extensive undertaking for which a similar act of recognition and encouragement is now solicited.

The measure proposed imparts to this great enterprize, and deservedly, a public character. It make the *credit of the State* the *credit of the company*. It ensures for it the confidence of foreign capitalists. It stimulates the doubting or slumbering energies of our own enterprising citizens; and thus, without the advance or the hazard of a dollar of the public money, secures its final and speedy completion.

Deeply impressed, therefore with, the correctness of these views, and the importance of the object—believing it to be in conformity with the just expectations of a large and respectable portion of the citizens of this State, and without hazard of pecuniary loss to its treasury—consistent with that equitable and enlightened public policy for which the State has heretofore been distinguished, and with that "comprehensive regard for the public good" which his excellency the Governor so properly inculcates, the committee respectfully recommend the passage of the bill.

STATEMENT OF THE RECEIPTS AND DISBURSEMENTS OF THE BALTIMORE AND OHIO RAILROAD COMPANY.

Baltimore, Feb. 15, 1836.

To Samuel Smith, Esq., Mayor:

Sir,—The undersigned beg leave to hand you a communication received by them from Philip E. Thomas, Esq., President of the Baltimore and Ohio Railroad Company, accompanied by two statements; the one giving a detailed account of the receipts and disbursements of the Baltimore and Ohio Railroad Company, and the other a similar exposition of the Branch to Washington City, from the organization of both up to the first of January, 1836.

Believing, as intimated by Mr. Thomas, that "a clear exhibit of the pecuniary concerns of the Company" would be satisfactory to the Mayor and City Councils, we most respectfully submit the same to your and their consideration.

Respectfully, your ob't serv'ts,

John Kettlewell,
Rezin Wight,
City Directors in the B. & O. R. Co.

Baltimore, Feb. 10, 1836.

Gentlemen,—Presuming it might be satisfactory to you, as representatives of the City of Baltimore, in the direction of the Baltimore and Ohio Railroad Company, to be able to lay before the Mayor and City Council, a clear exhibit of the pecuniary concerns of the Company, I take leave respectfully to hand you a statement of all the monies received, and all the disbursements made, by it, from the time of its organization to the end of the last quarter, terminating on the 31st December, 1835.

Upon reference to the original estimate for the branch Railway to Washington, and which will be found in the 6th Annual Report of the President and Directors, it will be perceived that the cost of the road was estimated at $1,555,529 47. Circumcumstances, however, having delayed the commencement of the work for one year, the time was employed in making more minute and extended surveys, which resulted in a considerable modification of the location as it had first been proposed, and a new estimate of the cost, based on the improved line, was submitted in the year 1833, amounting, as will be seen on reference to the 7th Annual Report of the President and Directors, to the sum of $1,459,896 38. Upon this estimate its actual construction was then undertaken.

The road was finished with a single set of tracks the entire distance, within less than two years from the time of its commencement, and with *two sets of tracks* through, all the deep cuts, embracing about five and a half miles, leaving about twenty-four and a half miles of the second track yet to be laid; when that is done, the entire work will be completed as originally projected. The cost of the road for graduation and masonry, and constructing the rail tracks as far as they have been laid, including all materials, is $1,228,821 43, and it is estimated that the additional tracks to be laid on the twenty-four and a half miles, as above stated, will be $174,499 43, making the entire cost of the road for graduation and masonry, and laying the rails, $1,403,321 36, being less than the estimate upon which it was undertaken, $56,575 02, notwithstanding the tracks *are extended into the city of Washington*, beyond the point for which the estimate was made, and the Company were also burthened with the additional cost of numerous and extensive landlips, which have precipitated many thousand cubic yards of earth into the roadway, throughout several of the deep cuts along the line, and notwithstanding also the serious interruption to which the work was unhappily exposed, by the repeated riots on the road, which greatly retarded its progress, and involved extraordinary expenses to the amount of several thousand dollars. At the same time I may add, it is universally conceded, that this road has been constructed in as substantial, permanent, and efficient a manner, as any railroad in the United States; and the travel on it has never, in any condition of the weather, or other circumstances, been suspended a single trip since the day it was opened.

Although it will be perceived the operations and business upon the main line of the Baltimore and Ohio Railroad have been steadily increasing every year since the opening of that road, yet hitherto no adequate indication has been afforded of what would be the results of the work were it completed to the points originally contemplated. No one acquainted with the vast commerce and travel that will pass over the road when it shall reach the Ohio, and become connected, as it then would be, with the trade of that river, and the numerous Railroads and Canal communication already projected, or in actual progress, ramifying in every direction, and connecting themselves with the Northern Lakes and the immense regions lying to the west and south of those waters, can doubt that while this road would at once become the channel of perhaps the greatest inland

commerce in the world; it would realise a liberal profit upon the capital invested, and annually bring millions of wealth into our city.

Assuring you of my sincere esteem, I am, very respectfully, your friend,

PHILIP E. THOMAS,
Prest. Balt. and Ohio Railroad Co.

To John Kettlewell and Rezin Wight, Esqs., Directors, &c. &c.

EXHIBIT

Of the entire receipts and disbursements (appertaining to the capital and construction of the Road) of the Baltimore and Ohio Railroad Company, from its first organization up to the 1st of January, 1836.

The Company have received $75 per share on 4000 shares of stock,	$3,000,000 00
$25 additional on 2 shares paid in full,	50 00
	$3,000,050 00
The Company have further received $25 additional per share in full on 10,000 shares, owned half by the State and half by the city, and advanced to the Company at 5 per cent. per annum, interest,	250,000 00
Total amount of capital paid in,	3,250,050 00
The Company have borrowed, at 6 per cent. interest,	1,000,000 00
Of which they have invested in 9,388 shares of the Washington Branch Railroad stock,	938,800 00
	61,200 00
And applied the balance to the general purposes of the Company—making a total of	3,311,250 00
Which has been expended as follows, viz:	
For graduation, including the $266,000, paid in the compromise with the Chesapeake and Ohio Canal Company,	1,234,952 93
For masonry,	342,682 84
	1,577,635 77
For expense of laying railway tracks, including the costs of the materials,	944,705 20
For right of way and damages,	107,073 14
For reconnoissances of the entire country from Baltimore to the Ohio river, and extending from the waters of the Tonghogany to the great Kenhawa, including surveys and instruments,	65,974 62
For contingent expenses, viz: for obtaining the charters in Maryland, Virginia, and Pennsylvania; obtaining subscriptions to the stock, and organizing the Company; of various committees to Annapolis, Washington, &c.; mission to England; office expenses, salaries, advertising, printing, &c. &c.	86,166 79
For law expenses, including fees of counsel,	34,048 46
Real estate and construction of depots,	203,150 01
Locomotive steam power,	19,468 45
Passenger cars, (about 52,)	34,244 92
Burden cars, (1,033,)	165,202 62
Horses, mules, and harness,	46,985 78
Total expended on items, appertaining to capital,	3,284,655 76
Besides the above, the Company have paid at different times a large amount of interest, of which there still remained on the 1st October, 1835, to be returned out of the revenue, the sum of	43,115 14
Deduct amount since expended on account of construction, and taken out of revenue,	16,520 90
	26,594 24
	3,311,250 00

Errors excepted.

Office of the Baltimore and Ohio Railroad Company, 1st Jan., 1836.

J. J. ATKINSON, Secretary.

Second—As to the Revenue of the Company.

The gross amount received during the year ending 1st October, 1832,	$183,053 21
1833,	191,678 35
1834,	222,973 92
1835,	263,368 10
Quarter ending 1st Jan., 1836,	72,163 62
	933,237 20
The expenses of transportation during the same period were, for the year 1832,	$98,753 01
1833,	83,880 75
1834,	95,344 78
1835,	108,179 50
Quarter ending 1st Jan., 1836,	36,044 60
	422,102 64
	511,134 56
Received on account of stock forfeited,	560 25
	511,694 81
Giving an amount of $511,694 81 revenue, which has been appropriated as follows, viz:	
To the payment of interest,	117,553 36
Repairs of railroad and machinery,	116,795 16
Towards providing for the wear and tear, depreciation and renewal of locomotives, cars and horses,	129,251 16
To pay dividends,	144,138 23
To pay office expenses and salaries,	964 61
To repay old interest,	16,520 60
In the hands of the disbursing officers,	4,296 03
	520,529 45
Balance of cash account for money over expended,	17,824 64
	511,694 81

Errors excepted.

Office of the Baltimore and Ohio Railroad Company, 1st Jan., 1836.

J. J. ATKINSON, Secretary.

EXHIBIT

Of the entire receipts and disbursements (appertaining to the capital and construction of the Road) of the Washington Branch of the Baltimore and Ohio Railroad, from its commencement to the 1st January, 1836.

The Company have received $100 per share on 15,000 shares of stock,		$1,500,000 00
Which has been expended as follows, viz:		
For graduation,		$684,499 90
masonry,		287,389 26
		$971,889 16
For expense of laying the railway tracks, including cost of all materials,		256,932 27
		1,228,821 43
For right of way and damage,		94,283 47
surveys,		30,979 56
Contingent expenses, viz: For obtaining the charter; various committees to Annapolis and Washington; office expenses, including salaries, advertising, printing, &c.		7,165 41
Law expenses, including fees of counsel,		2,605 00
Real estate and construction of depots,		33,021 52
Locomotive steam power,		18,428 54
Passenger cars,		33,167 25
Burden cars,		11,620 00
Making a total of		$1,460,092 28
Unexpended on account of capital,		39,907 82
		$1,500,000 00

Errors excepted.

Office of the Baltimore and Ohio Railroad Company, 1st Jan., 1836.

J. J. ATKINSON, Secretary.

Second—As to the Revenue.

The Company have received		$64,676 47
Less State tax,		$12,866 52
—— amount credited the Balmore and Ohio Railroad Company for the use of 8 miles of their road,		11,823 50
		24,690 02
		39,986 45
Deduct expenses of transportation,		11,987 23
		27,999 22
Giving an amount of revenue of $27,999 22, which will have to be appropriated as follows, viz:		
To the payment of interest,		16,482 68
Repairs of the road and machinery,		10,500 61
Pay office expenses and salaries,		718 46
		27,701 75
Leaving a balance on hand of		297 47
		27,999 22
Amount in the hands of disbursing officers,		21,190 06

Balance of cash in hand,	18,717 76
	39,097 82

Errors excepted.

Office of the Baltimore and Ohio Railroad Company, 1st Jan., 1836.

J. J. Atkinson, Secretary.

RAILROAD AND CANAL INTELLIGENCE.

NEW-ENGLAND.

Worcester Railroad.—The petition for a Railroad from Worcester to Hartford, presented to the Legislature of Massachusetts, has been referred to the next session by the House of Representatives.

NEW-YORK.

Utica and Schenectady Railroad.—The grading of this road is now very nearly completed; the culverts and stone work are finished, and the bridges in so great a state of forwardness, that they will be in readiness for the reception of the rails by the first of May. The superstructure, including the rail plates, for a distance of 15 miles, was perfected before the commencement of winter, and arrangements have been made to recommence laying the rails at an early period in the spring, and in a manner so vigorous as to insure the opening of the road throughout the whole line early in August next. Eight engines, from the best factory in the country, have been ordered; and from the immense travel which is fairly to be anticipated, we have no doubt they will have ample employment. Indeed such a thoroughfare is no where else to be found in the Union; and what is still more extraordinary, it is placed by the formation of the country almost beyond the reach of competition.

It is proposed by some to terminate the Erie Canal below the Overslaugh.

PENNSYLVANIA.

Reading and Brandywine Railroad.—The Commissioners of this Road offer the stock to the public. From their circular we obtain the following information:—

The Reading and Brandywine Railroad is intended to connect the Schuylkill navigation, at the borough of Reading, with the Pennsylvania Railroad at Downingtown, a distance of 33½ miles. One half of the Road will traverse the valley of the Brandywine. Several intersections will be formed with the various contemplated improvements.

VIRGINIA.

The Legislature have granted an appropriation for the relief of the Rappahannock Canal Company.

Winchester and Potomac Railroad.—The following rates of travel and transportation, on the above Railroad, have been established by the Board of Directors, and are made public, in the Winchester papers, for the satisfaction of those likely to use the road, in either way. We are gratified to observe that this Railroad, destined to be an important link in connection with our Baltimore and Ohio Railroad, will be opened for use during the present month.

Transportation on the Winchester and Potomac Railroad.

The President and Directors of the Company have established the following rates of travel and transportation between Winchester and Harper's Ferry:

Fare through, with a reasonable allowance of baggage, for passengers set down or taken up at the depot of the Island of Virginius, near the Potomac,	$1 50
For any intermediate distance, per mile,	6

Downward Trade.

Toll for transportation from the depot at Winchester, and delivery at the end of Wager's Bridge, on the Maryland side of the Potomac, for flour, per bbl.	$0 18
Wheat, per bushel,	5
Corn and corn meal, rye and rye meal, per bushel,	4½
Oats,	3
Bar iron, blooms, pig iron and castings, per ton,	1 80
All other commodities, per ton, per mile,	6

Transportation to and from any intermediate depots, the same proportional rates wite the above.

Ascending Trade.

Transportation from the place on the Maryland side of the Potomac above mentioned, to Winchester.

For plaister, per ton,	$1 7.
Salt, per bushel,	8
Fish, per barrel,	30
Merchandise, and all other commodities, per hundred pounds,	11

And to and from any intermediate depots, the same proportionate rates.

The above rates include all charges incident to transportation, to and from other companies. There will be a small additional charge made at the different depots, for receiving and forwarding—about 2 cts. on a barrel of flour, and a similar rate for other commodities. By order of the Board.

John Bruce, President.

It is expected that the road will be ready for transportation early in March. J. B.

MISSISSIPPI.

The Mobile and Jackson Railroad bill has passed both branches of the Legislature of Mississippi. It has not yet received the signature of the Executive, of whose sanction there is no doubt. It has banking privileges, with a capital of $4,000,000. On he utility and vast importance of this road, it would be idle to descant. Alabama cannot fail to pass the charter in her Legislature, and to lend the undertaking efficient support.—[Mobile Chron. 16th inst.]

New-Orleans and Nashville Railroad.—The Mississippi Legislature have passed an amendment to the charter of this important road, requiring the company to run the track *east* of Pearl river, crossing it Pearlington, and continuing in that direction to Noxubee county.

FLORIDA.

A charter for a Railroad from St. Augustine to the St John's river, was granted by the Legislative council of Florida.

LOUISIANA.

We are informed that the whole of the stock for the Atcha alaya Railroad and Banking Co. has been taken this morning, and that it already commands a premium. Bank stocks are commencing to look up, now that the probabilities are that our affairs with France will be amicably arranged.—[N. Orleans Union.]

ILLINOIS.

The Illinois Central Railroad Company has recently organized and elected the following gentlemen Directors: Hon. A. M. Jenkins, Hon. S. Breese, Col. Pierre Menard, D. J. Baker, Esq., and D. B. Holbrook.

Alton and Shawneetown Railroad.—Meetings have been held at Shawneetown, approving of the location of this Road through Equality, Frankfort, Nashville, Lebanon, and Edwardsville, and recommend the commencement of the survey as soon as the season will permit.

We give the following as a specimen of the many calculations to be found in the Baltimore papers—all showing the great advantages of the location of Baltimore compared with that of New-York!

In a recent Baltimore paper, a writer exclaims, "What would New-York not give for the advantageous situation of Baltimore?"

Baltimore and Ohio Railroad.—We have before us a very interesting map designed to show the connection between the Baltimore and Ohio Railroad and other Railroads executed or in progress throughout the United States.

No one can study this map with any degree of attention without being struck with the great advantages of the position of the city of Baltimore. Amongst those advantages may be enumerated, as is done on the margin of the map, the following:

1. That Baltimore is nearer to Pittsburg and Wheeling, the two cities which approach closest to the Atlantic seaboard, west of the mountains, than either Philadelphia or New-York.

2. That the readiest route from Wheeling and Pittsburg to Philadelphia and New-York will be through Baltimore, when the Baltimore and Ohio Railroad shall be completed.

3. That the route from Maumee Bay to Baltimore, by a Railroad already authorised in Ohio, and intersecting the great Erie and Ohio Canal, and the Mad River and Lake Erie Railroad, is shorter and more direct than the routes either to New-York or Philadelphia. The route to New-York being a part of it on Lake Erie, a part of it on the Erie Canal, or on the Erie Railroad, when that shall have been completed, and a part on the Hudson River. The route from Maumee Bay to Philadelphia, being part by Railroad and part by Canal, or part by Lake Erie, part by Canal and part by Railroad, while on the other hand, the route from Baltimore to Maumee Bay will be an unbroken line of Railroad.

4. That therefore the best route to Maumee Bay to Philadelphia or New-York will be through Baltimore.

5. That the extension of the same line of road will afford the most direct communication between Galena and the Atlantic seaboard, the travelling for Philadelphia and New-York passing in like manner through Baltimore.

6. That the extension of the Railroad system from Harper's Ferry along the valley of Virginia involves a connection with the Nashville and New-Orleans Railroad, near the Muscle Shoals of the Tennessee River, in which event Baltimore will be a point through which the entire travel from Boston, New-York and Philadelphia towards New-Orleans, must pass. The line of route cannot be laid further south, on account of the Chesapeake Bay, nor further north, without encountering the hilly district at whose connection with the alluvial country Baltimore is situated; therefore there is no better line can be laid down than that which passes through Baltimore.

7. That, should the route to New-Orleans be carried along the alluvial country south of Baltimore, by the way of Weldon and Raleigh, it must still pass through Batimore, using the lateral road to Washington, instead of the main stem of the Baltimore and Ohio Railroad.

8. That the extension of the Railroad along the Valley of Virginia will, by intersecting the James River and Kenawha Railroad, give to Baltimore a direct Railroad communication with the Ohio at Guiandot, where the water is deeper and the river less obstructed by ice than at either Pittsburg or Wheeling.

9. That the extension of the main stem of the Baltimore and Ohio Railroad to Hagerstown, will at once afford a connection with Chambersburgh and the Cumberland Valley.

10. That the prolongation of a Railroad from Pittsburg to Cleveland, which is now proposed, will make the route through Baltimore to the latter place, from Philadelphia and New-York, preferable to any other.

11. That, in fine, the geographical advantages of the position of Baltimore are such that all travel from Boston to New-Orleans, and from Boston, New-York and Philadelphia, to Pittsburg, Wheeling, Sandusky City, Maumee Bay, Detroit, Chicago and Galena, will inevitably, when regard is had to ease, rapidity and comfort of the mode of conveyance, pass through this city, should the Baltimore and Ohio Railroad be completed to Pittsburg and Wheeling.

12. That these advantages are peculiar because, excepting where the Lakes head the Alleghanies and at the pass near Christiansburg, to the south, no where else but by the Potomac route can the mountain be passed without stationary power.—[Balt Chronicle.]

From the Journal of the Franklin Institute.

REPORT ON THE USE OF THE HOT AIR BLAST IN IRON FURNACES AND FOUNDRIES. BY A. GUENYVEAU, ENGINEER AND PROFESSOR IN THE ROYAL SCHOOL OF MINES.*

(Translated for this Journal by Professor A. D. Bache.†)

This report embraces the observations made during a tour of examination of the furnaces and foundries in the South of France, in some of which the hot air blast is used. The tour was undertaken by order of the director-general of bridges and roads, and of mines.

In remarks upon the subject, a distinction must be made between the furnaces where coal is used and those which use charcoal. The amount of air required is so different in the two classes, being sometimes as two or three to one, that the apparatus for heating it is usually different. The results are, however, nearly the same for both classes. All the furnaces examined use ores from the same part of France. The hot air blast has succeeded best in the furnaces of Vienne (Isere,) the two at Terre-Noire (near St. Etienne,) and those of the Voulte (Ardeche.)

In one furnace, that of Firmy (Aveyron,) the results with this blast were not satisfactory, either with raw coal or with coke. The large establishments of Creusot and Alais, and those of l'Orme (Loire,) have not yet applied heated air. The fuel used in them is coke. At the furnace near Torteron, where the fuel is a mixture of charcoal and coke, the hot air blast has been used to advantage, in regard to the quality of the iron. In the various smelting furnaces in Burgundy and Franche-Comte, where charcoal is used as a fuel, the new process has proved satisfactory.

I. HEATING APPARATUS.

Of these there are various forms in use. The objects sought are economy in heating the air, a sufficiently high temperature, and the preservation of the pipes.—The apparatus used at Calder* (Scotland,) appears to answer the best purpose. It is in use at Vienne, and in one of the Firmy furnaces. The first apparatus put up was like that used at the Clyde† furnaces; this is still used at Torteron and la Voulte, but has, at Vienne, given place to the Calder apparatus. The heating pipes are two inches in diameter, and at Firmy have been replaced by others two and a half inches in diameter. It might seem that these pipes are too small, but experience has sanctioned their use. It is not known how long this apparatus will last; in fact the duration must depend upon the temperature to which the pipes are heated, and upon the nature of the coal. It is believed that the arrangement with highly inclined tubes will outlast those with horizontal ones. The temperature of the air is easily raised above the melting point of lead (604° Fahr.) The cost of the apparatus for each tuyere is about 1200 francs ($240.)

The flame which appears at the trunnel head of smelting furnaces which use coke, has not been applied to heat the blast, although it has been advantageously applied in charcoal furnaces. It would seem that this mode of heating should apply particularly to furnaces in which raw coal is used, on account of the amount of unconsumed combustible matter which issues from the trunnel head; notwithstanding which, M. Dufrenoy gives one case, in the neighborhood of Birmingham,* in which the heating apparatus placed upon the platform of the furnace did not answer the purpose. The temperature of the air could not be raised above 360° Fahr., and subsequently it was heated by a separate furnace which consumed four tons of coal for each ton of iron. As, however, the temperature to which the air is heated at the Voulte furnace is below that just stated, the question cannot be considered as decided.

The air blast is generally heated above melting point of tin (442° Fahr.,) and sometimes above that of lead (604° Fahr.,) and even higher. In other furnaces, as at the Voulte and Torteron, where horizontal heating pipes are used, the temperature has been diminished, in order to save the wear of the pipes. At the first mentioned furnace it never exceeds 340° Fahr., being at a mean about 320°, and at the second never exceeds the melting point of tin. At the furnaces of Terre-Noire the heat is carried by Taylor's† apparatus to 572° Fahr. It has been said that the advantages of the hot air blast increase in the ratio of the temperature of the blast, an assertion which, although it appears probable, and has been confirmed by certain observations, is not true in all cases. At the Voulte the results were sensibly the same where the air was heated to 428° and to 320°.‡

Several methods have been used to determine the temperature of the hot air blast. One was to use a common thermometer, with a metal scale; the bulb being inserted into the blast pipe near the nozzle. Another method was to use a slip of lead, tin, or of some fusible alloy, according to the temperature, which was exposed to the air issuing from the hole in the blast pipe.§ At Torteron the alloy was two-thirds tin to one-third of lead.

Great inconvenience has been felt from the leakage of the pipes used in the heating apparatus. These leaks, when they occur in the heating ovens, are only discovered by a deficiency in the yield of the furnace. They occur commonly at the joints, and the liability to them increases with the increased temperature of the blast. The repairs which are necessary alter the supply of air, and thus derange the system of working.

It is a desideratum to render the leakage less common and the means of repair more easy. When these leaks occur, if the fire is not immediately extinguished, the pipes being no longer kept cool by the air passing through them, burn out very quickly. The heating apparatus placed near the trunnel head is free from this defect.*

The effect of these difficulties has merely been to produce a resort to the reduc-

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* Annales des Mines, vol. vii., Livraison 1.

† This is a translation of extracts from the report of M. Guenyveau, and in parts where the details do not seem to be of special interest, an abstract of his results.

* See this Journal, vol. xv., p. 213, pl. 2, figs. 6, 7, 8, and 9.

† Ibid, vol. xv., p. 209, pl. 2, figs. 1 and 2.

* See this Journal, vol. xv., p. 272, pl. 3, figs. 15 and 16.

† Similar to that described by M. Dufrenoy, vol. xv. p. 213.

‡ It may readily be understood why an increase of 100° from 320° to 420° should not produce so sensible an effect as from 220° to 320°, or as from 120° to 220°.—[Translator.]

§ By reference to this Journal, p. 74, vol. xvi., a more convenient method of using the thermometer will be found.—[Translator.]

* If so, it would seem that it must be deficient in heating power.—[Translator.]

tion of temperature noticed at the furnaces of La Voulte and Torteron. The remarks of M. Dufrenoy on the forms of apparatus, confirmed as they are by extensive observation, deserve great attention.

The effects of heating the air upon the quantity and pressure of that passed into the furnace, may be thus estimated. If we suppose the air heated from 60 deg. to 568 deg. Fahr., its bulk will be double, and consequently, under the same pressure, but half the quantity will pass through a given orifice, which would have passed had the air not been heated. Generally, until the area or nozzle of the blast pipe is nearly doubled, the advantage of the hot air blast is not realized. Before this change in the nozzle, the furnace is not duly supplied with air. Besides, the pressure at the tuyere has been observed to diminish with a given pressure at the blowing machine, a fact which may be explained by the resistance of the air moving through the pipes of the heating apparatus, the elbows in which tend to make the resistance quite considerable in amount.

If then the pressure and the quantity of air thrown into the furnace should be the same with the hot and cold blast, the power of the blowing machine must be increased. This has not been found necessary in the English works, where on the contrary they have supplied more furnaces with heated air by the same blowing machine, than could be supplied with cold air. Less fuel being consumed in a given time, with a greater yield of metal, less air is required to support the combustion. In these works the power required to supply heated air is estimated at one-tenth more than that employed for the cold blast, for the same weight of ore, but as the weight of the air thrown in is diminished one-fourth, the same blowing machine which supplied three furnaces with cold air will supply four with the hot blast.

At the Calder furnaces, (Scotland,) the pressure of the hot air blast was less than that of the cold air previously used by two-thirteenths, and at the Clyde works by one-sixth. M. Varin estimates the economy from this source at la Voulte works at one-fifth, the pressure being reduced from three inches and a quarter of mercury to two inches and a half.

At the Torteron furnace where the heated air blast has neither changed sensibly the amount of fuel used, nor of iron produced, the blowing machine requires a little more fuel to produce the steam required to move it, than it did when cold air was used. At Wasseralfingen, where the consumption of charcoal has not varied materially by the change from the cold to the hot air blast, they require more power with the latter, a larger quantity of air being necessary in running the furnace. It is not said that the dimensions of the blast pipe nozzle have been changed. At Ancy-le-Franc, in August, 1834, the pressure at the governor remaining constant, that at the tuyere was observed to fall to one-half, when the air was heated. The size of the nozzle was increased, but there was not an adequate power to supply the air required, and the yield of the furnace diminished.

Tuyeres, cooled by water, have been substituted for the ordinary ones in furnaces using the heated air blast; the cooling effect of the blast being taken away, the ordinary tuyere is rapidly burned out. Cast-iron water tuyeres have been found to last longer than those of wrought iron; they wear out in from three to six months.

In many establishments the blast pipe nozzle is permanently attached to the tuyere, an arrangement which answers well when it is not necessary to clean out the tuyeres. When this is necessary, the common arrangement is to be preferred, and this is generally the case in the French works even where charcoal is used.

When the nozzle is not closely fitted to the tuyere, the blast is slightly cooled before it gets into the furnace, and part of it does not pass in.

II. ON THE EFFECTS AND ADVANTAGES OF THE HOT AIR BLAST.

The effect appears to be to increase the heat within the furnace, so that a refractory ore is fused; any stoppage in the furnace is prevented, and the working is more readily resumed after the furnace has been cooled. Less fusible ores may be used, less flux is required for their reduction, the slags are more fusible, and become spongy if water is thrown upon them when incandescent. This property has been observed only in the Styrian furnaces and others where charcoal is used as a fuel, and the ore is a manganesian carbonate of iron. Further, grey pig iron is obtained with every kind of ore, this variety of iron requiring a high temperature for its production. Generally the heated air and combustible gases which issue from the trunnel head, are diminished in quantity, and the heat is more concentrated in the lower parts of the furnace; a source of great advantage, but which causes a more rapid destruction of the hearth and boshes.

The working of the furnace when heated air is used is comparatively easy; there are fewer cases of clogging, and they are readily remedied; the tuyeres are almost always free, no slag collecting and hardening about them. Frequently a clogging in the furnace may be removed by raising the temperature of the blast. The advantages may be succinctly enumerated as follows:

1. A change in the iron, which becomes more grey, and even black, and the slag is more fluid than when cold air is used.

2. An increase in the quantity of ore which a given weight of fuel will bear, whence results a diminution in the quantity of fuel required to produce a ton of metal, after the fuel required to heat the air has been taken into account.

3. A diminution in the quantity of flux, to which there are, however, exceptions.

4. An increase in the daily yield of a furnace.

We do not enumerate among the advantages that of using crude coal, because it has been ascertained both in Wales and at Decazeville, that this may be done with the cold air blast.

In regard to the quality of the iron produced by the hot air blast, the following facts have been collected:

It has been asserted that iron, thus obtained, requires to be remelted when it becomes duly tenacious, and yet the Lyonese founders complain that the iron of Vienna is weak. On the other hand, iron from the Torteron furnace was cast into shells which required more powder to burst them than similar ones made from iron procured by the cold blast, the strength having been nearly double, in the former case, of that in the latter.

In England there appears to have been no sensible difference between the castings made from iron obtained by the two different methods.

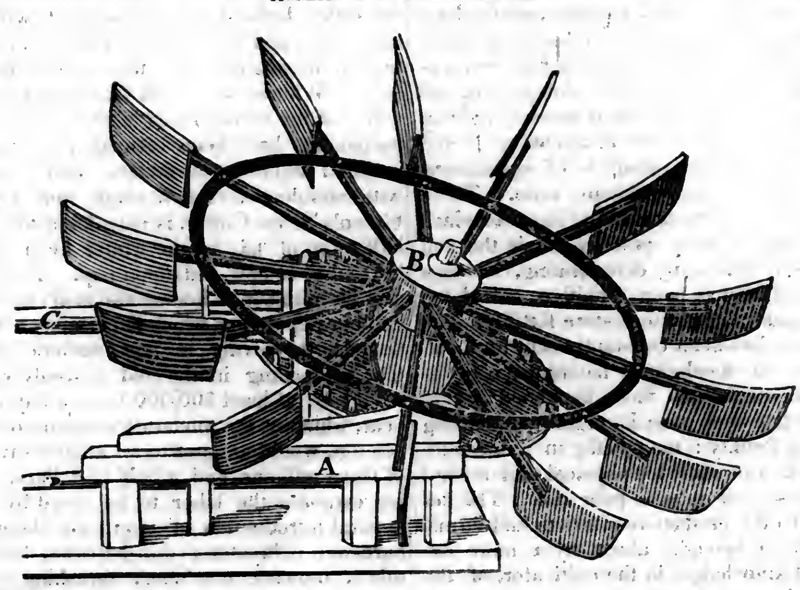
The same uncertainty prevails in regard to the forged iron obtained from pigs reduced by the aid of the hot air blast. M. Dufrenoy and M. Debilly, consider the notions prevalent on this subject in England, to be founded in prejudice. My observations in the South of France have shown that there is, if any, a very slight difference in the quality of the iron in favor of that made by the cold blast. At one of the furnaces it was suggested that silicious ores gave a worse iron by this process than by the cold air blast, the great heat facilitating the union of the silicium with the carbon and iron. A careful analysis is required to demonstrate this theory, in favor of the probability of which it may be stated that at Firmy, where a very silicious ore is used, the iron made by the hot air blast is worse than that by the other process, and when refined, produces a worse malleable iron. It is remarkable, moreover, that the best iron is obtained when the ore is in excess in charging the furnace, in which case the iron is reduced at the lowest temperature.

(To be continued.)

The Erie Gazette states that a specimen of mineral coal, measuring about eleven and a half solid feet, and weighing nine hundred pounds, has been sent to that place from the coal mines of the Shenango, about eighty miles from that place, and on the line of the proposed Canal. The quality is pronounced of the first order, and the quantity inexhaustible. Should this be the case, and the coal can be afforded at a fair price at Erie and elsewhere, it will yield no trifling addition to the means of navigating our lakes by steam.

SLEEPER'S PATENT CORN MILL.—We were gratified yesterday in witnessing the operation of one of these newly invented mills, in the rear of Mr. Sowle's Cabinet Warehouse, Purchase street. It is exceeding simple in its construction, the grinding being effected by means of three iron cylinders, which are kept rapidly in motion by means of a steam engine of moderate power. We were told that it would easily accomplish the grinding of eight bushels per hour, with the power ordinarily applied.—Mr. Abraham Russel, Jr. is an agent for the sale of these mills in this town and vicinity.—[New Bedford Mercury.]

INCLINED WATER-WHEEL.



We were invited a few days since to examine the model of a water-wheel upon a plan to us entirely new. It was called the "*inclined water-wheel*," and is in some measure represented by the above cut.

The object of this wheel is, as we were informed by the Patentee, to be used as a *tide* wheel, or in rapid streams, without the expense of constructing a dam; and one of its great advantages is believed to consist in its peculiar construction, by which it may be used without the expense of erecting a pier in the water to sustain the outer end of the shaft, which is necessary in using the ordinary wheel.

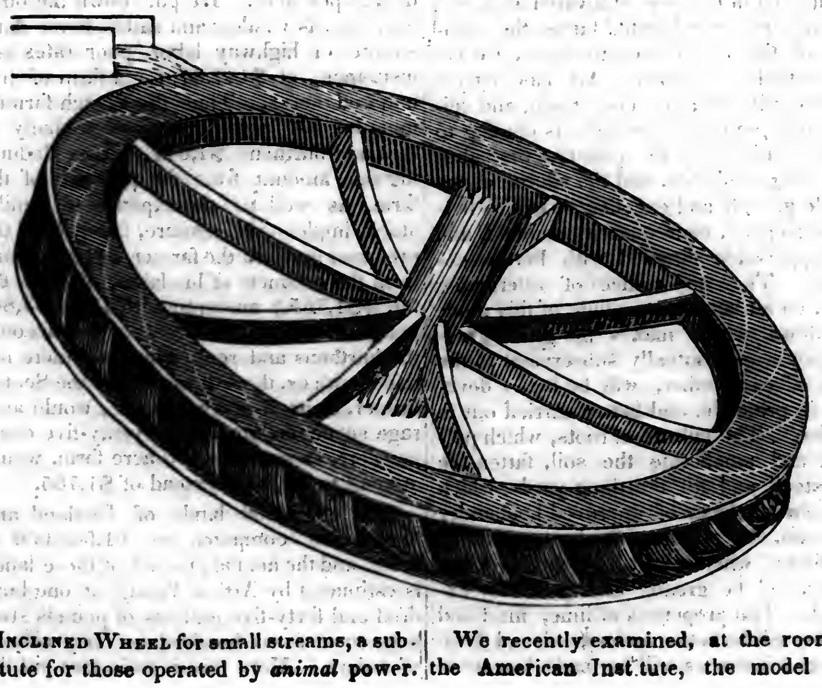
The shaft of this wheel stands at an angle of 15 to 30 degrees, the upper end leaning towards the water, causing the paddles, which are made fast to projecting arms, of ten to fifteen feet in length, to dip in the water, and the wheel of course turns by the power, and with the velocity of the current.

This wheel, it will be seen, rests entirely upon the bank of the stream, or wharf built out to the current; and it is so constructed that the shaft may be regulated to suit the rise or fall of the stream or tide, or the paddles may be thrown entirely out of water. The gearing and the paddles may be so constructed that the wheel will turn either way, and the wheel is of a size to suit the power and the labor required.

A represents the platform, or frame, on which the shaft B stands, and it may be made permanent, or moveable, as may be desired.

This wheel was invented by Cotton Foss, and Justin Ware, of Madison, Ohio, and Andrew Luke, 352 Broadway, New-York.

INCLINED WHEEL, FOR SMALL STREAMS.



Inclined Wheel for small streams, a substitute for those operated by *animal* power.

We recently examined, at the rooms of the American Institute, the model of a wheel, of which the above is a representation, designed as a substitute for the horizontal, or loded wheel, moved by *animal* power. It is not uncommon, in some parts of the country, to use wheels upon the surface of which horses, mules, or cattle travel, for grinding grain, and for other purposes, for the want of sufficient *water* power to drive the ordinary wheel.

This wheel is neither horizontal nor perpendicular, but a medium between the two, and the buckets are so constructed as to retain the water until the wheel has completed nearly the half of a revolution. This wheel, the inventor believes, may be used on small streams, wherever two, or three, or more feet fall can be had, with much advantage over any other wheel, as by adopting the inclined position, a much larger wheel, or longer lever, may be used, and therefore a less quantity of water with a trifling fall, may be used to advantage, for many purposes. Its superiority over animal power, consists in its economy, as when it is once prepared it requires neither *provender*, driver, nor replacing with another, when weary and worn out; and it will be readily perceived that the weight of water required is only equal to the traction of the *animal* used on the horizontal wheel.

We consider them well worthy the attention of those who desire to use the kind of power for which they are designed as a substitute.

C. Foss & Justin Ware, of Ohio, patentees, and Andrew Luke, of 352 Broadway, agent.

AGRICULTURE, &c.

Agricultural Convention.—We have at length received the proceedings of the *State Agricultural Convention*, held at Albany, on the 8th and 9th of February. It was, we are gratified to be able to say, an assemblage of gentlemen which does credit to the State; and from which much good must inevitably result.

We have delayed this number of the Farmer several days, in order to give the proceedings of the Convention, which we are enabled to do through the politeness of Alexander Walsh, Esq., of Lansingburgh, who furnished us with the Cultivator containing them.

The Convention was opened by the appointment of Jesse Buel, Esq., Chairman, who thereupon delivered an eloquent address, in which he inculcates sound maxims and important truths, in relation to the policy and necessity of a higher system of agricultural education. We give the address, proceedings and memorial of the Convention, and ask for them an attentive perusal; believing, as we do fully, that such an education as is here contemplated, in the acquirement of which, a practical knowledge of agriculture and mechanics may also be obtained, will do more to promote the

happiness of mankind, by preparing young men for usefulness, than any other system ever adopted in this country; and we indulge the hope that the Legislature now in session, will, in its wisdom and liberality, make the necessary provision for an Agricultural School, which shall become a *pattern* school for the whole Union. Let New-York, in this equally important measure, as in *Internal Improvements*, take the lead.

We have also the proceedings of the State Agricultural Society, which, however, we are compelled to defer until our next, as our columns, for this number, were crowded before the Cultivator came to hand.

AGRICULTURAL STATE CONVENTION.

At a meeting of delegates and others, from different parts of the State, in agricultural convention assembled, in the assembly chamber in the city of Albany, on Monday, February 8th, at 3 o'clock P. M.

On motion of Mr. Dickinson, of Broome, the Hon. Judge Buel of Albany was temporarily called to the chair, and on motion of Mr. Leland of Steuben, D. L. Dickinson of Broome, and J. J. Viele of Rensselaer, were chosen secretaries.

The chairman then rose and addressed the convention as follows:

Gentlemen,—Land and labor are the principal sources of public and private wealth. The more fertility we can impart to the one, and the more intelligence we can infuse into the other, the greater will be the returns they make, and the greater our means of happiness; for it is wealth, rightly employed, that enables us to multiply not only our own, but the comforts and happiness of those around us. Yet it is not a few very rich men, or very wise men, be the aggregate of wealth and talent ever so great, that give prosperity and greatness to a State. It is the general diffusion, among a whole people, among the rank and file of society, of property and knowledge, and the industry, enterprise and independence which they beget, that renders a State truly respectable and great. If this convention, therefore, can do aught to render labor more profitable and more honorable, and our lands more productive, it will effect a substantial good to society.

I venture to lay down this broad proposition, that the productions of our agricultural labor may be doubled in ten years, and trebled in twenty. In proof of this, I appeal, in the first instance, to facts which have fallen under the observation of all: to the contrast, in products and profits, which are seen to exist, between districts and farms, of equal natural fertility, and often contiguous to each other, which are under good and bad management, and the constantly increasing profits of husbandry, where the spirit of improvement has been fully awakened. We find many individuals who pay from seventy to one hundred dollars an acre for farms, getting not only the interest of their purchase money, but realizing large profits, from their agricultural labors; while we see others, equally well circumstanced, hardly getting enough to meet the contingent expenses of their families. Within the last thirty years, in many districts, particularly in Orange, Dutchess, Columbia, &c., where the natural fertility of the soil had been exhausted by the old system of depletion, and where improvement gained an early footing, the price of lands has increased three and four fold, and the products of agricultural industry in a proportionate ratio. There are other districts again, that have remained stationary in their practice, while the soil has been constantly deteriorating, because this practice has been primitive, calculated to exhaust, but not to restore fertility. The measure has been constantly sent for meal, without the meal-chest having been replenished. This has most happened where nature had been most bountiful in imparting natural fertility: man being in a measure compelled to exert his physical and mental energies most upon a poor soil. The benefits to the productive districts and farms, have been brought about by a more extended knowledge, in the cultivator, of the principles upon which good husbandry is based, by the force of competition, and examples of individual excellence. The bad husbandry has diminished in products and profits, from the want of this knowledge, from the force of prejudice, the want of a spirit of competition, the want of system, and from culpable indolence, the natural result of the other causes. In what manufacturing or mechanic art, do we see the master prosper, who adheres to the modes and practices of his grand-father? The labor of fabrication has been abridged of one-half of its toil in these, by the discoveries of science and the inventions of genius. Nor is much less the case in agriculture, where science and skill have been pressed into its service. "Why," says a late writer, "this becomes another world to the man who opens his eyes. Science breathes life and light into it; it kindles with glory, happiness and praise; there is no one who cannot feel its inspirations if he will."

But even in our best cultivated districts, and on our best cultivated farms, the capacities of the soil to reward labor, are yet but partially developed. Art has not yet exhausted its energies upon them, and science, with gigantic strength, is coming to its aid. The value of manures, the pabulum of vegetable life, and the source of vegetable growth and excellence, will be better appreciated, their quantity doubled, and their application directed with better economy. The importance of alternating crops, on all lands susceptible of this mode of culture, which makes the grain, grass and root crops mutually subservient to the wants of each other, will be better developed in principle, and better carried out in practice. The culture of roots, which pulverize and ameliorate the soil, fatten the farm-stock and fill the dung-yard—which has been the basis of improved husbandry in Britain, and promises the best results in this State, wherever it has gained a fair footing, will be greatly and profitably extended. The properties of lime, marl and gypsum will be better understood, and these mineral substances will be made to contribute more largely to the productiveness of the soil. Labor-saving implements will be multiplied, and our farm stock will be improved in quality, and increased in numbers. Whitney's Cotton Gin doubled the value of the cotton lands of the south, and its benefits have been estimated over one hundred millions of dollars; and I state with confidence, that a single implement, Green's Straw Cutter, is calculated to save half a ton of hay in the winter keep of a horse, ox, or cow, fed upon hay. Estimating the number of horses and neat cattle at half our population, which is certainly within bounds, the saving in this machine, over that of feeding in the old slovenly way, would be at least 500,000 tons of hay in a year, which at the moderate estimate of $7 per ton, would amount to an annual saving of three millions and a half of dollars. If we estimate the labor to be saved by the general introduction of improved ploughs, harrows, cultivators, drill-barrows, horse-rakes, mowing machines, threshing machines, &c., which not one farmer in twenty has yet availed himself of, and consider the benefits of the countless new inventions which the genius and enterprise of our countrymen are likely to produce, I cannot be mistaken in assuming, under a view of all these considerations, that every tolerable acre of land, near the borders of the Hudson, may be made to produce to the cultivator, the clear interest of two hundred dollars per annum. There are thousands of acres which already produce double this income.

To strengthen the force of this conclusion, I beg leave to call your attention to the agricultural products of other countries.

Professor Low, one of the latest and best authorities for Scotch husbandry, bases his estimate of farm profits upon an annual rent to the landlord—(for Scotch, as well as English farmers, are almost invariably tenants to the nobility and gentry)—I say he bases his estimate of the farmer's profits upon an annual rent of 2*l*., or about nine dollars per acre. He puts down the other burthens, as window and saddle horse duty, statute or highway labor, poor rates and insurance, at $141.87, for a farm of five hundred acres. Thus the Scotch farmer, upon his 500 acre farm, pays annually in rent and burthens $4,641. After deducting this amount from the products of the farm, as well as the expense of family, stock, implements, manure, labor, &c., the professor gives to the farmer, a nett income, from the products of his labor, of 399*l*. 6*s*. 2*d*. ($1,785,) amounting to 16*s*. ($3.80) per acre. If we throw out of the account the burthens and rent, which are mere nominal with us, the nett income of the Scotch farmer, clear of every expense, would average seven dollars and seventy-five cents per acre, or upon his 500 acre farm, would amount to $3,875, instead of $1,785.

The cultivated lands of England and Wales are computed at 91,000,000 of acres, and the annual product of these lands is estimated by Arthur Young, at one hundred and forty-five millions of pounds sterling, equal to six hundred and forty millions of dollars. More recent estimates put the

agricultural products of Great Britain, including Scotland, at two hundred and sixty millions of pounds. Upon the first estimate we have, as the average product per acre, about $19.36. To show the burthens of the British farmers, which are an enormous drawback upon the profits of his labor, we will only quote from Arthur Young, who made an agricultural survey of the country some forty years ago, the amount of these burdens in the county of Essex, a district sixty miles long by fifty broad. The tithes amounted to 4*s.* 9*d.* (94 cents) on the acre. But I will give gross sums:

Rents, - - - -	936,320*l.*
Tithes, - - - -	225,620*l.*
Poor rates, - - -	500,000*l.*

Exceeding, in the aggregate, seven millions, three hundred thousand dollars, which the farmers of one county annually pay, to the landlords, the clergy, and paupers! And yet, says our account, with all these burdens, their profits from the improved modes of cultivation, were greater in 1805, than when the expenses were much less. Let us imitate their industry and their skill, but may we long be exempt from their rents, rates and tithes.

Let us now examine the statistical data of New-York Agriculture. The cultivated lands in our State were estimated, in 1825, at 7,160,967 acres, and their aggregate value, at the average value of $25 per acre, at $179,124,175. The farm stock was estimated to swell this amount to two hundred and twenty millions. Let us suppose, what we believe will be making a pretty fair allowance, that the farmer upon 100 acres, which, with the necessary farm stock, we will put down at $3,000, produces twenty per cent. upon this capital, or $600 a year. Deduct seven per cent. from this sum, for interest upon the capital, or for rent, and he will have left, for his labor, and family, and other expenses, $390. Upon this estimate, it will be perceived our lands do not yield one-third of the produce per acre, upon an average, that is produced upon the farm lands of England. And even the farming in England, we believe, is badly managed in many districts, and is less productive than either that of Scotland or Flanders. We certainly have the capacities, if we will call them into action, of successfully competing, in every branch of productive labor, with the population of the old world.

In recurring to the history of agriculture, we find that a century ago it excelled in the Netherlands, embracing Flanders, and in some districts of Italy, particularly in the valley of the Po. In the former of these countries, a judicious system of rotation, suited to soil and local circumstances, had been adopted; clover and roots had been introduced, and manures were sedulously husbanded and discreetly applied. In addito these improvements, irrigation had been extensively adopted in the valley of the Po. Although these countries have, during the last century, progressed but comparatively little in agricultural improvement, they nevertheless retain a degree of pre-eminence at this day, and furnish practical examples highly worthy of our imitation. So recently as 80 years ago, agriculture was in a most wretched condition, both in Great Britain and France. Most of the improvements in English husbandry have been made within the last seventy years; those of Scotland during the last fifty years, and those of France since the period of her revolution, or within the last thirty years. These improvements, which have contributed essentially to the prosperity and happiness of the human family, were brought about by the spirited exertions of a few distinguished individuals, such as Young, Sinclair, Davy, Chaptal, Bakewell, and others of minor note, though probably not less efficient; by the application of science to husbandry, and the co-operation of societies formed to promote its improvement. Among the leading features of the great practical agricultural improvement which has so recently taken place in Britain, Loudon places at the head—the introduction of a better system of rotation—the drill system of growing turnips, about 1765; the improvement of live stock, by Bakewell, about 1770; the use of lime in agriculture, and the system of convertible husbandry, which commenced about 1765; the improved plough, by Small, about 1790; and the threshing machine, by Merkle, about 1795; the system of draining or tapping springs, discovered by Anderson from principle, and by Elkinton, by accident, about 1765; the revival of the art of irrigation, by Boswell, in 1780; the field culture of the potatoe about 1750; the introduction of the Swedish turnip, about 1790, of spring wheat, about 1795, and of mangold wurzel at a still later period. The British Board of Agriculture, and the Highland Society of Scotland have effected much towards improvement; and perhaps no country in the world has made greater strides, at any period, in bettering the condition of her husbandry, than Scotland has, during the last half century, under the fostering auspices of the last named society, and which is dispensing its labors of usefulness, with untiring patience and unabating energy.

Although it is difficult to compare the average crops of different countries with any degree of accuracy, I will nevertheless endeavor to do it from the imperfect data to which I have had access, so far as regards some of the staple products of the soil, premising at the same time, that the comparison affords but an imperfect view of the relative amount of farm profits, the disparity in the price of labor, and the general economy of farm management, not coming under notice.

Flanders is a flat, wet, and generally sandy country, illy adapted to the wheat crop. Yet the average over 25 bushels per acre. Lowe gives the average product of different districts, in this grain, according to Radcliff, varies from 20¼ to 32 bushels to the acre; mean average product in Scotland, of wheat 24, barley 42, and oats 48 bushels the acre. Loudon states the average product in Britain at 24, 28, and 32 bushels; mean average 26 bushels the acre. In 1790, Washington, in a letter to Arthur Young, computed the average crop in Pennsylvania, then one of our best wheat growing States, as follows:—Wheat 15 bushels, rye 20, barley 25, oats 30, Indian corn 25, potatoes 75. Strickland, in a report made to the British Board of Agriculture, forty years ago, gave the average wheat crop of our State at 12 bushels the acre, and of Dutchess, then, as now, our best cultivated county, at 16 bushels. An intelligent correspondent of the Baltimore Farmer, who dates Philadelphia county, expresses his doubts whether the average produce in Pennsylvania, with the exception of the potato crop, is as great as it was half a century ago. I am inclined to believe that in our State there has been a manifest improvement in that period; for, although some districts have retrograded, others have advanced with a good deal of celerity.—Well managed farms may be selected in the old river counties, where improvement has made the greatest advances, upon which the average crops have more than doubled during the last few years; where wheat has yielded an average crop of 25 to 30 bushels an acre, corn 70 to 80, potatoes 300, and other crops in proportion, and where cultivated grasses and roots have still more added to the profits of the husbandman.—The maximum produce of our grain crops may be stated, wheat 40 bushels, Indian corn 100, rye 35, oats and barley 60. In this estimate I leave out of view the fertile west, where nature has been profusely bountiful of her gifts, and where man seems to think the soil inexhaustible, and confine my remarks to the valley of the Hudson. These facts suffice to show, that while the condition of our husbandry is bad, it is susceptible of great improvement. What has been done in one district, or on one farm, may be done in others. And if we despair of the present generation to make the desired improvements, let us take care at least to qualify our sons to become better managers than their fathers.

From the estimate I have made of our agricultural products, it would seem that they amount to about 43 millions of dollars per annum. Now if this Convention can be instrumental in adding merely ten per cent. to this amount, by inducing a more profitable mode of culture, they will be instrumental in adding annually four millions three hundred thousand dollars to the capital of the State, independent of the enhanced value of the lands, consequent upon their improved culture. But if they can succeed in awakening, in our legislators, and in our fellow-citizens at large, a spirit of hearty cooperation in the work of improvement, the value of our agricultural products may be doubled. "Agriculture," says Sully, "may be regarded as the breasts from which the state derives its support and nourishment."

The inquiry next presents itself, how are these desired ends to be brought about?—We can make good farmers as we make good officers for our navy and army: Teach the pupil the science as well as the art; instruct the head as well as the hands, and subject him to system and discipline. Give us an Agricultural West Point to begin with, where may be concentrated and taught, all that is useful in theory and excellent in practice. "The education of the head and

connected with the interests and happiness of the largest portion of their fellow-citizens throughout the State.

To advance these interests—to add new stimulus to industry, care, skill and economy, in increasing the productiveness of our rich soils, and in adding fertility to the poorer; to improve the condition and increase the profits of farm stock of every description; to make the various implements of husbandry more perfect, economical and useful; and generally to adapt the improvements and discoveries in science to agricultural pursuits, have occupied the anxious attention of your Committee, and they regret that their time will not allow them to detail and explain the various reasons and motives which have influenced them in presenting and recommending the following resolutions for the adoption of the Convention:—

Resolved, That it is expedient to provide by law, for the establishment of a school of scientific and practica lagriculture, and that this Convention respectfully solicit the Legislature of this State to incorporate a company for the above objects, and to endow the said school with such sum, and in such manner, as shall be commensurate with the great benefits to be attained thereby.

Resolved, That an appropriation of public moneys, to excite industry and emulation in agriculture, to reward those who make important discoveries in labor-saving machines, or in other departments of husbandry; or who improve or extend useful methods of cultivation, would tend greatly to increase the resources and revenue of the State, and to promote the diffusion of useful knowledge.

Resolved, That the extensive and increasing ravages of the wheat worm, present a strong claim upon an enlightened Legislature, alive to all the interests of her people, to offer a competent premium for the discovery of a perfect preventive or remedy for the ravages of the said worm.

Resolved, That it be recommended to the friends of agricultural improvement, in every county in this State, to co-operate with this Convention in obtaining legislative aid in furtherance of the objects of the above resolutions, and also in the speedy formation of an agricultural society in every county where there is not one already.

Resolved, That the existing laws in relation to common roads and bridges, are found, by experience, to be very defective and oppressive, inasmuch as the heavy tax which is annually imposed for these objects, is expended so lavishly, injudiciously and temporarily, as to produce no correspondiug benefits to the tax-payers or to the community; and in the opinion of this Convention, the whole system requires alteration and amendment.

Resolved, That the agricultural publications, entitled the "Cultivator," published in Albany; the "Genessee Farmer," published in Rochester, and the "New-York Farmer," published in New-York, are eminently calculated to diffuse agricultural knowledge, to make known the various improvements in husbandry, and to excite and call forth new and valuable discoveries, and that they are therefore recommended to general attention and patronage, and particularly to that of the farmers.

Resolved, That, as property of every description is continually changing hands in a republican government like ours, and real property not more productive or valuable than personal, in the opinion of this Convention, all property, real and personal, should be subject to the same general rule of taxation—assessed and taxed equally wherever the same may be, and in whatever hands it may be found, without regard to ownership or indebtedness.

The above resolutions having been severally read, were unanimously adopted by the Convention.

On motion of Mr. Van Bergen, of Greene,

Resolved, That the paper entitled the "Silk-Worm," published in this city, be added to the list of those recommended to the patronage of the community.

Mr. Allen, from the Committee of sixteen, reported a memorial to the Legislature, which, being read, was adopted, and ordered to be signed by the officers of the Convention.

Tuesday evening, 7 o'clock.

The Convention met pursuant to adjournment. On motion of Mr. Shepard, of Cayuga, it was

Resolved, That the thanks of this Convention are due to the Hon. J. A. Dix, Secretary of State, for his very able and luminous report in relation to the geological survey of the State, made to the Legislature January 6, 1836, in pursuance of a resolution of the Assembly, April 6, 1835, and they express the hope that the Legislature will make the appropriation for the purposes recommended in said report.

On motion of Mr. M'Collum, of Niagara, it was

Resolved, That such provision be made, as the Legislature shall deem expedient, to encourage the growth and manufacture of silk.

On motion of Mr. Allen, of Erie,

Resolved, That this Convention recommend the introduction of elementary works on agriculture and horticulture, as reading books in our common schools.

On motion of Mr. Nash, of Monroe,

Resolved, That a state agricultural convention be held at the Capitol, in the city of Albany, on the first Thursday of February next, at four o'clock P. M., at which all persons are invited to attend, who take an interest in agricultural pursuits.

On motion of Mr. Frey, of Montgomery,

Resolved, That a copy of the opening address of Judge Buel to the Convention, be requested for publication; and that Mr. Carroll, of Livingston, and Mr. Allen, of Erie, be requested to furnish a copy of their remarks for the press.

On motion of Mr. Hopkins, of Cayuga,

Resolved, That the thanks of this Convention be tendered to the House of Assembly, for the use of their chamber during its sitting.

On motion of Mr. Fuller, of Onondaga,

Resolved, That the thanks of this Convention be given to the President, for the able and dignified manner with which he has discharged the duties of the Chair.

On motion of Mr. Leland, of Steuben, the Convention adjourned.

J. BUEL, President.

J. M'CALL,
L. BRADISH,
G. WENDELL,
P. PATTERSON, } Vice Presidents.

D. L. DICKINSON,
J. J. VIELE, } Secretaries.

MEMORIAL TO THE LEGISLATURE.

The following is the memorial alluded to in the above proceedings:

To the Legislature of the State of New-York:

The memorial of the subscribers, inhabitants of the State of New-York, assembled in Agricultural Convention, at the Capitol, in Albany, on the 9th February, 1836—respectfully represents:

That your memorialits consider that an acquaintance with the principles of the physical or natural science, embracing the properties of soils and manures—a knowledge of the structure and functions of animals—of the diseases to which they are incident, and the modes of cure;—of the principles of mechanics, in their application to implements of farm labor;—of the agency of heat, air, water and light in the growth of farm crops—and of new plants, their mode of culture, and use in the arts of commerce—as highly essential, in the cultivators of the soil, to the successful prosecution of husbandry, in this age of general improvement. That agriculture is the great business of our State, and the main source of its prosperity—and that no means present to their minds, so likely to insure substantial improvement in this primary branch of labor, as the establishment of a school of scientific and practical agriculture, which shall embrace the best models of practice in all the departments of rural labor: That three committees of the Legislature have reported in favor of the establishment of an agricultural school, with accompanying bills providing therefor, two contemplating the establishment to be made under the auspices, and at the expense of the State, and the other granting corporate powers to an association who had prayed to be incorporated for this purpose; that the latter bill passed the House of Assembly with three dissenting votes; but that this, as well as the other bills, were not finally acted upon, by reason of the late period in the session in which they were introduced, and the press of public business:—your memorialists pray for an act of incorporation, with a restriction therein, limiting the dividends to be derived from such institution to five per cent. per annum, for the above objects, and to endow such institution with such sum, and in such manner, as shall be commensurate with the great benefits to be attained thereby.

Your memorialists further represent, that they are persuaded great benefits to agriculture, and to the substantial interests of the community at large, have resulted from the law of 1819, "to improve the agriculture of this State," by the stimulus which it gave to industry, and the improvements which it in-

hands must always go together, or the health, strength, and efficiency of the physical and mental powers of man can never be duly developed and maintained." Raise the standard of instruction in our common schools, the nurseries of statesmen as well as farmers. Infuse into the juvenile studies of your boys the elementary principles of physical science; of those fixed laws of nature, which regulate and control matter, organic and inorganic, a knowledge of which is as beneficial to agriculture as it is to the art of war, or the healing art. Nay, there is probably not a business in life which can derive higher advantages from some of the sciences than agriculture. "It is not the arbitrary laws of man that improve the condition of man; for if they did, there has been enough of them, such as they are, to have made him perfect long ago. No—they will not do; we want the development of the laws of nature, in agriculture, manufactures, commerce, knowledge," to improve his condition, his habits, and his morals.—Excite emulation, encourage industry, and recompense useful talent and enterprise by pecuniary and honorary rewards. With these teachings and these encouragements, the work of agricultural improvement will be accelerated; intellectual and moral improvement will receive a new impetus; science and art will consort as twin sisters, as legitimately designed; industry will become more honorable and be more honored; agriculture will assume a higher walk and character; and, to borrow Sully's simile, her paps shall teem with nutriment, that shall fill every mouth with plenty and every heart with joy. These things will lead to as benign a result here, as they have every where that they have been put in practice. They are as certain as cause and effect. "Does any one think," to quote a late writer, "that the world is travelled over, so that nothing remains to be explored? So far from it, the spirit of observation, when under the direction of science, labors with tenfold more success, and unfolds, even in the most beaten paths, a thousand resources of which man never dreamed. Look, for example, at the progress of horticulture. How many would have laughed at the idea of forming societies in reference to fruit trees, of which all the kinds were supposed to be familiarly known? And yet who does not know that science is creating new varieties, by following out the suggestions of nature? There can be no doubt that science will be continually drawing out new resources from the vegetable world. Fruits that are now thought worthless, will be multiplied, like the crab apple, into rich and various kinds; roots, like the potato and mandioca, which were poisonous in their natural state, will be disarmed of their venom, and *tamed* for the service of mankind." "The fact is, that every man, woman and child, has a direct interest in these studies. Every man who owns a beast; every woman who lives where moths corrupt a garment; every child who rambles in his holidays, returns burning with poison from the hedge, has a direct and pressing interest in studies of this description."

On the old continent, it has ever been the fortune of the tillers of the soil, though constituting the mass of population, to occupy a menial and subordinate station in society. Though their privileges have been nominal, their burdens have been onerous; they have been literally the tax paying class.—We profess to have thrown off the shackles from our yeomanry, and to hail them, particularly when we want their votes, as the enlightened sovereigns of the land; and sovereigns they truly are, and must continue to be, while our country remains free. But are they treated as such? Are they educated as such? We have established and endowed schools for the special instruction of the minor classes; but have we established any for the special benefit of the major class—the working class—the farmer and mechanic? We spend millions to protect our commerce; and we pay other millions in the form of custom-house duties—for it is the consumer who ultimately pays—upon the foreign commodities we consume, to encourage and sustain our manufacturing establishments. This is as it should be. But what direct aid do we give to our agriculture—the business that freights our commerce, and feeds our manufacturers? We have no discriminating duty which protects this branch of our labor, nor do we ask for any. But we do ask for a more equal participation in the blessings of public education, and for legislative patronage, to enable us to develope the natural resources of our soil.

There is another point, I think, in which justice is withheld from the agriculturist. I mean in the imposition of our taxes. The balance of our mercantile and professional, and I believe manufacturing capital, consists in personal estate. The law allows so much of this to be exempt from assessment and tax as is equal to their debts, which are too often enough to cover their personal estate. The property of the farmer consists principally of his farm—his personal effects being comparatively trifling, or of that description which the law exempts; and though he owes to the extent of his whole farm, the assessor is not allowed to abate a cent of its value, in consequence, upon the tax roll. The inequality of this rule will appear by supposing two individuals to start in business with a credit each of $10,000; one buys a farm for this amount, and the other buys merchandise. Neither are in fact worth any thing, above their debts. By the existing law, the farmer would be compelled to pay a tax on $10,000, while the merchant would not be required to pay a cent's tax. Is this right? Is it equitable? Does this not savor somewhat of the spirit of the aristocratic notions of the old world, which imposes onerous burthens upon the farmer? The impression is irresistible upon my mind, that although we have done much to elevate the farmer to his true rank in society, we have not done enough to improve the powers of his intellect—to make him wise in his business, and useful to the republic.

I come now to the question, what can this Convention do in furtherance of these great objects? To this I reply—imitate the industry, liberality, and perseverance of the good men who have achieved equally difficult tasks, in other branches of public improvement, in our day and country. Inform the public mind, digest your plans, and enlist the co-operation of your fellow-citizens. Petition your Legislature for the aid which justice and sound policy demand; and if they deny or neglect your prayers, carry your appeal to their fears: *threaten*, that, with respectful but persevering importunity, *you will continue to urge your claims* till more auspicious times, or a more enlightened policy shall crown your efforts with success. Imitate the persevering examples of Ami Dardin and Corn's Higgins, who renewed their applications for legislative justice, or legislative bounty, for more than twenty years, and until they finally gained a hearing, and got their reward.—There is no dishonor in being discomfited in a good cause, even twice or thrice, and there is much pleasure in finally triumphing.

On motion of Mr. Viele of Rensselaer, a committee of one from each Senate district was appointed to nominate officers for this Convention, and to report names at the next meeting. The committee appointed in accordance with the above motion, was Messrs. A. Van Bergen, H. Holmes, P. Jones, Gen. Hathaway, T. D. Burrall, J. McCollum, Charles Livingston, and P. Pelton.

On motion of Mr. Leland, of Steuben, a committee of two from each Senate district was appointed to report the proper business to be brought before this Convention, and the order of business that ought to be adopted therein.

The committee chosen in pursuance of the above resolution, were H. H. Jones and J. L. Graham, of the 1st district; J. Chambers and W. Cunningham, 2d district; A. M'Intyre and Joab Center, 3d district; L. Bradish and G. Wendell, 4th district; J. B. Yates and J. B. Lewis, 5th district; J. R. Drake and Z. A. Leland, 6th district; J. Hopkins and J. C. Fuller, 7th district; C. H. Carroll and L. F. Allen, 8th district; together with the chairman.

The Convention adjourned to meet at this place to-morrow at 3 o'clock, P. M.

Tuesday, February 9.

The Convention met at 3 o'clock, P. M. Mr. Van Bergen, from the committee to nominate officers for this Convention, reported the following names:

J. Buel, of Albany, President. G. Wendell, of Washington, 1st Vice-President; J. M'Call, of Allegany, 2d do.; L. Bradish, of Franklin, 3d do.; P. Patterson, of Genesee, 4th do. D. L. Dickinson, of Broome, and J. J. Viele, of Rensselaer, Secretaries.

The report was unanimously adopted.

Mr. Carroll of Livingston, from the committee appointed to report the business to be brought before this convention, reported as follows:

The committee of sixteen, who were appointed to consider and report suitable subjects for the action of the N. Y. State Agricultural Convention, have entered upon the consideration of the duties assigned them, with a thorough conviction, that the deliberations of this convention were intimately

duced in the various branches of husbandry; and believing that a further appropriation would be alike beneficial, in developing the capacities of the human mind, and of the soil, for improvement, and in augmenting the resources and revenues of the State,—they respectfully solicit that an appropriation be made, with the view of exciting laudable emulation, and of rewarding those who make important discoveries in labor-saving machines, or in other departments of husbandry—who introduce new and valuable breeds of animals, plants or seeds—or who improve or extend useful methods of cultivation, and that they believe such appropriation would tend greatly to increase the resources and revenues of the State, and to promote the diffusion of useful knowledge.

And your memorialists further represent, that within the last year, an insect, denominated the grain worm, before unknown among us, has committed serious depredations upon the wheat crop, in the northeast counties of this State; that it is progressing south and west, and threatens immense damage to this great staple product of our State, unless efficient means can be discovered to prevent its ravages. Your memorialists would respectfully suggest, that the Legislature offer a pecuniary reward, of sufficient amount to call into action the scientific and practical talents of our citizens, for the discovery of a preventive of the evil—the reward to be withheld until the efficiency of the preventive shall be fully and satisfactorily established.

J. BUEL, President.

J. M'CALL,
L. BRADISH,
G. WENDELL,
P. PATTERSON, } Vice Presidents.

D. S. DICKINSON,
J. J. VIELE, } Secretaries.

RECIPE FOR CURING BEEF.—A friend has handed us the following recipe for curing beef. To every 100 lbs. of beef add a pickle compound of 9 lbs. of salt, 3 qts. molasses, ½ lb. saltpetre, and 2 oz. salaratus. The ingredients should be boiled together and skimmed, and added to the beef when cold. Beef cured in this way will be perfectly sweet, tender and good.—[N. H. Spec.]

OFFICE LONG ISLAND RAILROAD CO.
New-York, March 1, 1836.

NOTICE TO RAILROAD CONTRACTORS.

Proposals for the Graduation or formation of the Road Bed of a Division of the Long Island Railroad, extending from Jamaica to Jericho, (a distance of about 15 miles,) will be received, at the Office of the Co., No. 10 Front street, Brooklyn, from the 20th to the 25th inst; during which period, those disposed to contract, will obtain the requisite information, at the Office in Brooklyn, or at Mr. Van Colt's Tavern, in Jamaica.

ALSO, will be received, on or before the 15th inst., Proposals for the construction of Car and Engine Houses, to be erected in Jamaica, and in Bedford, or its vicinity; the plans of which, with specifications, will be exhibited and explained, by Mr. T. C. Gibbs, at the office in Brooklyn.

By order of the Board of Directors.
WILLIAM GIBBS MCNEILL,
Engineer of the Company.
JAMES P. KIRKWOOD,
m5-2w Resident Engineer

PROPOSALS FOR THE REPUBLICATION OF THE REPORTS OF THE BALTIMORE AND OHIO RAILROAD COMPANY;

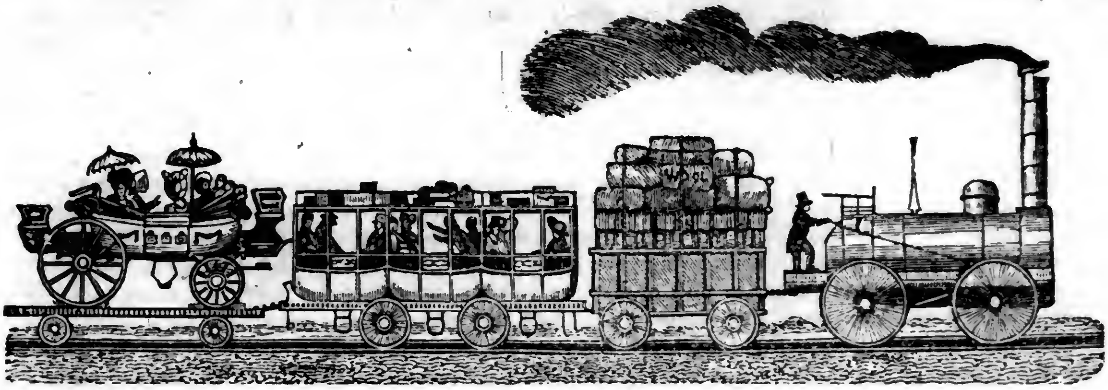
Condensed so as to include, together with other matter added thereto, all that is known at the present day of the location and the application of Motive Power and Machinery thereupon, accompanied with explanatory drawings. The whole being intended to serve as a Manual of the Railroad System, for the use of Civil Engineers, to which is prefixed a history of the Baltimore and Ohio Railroad Company.

The work, whose reports it is thus intended to republish, was the first of any extent commenced in this country for the purposes of general transportation; and its early history is but a series of experiments, costly to the Company which had it in charge, but furnishing results of the greatest value and importance to others. The character of the country through which the road passed, involved every species of excavation; and in the construction of the Railway, almost every mode was successively tried for the purpose of ascertaining the best. While portions of the road were straight, others were of the smallest admissible curvature, and the locomotive power employed had to be such, therefore, as was suitable to both cases. This led to a series of experiments in this department of the Railroad System, which has resulted in the production of Engines preferable to any in use elsewhere—equal in speed to the best imported, and far superior in efficient power. From all these circumstances, the reports of the Baltimore and Ohio Railroad, from its commencement to the present day, have been sought for by Civil Engineers for the sake of the knowledge which they contain, and the frequent demand for them has suggested to the subscriber their republication, with such additional matter as shall constitute a Manual of the Railroad System in the present state of knowledge on the subject.

The reports are now difficult to be procured, and but few complete sets are known to be in existence. While the proposed republication will therefore be of use to the profession of Civil Engineering, it will be the means also of preserving the records of a work whose importance and value are now universally appreciated. The work will be divided into five parts.

I. History of the Baltimore and Ohio Railroad Company.
II. The location of Railroads, including the principles of reconnoissances, general instrumental surveys, and location for construction.
III. The construction of Railroads, including the excavation and masonry and the construction of the Railway on the graduated surface, turnouts, weighing, &c.
IV. The motive power including engines, cars, wagons, &c.
V. Forms of contracts for every species of work which has to be performed in the construction of a Railroad.

☞ As it is not practicable to ascertain what sized volume or volumes the contemplated work will make, the price cannot be fixed, but Railroad Companies and individuals who may subscribe for it, may rest assured, that it will be made as reasonable as the nature of it will permit. Orders directed to
F. LUCAS, Jr. Publisher,
Jan., 1836. No. 138 Market street, Baltimore.



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 13 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, MARCH 5, 1836. [VOLUME V.—No. 9.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 5, 1836.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANICS' MAGAZINE, is removed to 132 *Nassau street*, opposite CLINTON HALL, and two doors *below Beekman street*.

☞ Will those Editors to whom the Journal is sent, do me the favor to notice this removal, send their papers in exchange, and request the friends of the Periodicals in the country to direct their orders to me at 132 Nassau street.

The favor shall be reciprocated at any and all times, by

D. K. MINOR.

March 23, 1836.

We have received the papers mentioned in the subjoined extract of a letter from A. A. DEXTER, Civil Engineer, for which we are much obliged to him. We shall make use of them as soon as possible.

"Railroad Office, Montgomery, Ala., "March 2, 1836.

"I transmit in the same mail with this two newspapers—one containing the proceedings of the Railroad Convention of this State, and my Report to the same—and the other containing my Report on the survey of the Demopolis and Woodville Railroad, in the southwestern part of this State. This latter work will probably be commenced shortly—and the great Mobile and Tennessee Railroad, having been chartered on liberal principles, will be carried through, without the least question. The Montgomery and Chattahoochie Railroad is now in progress of construction from this place to West Point, Geo.—about 40 miles are under contract, for grading and bridging. For these 40 miles, the profile is probably superior to that of any Railroad in the United States of a similar distance—as the maximum rate of inclination is only 13 feet to the mile, except in two instances, where for a short distance a rate of 20 feet to the mile is adopted. The estimate of the cost of graduating these 40 miles is only $110,000, and the work has been taken within the estimates. Our stock ($800,000) is all taken—$100.000 by the Corporation of Mobile City—and the graduation of the first 40 miles is to be completed in 12 months. We expect to be met at West Point by the Georgia Railroad from Augusta—and I hope in a few years to see a complete line of Railroad in operation between this place and Charleston, South Carolina.

"I have lately completed the survey of the route of the Benton and Haysville Railroad, (18 miles in length,) about 24 miles south of this place. Route very favorable, and work likely to go on."

To the Editor of the Railroad Journal:

Having accidentally turned my telescope to the sun on Wednesday last, (March 16,) I found a spot on its surfaee, of considerable magnitude.

I have observed it since at intervals, and find that it has increased. A second small one was formed, and yesterday I observed a third.

They are now near the N. W. limb of the sun.

The most northerly one is well defined, and elongated, resembling Saturn and its rings, when seen through a telescope of inferior power.

The middle one is well defined, and nearly circular.

The most southerly one is quite large, and irregular. The main portion of it is curved toward the second spot, a bright point being within.

Between these last two, numbers of smaller spots are sprinkled. The Umbra extends around the three.

The width varies; the length, measured by different methods and instruments, is 2′ 45″. The spots must therefore extend in the direction of their length, over 75,000 miles of the sun's surface.

They change continually.

As they are near to the sun's western limb, a very interesting view of them may be had when they disappear in a few days. It is for this purpose that I call attention to them, as those fortunate enough to possess better instruments than mine, may be enabled to give us some new light on this subject.

Should any of your readers observe these spots, I would be much pleased to ascertain the result through the medium of your Journal. G. C. S.

New-York, March 21, 1836.

LABOR-SAVING INVENTIONS.

In a former number on this subject, I came, I believe, by natural inferences drawn from correct premises, to the conclusion that the various labor-saving inventions of the present day were not injurious to society; and that, instead of injuring the poor by depriving them of labor, which is their only means of subsistence, they improved their condition, by rendering their labor infinitely more profitable to the employer, and thereby not only supplying him with the means to feed and employ greater numbers, but exciting in him the stronger disposition to do it, in proportion as the profits on the work of each laborer will be greater. I stated also, in concluding the last number, that I had not done with the subject, and pledged myself not to quit it till truth and reason shall determine in favor of one side or the other.

That labor-saving inventions are injurious

to the poor, by depriving them of labor, their only means of procuring subsistence, is either true, or it is not true. If not true, then the person whose deep and patient study, and whose persevering toil produces those inventions, is richly entitled to an adequate reward. But if true—if these inventions serve merely to aid the monopolizer and to oppress and starve the poor, then it is the duty of every honest man in society, not only to discountenance them, but to do all in his poweto destroy them, or at least to bring them into utter disuse.

As I have stated in a former number, the fairest way to decide this important question is to admit alternately, both sides, and on the ground of this admission, pursue each side to where it will naturally terminate, and then compare the results.

In the former number, I commenced and pursued that course, so far as relates to some of the most prominent modern inventions, such as the steamboats, canals and railroads, and the spinning and weaving by machinery. But as I have there stated, there is no stopping place: if one labor-saving invention is a curse to the poor, they are all so, and if they are a curse now, they were always curses—if any inventor of a labor-saving machine now deserves execration for so doing, every inventor, from time immemorial, was guilty of a most criminal offence, and ought to have suffered accordingly. I have already premised the destruction of the steamboats, the canals and railroads, and we will now suppose ourselves to have no other means of artificial locomotion than wheel carriages or other vehicles drawn by horses, oxen, or other domesticated animals. The entire apparatus for spinning and weaving by artificial mechanical power, we are also now to suppose destroyed or laid aside, and the farmers' wives and daughters manufacturing their own linsy-woolsy, as heretofore, with their own spinning wheels and looms.

But the case is not decided. We are to have no labor-saving machines. Not only the wheel carriages but the wheel and the loom are wicked labor-saving inventions. The carriage wheel was a most atrocious labor-saving invention; and so, ladies and gentlemen, who are riding in coaches, you must immediately disembark, and take some more harmless mode of conveyance. The invention of wheels must, no doubt, have thrown thousands of poor laborers out of employment, and left their families starving. No matter how long the offence has been committed; it is still unatoned for, and the longer it has been in use, the greater is the accumulation of guilt. The farmer, also, must, for the same reasons, discharge the wheels from his cart or wagon. If the travellers wish to be carried, they must hire poor men to carry them in a palanquin or on a litter—for they cannot now be allowed even to ride on horseback, as catching and domesticating the horse and other wild animals, and teaching them to labor, was evidently a labor-saving invention, and was transferring the labor from poor men to beasts. And if the farmer has any thing to carry to market, he must carry it himself, or employ his poor neighbors to do it. But as the farmer must now dispense with the use of the plough, the spade, the axe, and nearly all his implements of husbandry, they having all been, at some time or other, labor-saving inventions, he will, therefore, have little or nothing to carry to market. The spinning wheel and the loom, and all the ingenious labor-saving inventions by which the various fabrics for clothing are now made, must share the same fate. Both spinning and weaving were once performed, and in several parts of the world are still performed, in ways which would give employment to fifty poor people to do what would now be done by one wheel or one loom.

When we have brought the traveller, the farmer and the manufacturer of articles for clothing, to a proper sense of their duty, and they have discarded all those hateful monopolizing inventions, by which the poor are doomed to idleness and starvation, let us next turn our attention to that most pernicious of all other inventions, the printing press. So base a thing was this encroachment upon the ancient rights of those worthy people who obtained a respectable living by writing books, or rather long rolls of parchment, that the inventor was declared not only to be moved and instigated by the devil, but in absolute league with him, and was dealt with accordingly. When we have destroyed the press, the next business in course will be to destroy all the printed books, in order to restore business to those who would be employed to write them, as they were formerly, in manuscript rolls. And when we have done all this; when we have not only destroyed the press and its productions, but all the labor-saving machines and implements of the farmer and the manufacturer, let us review the subject, and see what will be the state of society, and what benefits will result to the poor.

In this state of things, labor of the most industrious man would not yield him one half of what we now consider the necessaries of life. The rich, so long as they remained rich, would indulge themselves in the comforts and luxuries of life, but they would have to import them from foreign countries, for they could not be made here; and as they would have nothing to export but cash, their wealth would be constantly diminishing. They could not afford to cultivate their lands any farther than was necessary to a bare subsistence, because nothing they could produce would pay the cost of producing. They could not let out their lands to the poor to work either on shares or on hire; for the whole of what the poor man could raise would scarcely keep himself and family alive, and he would have no means to pay rent, and therefore could not hire. In a few years, the land, but little of which could be cultivated, would become useless, except for hunting ground; the rich would become poor, and the poor would become inured to want and hardships. In a very few centuries, the country would be in the same state the aborigines were in when this country was discovered. In short, the whole ground by which this or any other civilized country differs from the state in which aboriginal America was discovered, is solely the result of labor-saving invextions.

The advocates of the anti-labor-saving doctrine will perhaps say, "This is a mere assertion, we want better proof, before we can be convinced." I will endervor, then, to give the best proof the nature of the case will permit, and I think the best they can possibly require. "Facts are stubborn things," and to their decision I will refer each part of the subject. I shall begin with the modes of conveyance of persons and property, and proceeding to modes of agriculture and modes of manufacturing, shall appeal to examples in each case, to show what has been the effect of labor-saving inventions.

With respect to travelling and conveying property, every thing that relates to it naturally comes under the same head. An improved public road, a turnpike road, a railroad, a canal, or a steamboat, are all equally entitled to be classed as labor-saving inventions. In each of these, our own country affords innumerable illustrations of the effect they have in giving labor to the poor, rather than taking it away from them. In constructing turnpikes and railroads, and in digging canals, more laborers have been employed and paid in the United States, within thirty years, than were ever employed in this country before, since its first settlement; or than would be employed in one or perhaps two centuries to come, had no such work been undertaken; and could any mode be contrived to increase the effect of such labor—could any means be invented by which one man could remove as much earth in a given time as two can now remove; instead of lessening the number of laborers, it would increase them, because in proportion as such improvements could be effected cheaper, many more would be undertaken. Before the Erie Canal was commenced, such works were by most people in our country, as well as in most others, considered visionary and impracticable. The chief demand for labor then, was to aid the farmer who had a little more land than he and his sons could till; and who happened to live near some city or seaport, where his produce would command money to pay for such labor. If he lived far from market, his effects would not pay for carrying to market, and therefore he could not hire. Now, hundreds of thousands of laborers are employed in constructing public improvements; and those improvements not only increase the demand for provisions, as the laborers must all be fed, but they open a market to the most remote farmer, and

thereby increase the demand for agricultural labor.

In the year 1827, the clamors of laborers and others against labor-saving improvements, attracted the attention of the British House of Commons, and a committee was appointed to investigate the subject. From their report I shall offer some extracts, which I think, if any doubts remain on the subject, after what evidence this country affords, must remove them.

"In the Highlands of Scotland, at the beginning of the present century, the communication from one district to another was attended with such difficulty and danger that counties were excused from sending jurors to the circuit, to assist in the administration of justice. The poor people inhabiting those districts were certainly cut off from intercourse with the rest of mankind. The Highlands were of less advantage to the British empire than the most distant colony. Parliament resolved to remedy the evil; and accordingly, from 1802 to 1817, the sum of two hundred thousand pounds was laid out, in making roads and bridges in these mountainous districts. Mark the important consequences to the people of the Highlands, as described by Mr. Telford, the engineer of the roads."

"In these works, and in the Caledonian Canal, about three thousand two hundred men have been annually employed. At first, they could scarcely work at all; they were totally unacquainted with labor; they could not use the tools; but they have since become excellent laborers; of that number we consider one fourth annually left us, taught to work. These works may be considered in the light of a working academy, from which eight hundred have annually departed, improved workmen. These men either returned to their native districts, having had the experience of using the most perfect sorts of tools and utensils, (which alone cannot be considered as less than ten per cent. on any labor,) or they have been usefully disseminated throughout other parts of the country. Since these roads have been made accessible, wheelwrights and cartwrights have been established, the plough has been introduced, and improved tools and utensils are used. The plough was not previously used in general; in the interior and mountainous parts they frequently used crooked sticks with iron on them, drawn or pushed along. The moral habits of the great mass of the working classes are changed; they see that they may depend on their own exertions for support; this goes on silently, and is scarcely perceived, until apparent by the results. I consider these improvements one of the greatest blessings ever conferred upon any country."

"There are many parts of Ireland which sustain the same miseries and inconveniences from the want of roads as the Highlands of Scotland did at the beginning of the present century. In 1823, Mr. Nimme, the engineer, stated to Parliament that the fertile plains of Limerick, Cork and Kerry, were separated from each other by a deserted country, presenting an impassable barrier between them. This country was the retreat of smugglers, robbers and culprits of every description. According to another engineer, Mr. Griffith, this tract, in 1824, was a wild and deserted country, without roads, culture or civilization. The government ordered roads to be made through this barren district. In 1829, in less than five years after the commencement of the roads, Mr. Griffith thus describes the change that had been produced:

"At the commencement of the works the people flocked into them, seeking employment at any rate; their looks haggard, their clothing wretched; they rarely possessed any tools or implements, beyond a small, ill-shaped spade; and nearly the whole face of the country was unimproved. Since the completion of the roads rapid strides have been made. Upwards of sixty new limekilns have been built; carts, ploughs, harrows, and improved implements have become common; new houses of a better class have been built, new enclosures have been made, and the country has become perfectly tranquil, and exhibits a scene of industry at once pleasing and remarkable. A large portion of the money received for labor has been husbanded with care, and laid out in building substantial houses, and in the purchase of stock and agricultural implements; and numerous examples might be shown of poor laborers, possessing neither money, houses nor lands, when first employed, who, in the past year, have been able to take farms, build houses, and stock their land."

Another witness, Mr. Kelly, thus describes their condition, before and after the roads were made—"At Abbyfeale and Bransa, above half the congregation at mass on Sundays were barefoot and ragged, with straw hats of their own manufacturing, felt hats being worn only by a few. Hundreds, or even thousands of men could be got to work for sixpence a day, if it had been offered. The farmers were mostly in debt, and many families went to beg in Tipperary and other parts. The condition of the people is now very different; the congregations at the chapels are now as well clad as in other parts; the demand for labor is increased, and a spirit of industry is getting forward, since the new roads have become available." * * * * * * * * "But there are people who can understand the value of a road, who cannot perceive that of a steam-engine. Let us see what the steam-engine does for communication."

"The establishment of steamboats between England and Ireland has greatly contributed to the prosperity of both nations. How have steamboats done this? They have brought the people closer together. They have made the closely packed millions of people who live in the country round Liverpool, the neighbors of the small farmers and peasants who live amongst the rich valleys of Ireland. The steamboat has given cheaper food and more of it to the manufacturers on the banks of the Mersey, and cheaper clothes and more of them to the laborers on the banks of the Shannon."

Mr. Williams (who gave his evidence last year to Parliament on the condition of the poor people in Ireland) says—"Before the steamboats were established, there was little trade in the smaller articles of farming production, such as poultry and eggs. The first trading steamboat from Liverpool to Dublin was set up in 1824. There are now 40 such boats between England and Ireland. The sailing vessels were from one to two or three weeks on the passage. The voyage from Liverpool to Dublin is now performed in fourteen hours.

Many millions of eggs, collected among the very poorest classes by the industry of women and children, are annually sent from Dublin to Liverpool. Mr. Williams has known fifty tons, or eight hundred and eighty thousand eggs shipped in one day, as well as ten tons of poultry; and he says this is quite a new creation of property. It is a creation of property that has a direct tendency to act upon the condition of the poorer classes in Ireland; for the produce is laid out in providing clothes for the females, and children of the females, who engage in rearing poultry and collecting eggs. Thus the English manufacturer is bettered, for he has a new market for his manufactures, which he exchanges for cheap provisions; and the dealer in poultry and eggs has a new impulse to this branch of industry, because it enables him to give clothes to his wife and children.

I might extend the quotation of facts in evidence of the benefits resulting to the poor from the introduction of labor-saving inventions, almost to infinity; but the mind that would not be convinced by what I have already said and what I have quoted, would not be so by any means short of miraculous interposition. I shall in my next number endeavor to show from reasoning, and from facts, what have been the effects of such inventions in the manufacturing interest, as to depriving the poor of labor, or of increasing their labor and benefitting their condition. S. B.

MACHINE FOR MAKING WROUGHT NAILS.

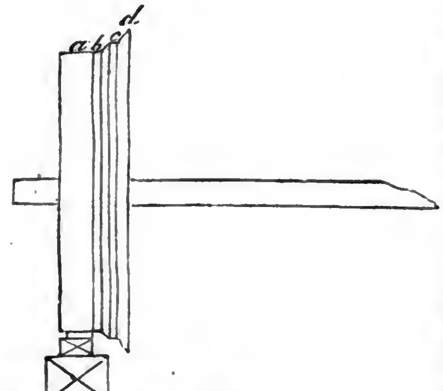
Our readers will recollect notice having been given, some time since, of a machine having been invented for the above purpose, by Mr. Simon Fairman, and therefore, to announce the same thing again requires an explanation. That explanation is as follows: Nearly two years ago, Mr. Fairman invented and constructed a machine for making wrought nails. This machine actually produced the effect of making wrought nails, and he sold the machine, together with the right of obtaining a patent. But it was an expensive and rather complicate machine

and we believe the purchaser thought it would cost more to keep it in order than would be gained by the profits, and therefore never attempted to put it in use.

But many of the most valuable improvements have been come at by approximation, and having pursued a wrong course, often enables an inventor to discover a better, until, by successive trials, he attains the desired effect. And so it proved with Mr. F. in this case. His first machine suggested to him another and a better plan, which he commenced putting in practice, but before he had completed it, his ever active mind suggested another plan, entirely different from, and infinitely more cheap and operative than either of the former. This he has now completed, and if there is any perfection in the arts, we should think a specimen of it was exhibited in this machine. Every part of the machine appears to be reduced to its lowest terms of simplicity, and with a degree of operativeness which cannot fail to do its duty—and is scarcely liable to disorder until its parts, which are constructed with great strength, shall be worn out in actual service.

We saw it in operation, making at the rate of about forty nails per minute, and to say they were handsome nails, would not be doing justice to the subject. They were in appearance such as an ingenious mechanic would make to exhibit as a specimen, by forging them carefully out of a piece of fine metal, and then finishing them by filing and polishing them in the finest shape that ingenuity could suggest. Mr. F. has hitherto been more successful in displays of useful ingenuity than in meeting the reward it merited; but if this invention does not place him out of the reach of want, we shall be ready to subscribe to the opinion, that ingenuity is a real misfortune. We think no small share of credit is also due to the patriotic gentlemen who furnished Mr. F. with means to perfect his machine, and bring his ingenuity to useful practice.

Diagram No. 3.



Improved Car Wheel.—By accident the following description of Mr. Steele's "*Improved Car Wheel,*" was published in number 7 [illegible] ut the illustration, which [illegible] accompany it. We now therefore, republish it, with the accompanying engraving.

Diagram No. 3 represents a double *flanged* car-wheel; *a* is the *cylindrical* part of the wheel, *b* the *cone*, and *c* and *d* the flanges. The object of the double flange is to decrease the liability of cars to run off the track. Each of the flanges we will suppose of the usual depth. Now suppose an obstruction on the rail which would raise the wheel high enough to clear the first flange, that flange would fall on the top of the rail, and the wheel for a moment would roll on it, but with such an increased diameter as would restore it in half a revolution to its proper position. The effect of this is so obvious and simple, that a further description is deemed unnecessary.

Respectfully,
S. D. Steele.

RAILROAD AND CANAL INTELLIGENCE.

UPPER CANADA.

Several Railroads are proposed in this province. One is from Sandwich to Buffalo; a rival route is from Burlington Bay (head of Lake Ontario.) to London, and from thence to Sandwich; also from London to Lake Huron; also from Hamilton (on Burlington Bay,) to the Niagara River. The route from Hamilton to Sandwich has been examined, and the distance is reported to be less, and the ground more eligible, than the Lake Erie route. A bill to incorporate a Company with a capital of two million dollars to construct a road on the London route, has been introduced into the Legislature.—This route, with the Boston, Albany, and Oswego Railroads, will shorten the time and lessen the expense of the journey from the east to Detroit by at least one-third.

CONNECTICUT.

The (New-Haven) Daily Herald of the 15th inst. contains a map of the various routes of the Hartford and New-Haven Railroad. It appears that the western route is the most favorable.

The Herald relates a curious anecdote of the people of Newington:—

The Newington folks, we are told, hearing that it was proposed to run a Railroad through their town, presented a remonstrance to the Directors, representing that they were a peaceable, orderly people (which in truth they are,) and begged that their quiet might not be interrupted by steam cars and an influx of strangers. As good luck would have it, there was no occasion to contravene their wishes—the other fork being deemed preferable.

NEW-YORK.

A memorial has been presented to the Legislature, asking for a Canal from the Chemung river, three miles long, to Elmira, for manufacturing purposes, as well as for navigation.

NEW-JERSEY.

From a list of 141 acts passed by the New-Jersey Legislature, at its late session, we copy the titles of those of a public nature. Among the private acts, are *twelve divorces.*

To incorporate the Reigelsville Delaware Bridge Company.

To repeal certain chartered rights therein specified, and for other purposes.

To incorporate the Salem, Delaware, and Philadelphia Steamboat Company.

To provide for the establishment of Public Schools in Paterson.

To incorporate the Belvidere and Port Colden Railroad.

A further supplement to the act relative to the Supreme and Circuit Courts.

An act relative to the property of the incorporated Society of Friends.

To incorporate the Lumberville Delaware Bridge Company.

To incorporate the Medford Railroad and Transportation Company.

A supplement to the act incorporating the inhabitants of townships, designating their power, &c., passed Feb. 1, 1798.

A further supplement to the act to incorporate the New-Jersey and Hudson River Railroad Company.

To incorporate the Belleville Railroad.

A supplement to the act incorporating the Salem and Philadelphia Steamboat Company.

A further supplement to the act incorporating the Elizabethtown and Somerville Railroad Company.

To incorporate the New-Brunswick Manufacturing Company.

To incorporate the Bergen Railroad and Transportation Company.

To incorporate the Elizabeth Port Manufacturing Company.

To incorporate the Newark Malleable Iron Manufacturing Company.

To set off a new township in Gloucester, to be called "the township of Washington."

To incorporate the Burlington and Mount Holly Railroad and Transportation Company.

To incorporate the Morris County Bank.

To incorporate the Monmouth and Middlesex Agricultural Railroad and Transportation Company.

To authorize Peter V. Pool and John A. Pool, trustees to sell certain real estate.

A supplement to the act establishing Banking and Insurance Companies in Newark, passed Feb. 17, 1804.

A supplement to the act incorporating the Farmers' and Mechanics' Bank at Rahway. [Increasing the capital $100,000.]

To incorporate the Totowa Manufacturing Company.

To incorporate the Neshanic Mining Co. of Hunterdon.

To incorporate the city of Newark.

To incorporate the Camden and Woodbury Railroad.

To encourage the growth of thorn hedges.

To incorporate the Belvidere and Delaware Railroad Co.

A supplement to the act regulating the repacking of beef and pork, passed Sept. 2, 1802.

To incorporate the Dennisville Glass Manufacturing Co. in Cape May.

A supplement to the act incorporating the Orange Bank. [Increasing the capital $100,000.]

To incorporate the Elizabethtown Silk Manufacturing Co.

To incorporate the Mount Holly and Camden Railroad.

A supplement to the act regulating the shad fisheries in South River, in Middlesex county, passed Feb. 22, 1804.

To incorporate the Union Manufacturing Co. of Trenton.

To incorporate the Patent Arms Manufacturing Co.

To incorporate the Camden and Philadelphia Steamboat Ferry Co.

To incorporate the Woodstown and Bridgeton Railroad.

A supplement to the act securing to mechanics and others payment for their labor, materials, &c., passed March 3, 1835. [Extending the act to the whole county of Hunterdon.]

To incorporate the Passaic Navigation and Manufacturing Company.

To incorporate the New-Jersey Silk Manufacturing Co.

To incorporate the Milford Delaware Bridge Co.

To provide for the instruction of indigent blind persons.

To incorporate the Alloways Creek Navigation Co.

A supplement to an act to incorporate the Clinton Manufacturing Co., passed Feb. 1, 1830, and an act supplementary thereto, passed Jan. 30, 1833.

To authorize the chosen freeholders of Essex and Middlesex to build a drawbridge over Rahway river, at Rahway.

To increase the capital of the State Bank at Newark. [$300,000.]

To incorporate the N. J. Manufacturing Co.

Making a further appropriation of $2,000 for the prosecution of Geological Surveys.

To raise the sum of $10,000 for the year 1836.

A further supplement to the act to incorporate the New-Jersey Turnpike Co.

To incorporate the Egg Harbor and Camden Railroad.

To incorporate the Mechanics' and Tradesmen's Institute of Newark.

To incorporate the Monmouth Silk Co.

To incorporate the Salem Silk Co.

MARYLAND.

We have before us the report to the City Council of Baltimore respecting the subscription to the Baltimore and Ohio Railroad. It is a well written document, containing much information.

The report and resolutions passed both branches.

VIRGINIA.

The Railroad *from Harper's Ferry to Winchester*, which connects with the Baltimore and Ohio Railroad, is now open. On the 9th inst., at 12 o'clock, the locomotive engine, Tennessee, the first ever seen in the valley of Virginia, came up from Harper's Ferry to Charlestown in style, with a train of cars, and, after tarrying a few minutes, passed on to Winchester.

LOUISIANA.

At a meeting of the Directors of the Atchafalaya Railroad and Banking Company, Joshua Baldwin, Esq. was elected President, S. G. Dixon, Cashier, and W. H. Rondeau, Secretary.

This institution is now open for banking business.

TENNESSEE.

The Improvement Act, recently passed, provides for the subscription by the State for one-third of the stock of Railroads, &c.

Several meetings in favor of the Cincinnati and Charlestown Railroad have been held in North Carolina and Tennessee.

OHIO.

The books of the Wellsville and Fairport Railroad have been opened. The stock was in great demand.

MICHIGAN.

Detroit and St. Joseph Railroad.—At a meeting of the Directors of the Detroit and St. Joseph Railroad, held at the office of the Chief Engineer, on the 27th day of February, 1836, present

John Biddle, President.
O. Newberry,
Mark Norris,
D. G. Jones, } Directors.
Edmund Brush,
Justus Burdick,

Resolved, That the north line, run by W. A. Burt, under the superintendance of the Chief Engineer, from Dearbornville to the 2d mile stake, be established as so much of the Detroit and St. Joseph Railroad.

Resolved, That the contracts for cutting and grubbing the road in half mile sections, for the first six miles, from Detroit westward to the 6th mile post, will be sold to the lowest bidder, at King's corner, Jefferson Avenue, Detroit, on Tuesday, the 15th day of March next, at 10 o'clock, A. M.—And a like sale will take place of contracts for cutting and grubbing the next six miles, (from the 6th to the 12th mile stake,) at the house of Daniel Thompson, on the 16th day of March next, at 10 o'clock, A. M.—And a like sale will take place of contracts for cutting and grubbing the next five miles, (from the 12th to the 17th mile stake.) at the house of Samuel Torbet, on the 17th day of March next, at 10 o'clock, A. M.—And a like sale will take place of contracts for cutting and grubbing the next five miles, (from the 17th to the 22d mile stake,) at the tavern-house of Bradford Canfield, on the 18th day of March next, at 10 o'clock, A. M.—And a like sale of contracts for cutting and grubbing the next five miles, (from the 22d to the 27th mile stake,) will take place at the house of John King, on the 19th day of March next, at 10 o'clock, A. M.

Resolved, That the time for the completion of the contracts is limited to the 15th day of May next.

By order of the Board,
C. C. Trowbridge, Secretary.

Railroads in the United States.—It is estimated on good authority, that at this time the Railroads in the United States, either actually under contract or in progress of being surveyed, amount to more than three thousand miles. Each yard of the highest iron rails, fit for a Railroad, weighs sixty-two and a half pounds. As there are 1760 yards in a mile, each mile of Railroad, with a double track, will require 238 tons of rails, besides chains, screws, and bolts—amounting in the whole to at least 250 tons of iron per mile—250, multiplied by 3000, is 750,000 tons of iron, that will shortly be used in the United States in the construction of Railroads.

Such is the demand for Railroad iron in England for the American market, that common bar iron, which one year ago was worth only £6 10s. sterling in Wales, is now worth £9 10s. at the Welsh works, as appears by the British Prices Current.

It is stated in the New-York papers, that at this time contracts have been actually made in England by American houses, for 400,000 tons of Railroad iron to be shipped to this country.

£9 10s. sterling is about forty-five dollars of our money; but Railroad iron costs more than common bar iron, and is at this time worth at least $50 per ton, at the works in Wales or Staffordshire. Four hundred thousand tons of iron, at $50 per ton, is *twenty millions of dollars*, that the people of the United States are bound to pay to the English by their present contracts for Railroad iron. If all the projected Railroads of this country shall be laid down with British iron rails, we shall pay to the English nation, within the next seven years, at least *fifty millions of dollars for Railroad iron.*

And yet, we have in our mountains both iron ore and coal, of the best quality, and in quantities sufficient to yield iron for the whole world.—[Pa. Telegraph.]

It is a singular fact, that since the establishment of Railroads in England, rival turnpikes, which were supposed to be thereby ruined, have actually done more business than ever.

ANNUAL REPORT OF THE CANAL COMMISSIONERS, TO THE LEGISLATURE OF THE STATE OF NEW-YORK.

(Continued from No. 7.)

CAYUGA AND SENECA CANAL.

This Canal has been navigable through the season, with but little interruption.

The locks on this Canal are of wood, and many of them are in such condition as to require expensive repairs. Several of them will have to be rebuilt within a short time.

The Commissioners respectfully ask the direction of the Legislature, as to the rebuilding of these locks; that is, whether they shall be rebuilt of wood or stone.

CHEMUNG CANAL.

This Canal has been in a good navigable condition the past season, except for a short time, the latter part of August and beginning of September, in the lowest stages of the water in the Chemung River, when the leakage on the feeder, and the large quantity of water required on the Summit Level, to supply the lockages in both directions on the main Canal, reduced the water in the feeder at Horse-Heads too low for the passage of loaded boats.

The rains in September raised the Chemung River, so that by placing flash boards on the State dam at the head of the feeder, a full supply of water was obtained for the remainder of the season. To remedy the occurrence of a similar interruption, the embankment on section No. 2, a mile below the State dam on the feeder, should be raised, and lining put in on the gravelly soil to some extent, where the leakage is greatest in the feeder, and by proper economy in the use of lockage water, it is believed a full supply for navigation may be obtained.

The great number of locks in the valley of the Catharine creek, renders a constant supervision necessary to keep the short levels at all times prepared for the passage of boats. On this part of the line, the guard walls, above and below the locks, have been enlarged. Some repairs have been made to the locks; and the towing-path on several of the levels has been raised and gravelled.

CROOKED LAKE CANAL.

On this Canal there are 27 lift-locks and one guard-lock. The guard-lock is constructed of hammered stone, laid in cement. The lift-locks are of wood, and numbered from the upper to the lower end of the Canal. In the construction of the lift-locks, the embankment of earth, ordinarily put in against the sides, to resist the lateral pressure of the water in locking, was dispensed with. For the breast work at the heads, a wall of stone was constructed, and for the chambers a strong timber frame planked on the inner side, and secured by bolts to long posts, put in on the outside, resting upon and tenoned into the foundation timbers

and a cap piece framed in them across the locks: Additional support was also given externally, by the erection of a perpendicular dry wall about five feet high, along the sides, and by braces of timber, extending from the end of the fundation sticks into each of the side posts, at a point near the top of the wall.

This plan is calculated to preserve the timbers from decay, by preventing the earth from coming in contact with the sides of the lock: It reduces the original cost of embankments, and will lessen the expense of repairs, by affording ready facilities for taking out and repairing the side timbers.

On account of the limited appropriation for the construction of this Canal, the side walls of the locks were in part dispensed with. These walls, now 5 feet in height, require raising to 9 or 10 feet, as an additional support to the timber walls of the locks, and to the embankment at the sides. According to the original design, these additional walls may now be constructed with greater economy, by using the navigation to transport the stone to the locks.

The Commissioners, under the act of May 11, 1835, authorising them to deepen the upper level of the Crooked Lake Canal, and for other purposes, have made a contract to have a waste constructed on the State dam; and to have a feeder constructed from the outlet into the Canal below lock No. 8. The work is in progress, and to be completed by the first day of July next. The estimated expense is $500.

CHENANGO CANAL.

During last winter, the propriety and necessity of effectual arrangements for an early commencement of the work in the spring, and a vigorous prosecution through the season, was urged on all the contractors. Experience had shown that the progress of a public work about to be finished is generally embarrassed by a scarcity of hands, and consequent high prices for labor.

In anticipation of the existence of such a state of things on this Canal, these suggestions were strongly urged, with a view of rendering the completion of the Canal in the fall of 1836 entirely certain, and exempt from the usual embarrassments.

The spring, however, was very unfavorable to an early commencement of the work, and it was not until late in May that it was in a suitable condition for its favorable prosecution. At this period, the work on the entire line from Utica to Binghamton, was pushed forward, and a want of hands was soon felt. At this period, also, the hay and coarse grain of every kind became scarce, and high, and gave a check to the progress of the team work. This state of things was followed by high prices for provisions of all kinds, which continued through the season.

These unexpected and untoward circumstances discouraged several contractors, and retarded the progress of the work. The past has, on the whole, been an unfavorable season for its progress, and the amount of work done has fallen considerably short of what was expected. Several contractors abandoned their contracts, without commencing the work; others, after executing a part of it; and altogether, fourteen contracts were abandoned in the past season. With these exceptions, the contractors have generally advanced with their work, and under the circumstances, have made commendable progress.

The work which was abandoned has been relet, and generally for prices higher than those in the first contracts. The contracts which were abandoned have been handed to the Attorney-General for prosecution.

The contractors on section No. 2 of the Summit Level became embarrassed, and the progress of the work was interrupted early in May. This unexpected occurrence on the heaviest contract on the line, and at a season when a contractor should be in a state of preparation for doing a good deal of work, for a while rendered the completion of this section at the time specified, doubtful. A new contract was however made, after an interruption of about two months, and the work fell into the hands of men possessing means, vigor and energy of character. Its prosecution thus far has been satisfactory, and not a doubt is entertained of its completion at the time specified in the contract.

The character of the work on the Summit has thus far been quite as favorable as was anticipated, and has been more free from the unfavorable incidents which generally occur in deep excavations, than is common.

The excavation and embankment north of the summit, and south of it as far as Sherburne, is nearly completed, and on about eleven miles it is finished. The mechanical work on this part of the line, embracing 87 lift locks, with the exception of the work included in two contracts, is in quite a forward state. The work included in one of these contracts was abandoned by the first contractors, and left in a backward condition. But it has been let to excellent men; and though much remains to be done, its execution is practicable, and it is expected that it will be completed next fall. The other contract alluded to remains in the hands of the first contractors, whose good intentions to perform the work has never been doubted; but whose progress has not been entirely satisfactory. They have, however, renewed their exertions, and the progress of the work is now satisfactory.

The west and middle branch, and the Madison brook feeders, and the Woodman's Lake reservoir, are in a reasonable state of forwardness. The Madison brook reservoir is completed, with the exception of a little clearing on its border. The Eaton and Bradley brook reservoirs, though required by contract to be completed last November, remain unfinished; but the work is in a forward state, and has been retarded in its progress by circumstances before alluded to.

The line between Sherburne and Greene is also in a forward state, and the utmost confidence is entertained that the Canal from the latter place to Utica will be completed next October.

The line from Greene to Binghamton, which comprises a good deal of heavy work, is not so forward as could be wished. This part of the line was put under contract late in the fall of 1834, and very little work was done previous to last spring. The tardiness of some of the contractors, the failure of others, and the scarcity of hands, has fallen pretty heavily on this part of the line; but its completion next October has at no time been despaired of.

It was foreseen as early as last August that it would require an effort to finish this part of the line at the time contemplated, and measures were adopted to place the work in a situation for a winter's operation. This arrangement will not only be important in reference to the progress of the work, but its tendency will be to retain on the line the laborers, many of whom would otherwise have left last fall. It is seldom profitable to work in the winter, but the contractors were deeply interested in keeping the men on the line during the winter, as it would be difficult to induce men to come from abroad next spring without paying extra wages of two or three dollars per month. Last November there was an insufficient number of men on the line for the winter, and a successful effort was made to procure them from other public works where the operations were about being suspended for the winter. The line is now pretty well supplied. The work will be continued through the winter, and on the Summit Level there are probably 450 men employed, besides 50 or 60 teams.

The contractors for the mechanical work are procuring their materials during the winter, to enable them to commence their work early in the spring.

Some hazard is incurred in suffering embankments to be made while the ground is frozen; and in the winter of 1834 the work was, for this reason, generally suspended. It is thought that in the aggregate it would be better to forego the hazard which has been alluded to, than not to finish the Canal next season.

It is deemed important that the Canal should be completed next year, and every reasonable effort will be made to bring about that desirable result. As has been stated before, no doubt is entertained of being able to finish the Canal as far as Greene; and if the winter is favorable for the work on the line, there can be but little doubt that the entire Canal will be completed by the first of November next.

The Kingsly brook reservoir was put under contract last fall, to be completed on the first day of next November.

In the last annual report an estimate was furnished of the cost of this Canal, at the estimated cost of the engineer, and also at the contract prices.

The former estimate amounted to $1,960,-456 28, and the latter to $1,859,849 12.

In the report allued to it is stated that "a portion of the line of this Canal is difficult and expensive; and in the construction of reservoirs, we have not the advantage of experience. Estimates made under such circumstances, are generally below the cost of the work."

"In making estimates before its construction is in progress, the engineer has, in general, only imperfect means to ascertain the quantity of rock and hard pan excavation, and the lining that will be necessary. These, the most expensive part of the work, are mostly hid from his view."

The Commissioners, in that report, also express the opinion "that it would not be safe to calculate that this Canal will be constructed for a sum below the estimate of the engineer."

When this estimate of the engineer was made, the work between Greene and Binghamton, which comprises heavy river banks and other expensive and difficult work, had not been commenced. The character of the work between Sherburne and Greene was not fully developed. As has been stated, several contracts have been abandoned, and the work let for higher prices.

In the estimate presented in 1835, the cost of the Kingsly brook reservoir was stated at $29,500. The location of this reservoir has not been changed, but the height of its head has been raised 15 feet. This increase in the depth of water will comparatively flow but a small additional quantity of land. It will add about 80 per cent. to the quantity of water, and $15,000 to the expense. This chanage of the plan was made with some reluctance, as it increased the aggregate cost of the Canal; but its advantages, it is thought, much more than counterbalance this consideration. The examinations made during the past season show, that the proportion of drainage to the falling water, very considerably exceeds the

estimated quantity upon which the reservoirs were planned: Hence the propriety of enlarging this reservoir, as its previous dimensions were fixed in reference to the original estimate of drainage.

The damage to private property by the reservoirs which have been adopted, is extensive. The reservoirs on Eaton, Bradley, Madison and Kingsly brooks, occupy the vallies of small streams, and the lines of farms are generally so arranged as to pass through the vallies and include high lands on both sides. In this way land belonging to the same farm is separated; and in some instances a very large portion of farms, including the buildings, have been taken.

By referring to the former report, it will be seen that reservoirs besides those alluded to, have been surveyed as a contingent resort. The enlargement of the reservoir in question, is equal to 65,000,000 cubic feet of water, and will go thus far to dispense with the necessity of resorting to this contingent supply.

The experience of the past season indicated a variety of causes, why the cost of this Canal must exceed the estimate, at the contract prices before alluded to. Under these circumstances, the chief engineer was requested to cause a careful revision of the estimate to be made. This has been done, and the cost of the Canal is now reported at 1,976,821 76, exceeding the former estimate, at the contract prices, $116,972 63, and the estimate $16,365 48.

In the Annual Report of 1835, it is stated "that in the construction of reservoirs, many acres of land are taken, and in some instances the principal part of farms. In such cases, the speedy appraisal and payment of the damages are obviously necessary, and the payments must be made out of the moneys appropriated for the construction of the canal. There should, therefore, be added to the appropriation a sum sufficient to meet this probable contingency."

In pursuance of this intimation, the canal appraisers last season examined and adjudicated on the claims for the Madison, Eaton, and Bradley brook, and the Woodman's Lake reservoirs. The awards on these claims amount to $32,761, of which there has been paid $23,853.18. In four cases an appeal has been made from the decision of the appraisers, to the Canal Board.

One claim for damages on the line of the canal has been assessed at $750. This case is a departure from the general rule, not to assess damages until after the public work is completed. The claim referred to was in the village of Norwich, where an entire lot, on which was a dwelling-house and other buildings, the only property of a widow, with a large family, was unavoidably appropriated.

There are a few cases where the entire property of individuals has been appropriated, and the claimants are very solicitous to have their damages assessed and paid; but this cannot be done without an appropriation for that purpose.

The present estimate of the cost of the canal is	$1,976,821
The amount of damages now assessed,	32,761
	2,009,582
The present appropriation is	$1,860,000
There has been paid into the treasury on account of donations received from citizens at Oriskany Falls,	1,070
	$1,861,070
	$148,512

To meet this deficit, will require a further appropriation.

In submitting this estimate, it is proper to remark, that a farther appropriation will be necessary for the payment of damages which may hereafter be assessed. The estimate presented contains 2½ per cent., equal to $35,000, to meet contingencies. This sum appears to be adequate for this purpose; yet it is possible that allowances which the Canal Board may make to contractors, and on appeals from the decision of the appraisers, and the increased expense growing out of a change of contracts by abandonment, and other unforeseen contingencies, may exceed this sum. If this should happen, and the canal should be completed next fall, it would produce a serious embarrassment in settling the contracts. Under all these circumstances, it is respectfully suggested whether it would not be advisable to add a few thousand dollars to the estimated deficit which appears in the account.

Pursuant to the intimations in the last Annual Report, the water passing in Eaton brook has been guaged every day, from the first day of last June to the last day of December, and in Madison brock every day of the year 1835, (Sundays excepted in both cases.) A rain guage was kept at the same places during the time aforesaid, and a comparison has been made, which shows a favorable result.

The report of Mr. Jervis in relation to the cost of the canal, and the result of the experiments in reference to the question of drainage, above referred to, accompany this report, to which we would refer for many interesting facts in regard to the latter subject.

The following is the amount of expenditures on the canals, from the 30th of September, 1834, to the 30th of September, 1835.

ERIE AND CHAMPLAIN CANALS.

By Wm. C. Bouck, incl'ng salary,	$1,501	50
" Jonas Earll, jr., do. do.	9,244	30
" Michael Hoffman, do. do.	1,646	10
" John Bowman, do. do.	398	63

IMPROVEMENT OF ERIE CANAL.

By Wm. C. Bouck, damages, &c.	4,192	06
" Jonas Earll, jr., do.	24,925	26
" Michael Hoffman, do.	1,592	68
" John Bowman, do.	1,500	00
" Superintendents of repairs, including their salaries, and the pay of lock tenders,	392,921	65

[The accounts of the superintendents are examined and certified by one of the acting Commissioners, and audited by the Comptroller.]

OSWEGO CANAL.

By Superintendent of repairs, including his salary and the pay of lock tenders,	$16,327	64

CAYUGA AND SENECA CANAL.

By the Superintendent of repairs, including his salary and the pay of lock tenders,	$9,685	32

CHEMUNG CANAL.

By William C. Bouck,	9	08
By Superintendents of repairs, including their salaries and the pay of lock tenders,	9,616	19

CROOKED LAKE CANAL.

By William C. Bouck,	1	70
By the Superintendent of repairs, including his salary and the pay of lock tenders,	3,566	56

CHENANGO CANAL.

By William C. Bouck,	651,209	24

Under the "Act to improve the inlet of the Cayuga Lake," the Commissioners have entered into a contract for the opening of a channel across the bar at the mouth of the inlet of the Cayuga Lake, in the town of Ithaca, so as to admit, in times of low water, the passing of vessels drawing five feet water, and for constructing a pier for the protection of said channel. The work is let to efficient contractors; and is to be completed by the first day of January, 1837.

S. VAN RENSSELAER,
WM. C. BOUCK,
JONAS EARLL, jr.

January 26, 1836.

VELOCITY OF WATER-WHEELS IN THE NIGHT.—Popular notions must always be a subject of curiosity and interest to philosophical inquirers, whether these notions are founded on observation, or confounded with superstition: and we are not aware that any popular notion is more extensively diffused among millers (though many of them may not believe in it,) than that which ascribes a greater velocity in the night than in the day, to a water-wheel under the same head. Why there should be any difference, none of the believers in this doctrine have even been able satisfactorily to explain. To argue against it has been futile, because early prejudice was stronger than the powers of reason; and therefore no other way remained that could prove effectual, but to bring it to the test of experiment. For this labor we are indebted to Professor Cleaveland. His statement, which follows, is contained in a letter to Professor Silliman, and published in the American Journal of Science and the Arts.

"In a former letter, I mentioned the opinion existing in this part of the country, that saw-mills move faster during the night than the day. The explanation usually given by the workmen is, that the air becomes heavier after sunset.

"I selected a fine day in August, and requested that all the mill-gates might remain stationary for twelve hours. At 2 o'clock P. M., I suspended a barometer in the mill; the pressure of the atmosphere was equal to 30.19 inches; the temperature of the water just before it passed the mill-gate, was 72° Fahr. The log was then detached from the saw, and the number of revolutions of the wheel, being repeatedly counted by different persons, was 96 in a minute. At midnight I again visited the same mill. The barometer stood at 30.26 inches, the *pressure* of the atmosphere having *increased* seven hundreths of an inch. The temperature of the water was 72°, the same as at the preceding observation, although it had been a little higher during the afternoon. The log being detached as before, the wheel was found to revolve precisely 96 times in a minute, showing the same velocity as at the preceding noon. The depth of the water was the same during both experiments. The workmen were satisfied that the result of the experiment was correct, but still they seemed to believe that it would be different in a cloudy night."

No. II.

A SYSTEM OF FINANCE.

To the Honorable the Legislature

of the State of New-York:

As it must be always acceptable to Legislators of ability and integrity to see fair discussion on subjects upon which they have to legislate, to assist them in coming at the best results for the good of the State, I propose to consider the subject of Finance, and have invited the public to a candid investigation—to the end we may adopt the system I shall offer—improve upon it—or suggest a better one—and I respectfully solicit the consideration of the members of the Honorable the Legislature to the same—to act in their wisdom as their guardianship of the whole State shall dictate.

Since taxation is only advisable where necessary to raise funds, or support the credit of the State, we will first consider if a system can be so framed upon our present resources, as may warrant our doing without them—and if we cannot sustain this, we will next examine to what extent taxation be most advisable, and in *what shape* it should come before the people.

The amount required for the ordinary expenses of the Government, is stated by the Comptroller; and for works of Internal Improvement, there is a point beyond which we cannot advance with good economy, inasmuch as the number of the laborers to be had for such works must be known, and I have not the material for such an estimate; but taking the bills before the House, will suppose an annual expenditure of *two millions* as much as required—*one* million for the enlargement of the old, or constructing a new Erie Canal—half a million for the Black River, and half a million for the Olean Canals, should the Legislature pass those bills.
This sum of two millions we shall probably find more than will be yearly expended.

In the system I now offer, I propose to keep the revenues of the General Fund distinct—and to create an *Internal Improvement Fund*, such as was offered in the Resolution in the Internal Imvrovement Convention, which I copy, as comprising all I desire to say on the subject.

"Resolved, That this Convention respectfully recommend to the Honorable the Legislature the propriety of forming a separate fund, which shall be called the *General Improvement Fund*, which shall be kept distinct from all other resources of the State—and into which shall be received all the revenues of all the State Internal Improvements, and against which shall be charged the disbursements incurred in said works, as well as the interest on loans contracted for constructing and improving all State Internal Improvements, and the residue, when any, form a Sinking Fund for the liquidation of such loans."

It will be seen, if such a system as this should meet the approbation of the Legislature, that it will be necessary that they reconsider the legislation of last season, which appropriated all the tolls to the enlargement of the Erie Canal, which appears the more extravagant, when we consider the claims of the other parts of the State. Was there no other district of this vast Dominion containing more than 45 thousand square miles, 27,680,839 acres of *assessed* land, and more than two millions of inhabitants, all of whom have borne taxation for a series of years to build up this country on the line of the Erie Canal like a garden? Was there none other then, and now, in need of fostering aid in turn—that to the State revenues for the last 20 years, 10 more were added for that one district, at the very time it was indebted to the State 10 millions of dollars. (See Compt. R. N. 5, page 64.)

The system of Finance I now offer, I hope will be found more equitable to all parts of the State; it is framed upon our present revenues for the payment of the ordinary expenses of Government, without creating any debt for those—and for the expenditure of two millions of dollars annually for the next 10 years on Internal Improvement; and whereby the payment of the whole 20 millions shall be made within five years after the expenditure.

This system may be extended, or contracted from time to time, and at no one period shall have made more debt than *half* the sum expended, and at all times have a revenue of about a million a year for the liquidation of such debt as may have been incurred when improvements shall stop.

One of the first principles in all legislation should be to simplify the work as much as practicable; in an affair of Finance of the Public Revenues which are intended for the understanding of all the people, this arrangement should be a cardinal point, never lost sight of. This system has that merit—for while there is evidently a strong desire for Internal Improvement, there is a feverish anxiety with some, least these Improvements should involve the State in debt and taxation. Make then the system so simple that the ignorant as well as the *indolent* can comprehend it without study; then the grumblers who have nothing to lose cannot mislead, and prudent Mynheer, who puffs his segar, and counts up his thousands, may not be disturbed amidst the fumes of his smoke, in his pleasing musings, by counting his contributions to wild speculations in Internal Improvement: all these considerations I shall endeavor to realize.

The able Report of the Comptroller on the Finances does credit to the State and to himself for executing his trust in so satisfactory a manner—so clear, yet so in detail that every one by his own fireside is enabled to form his own opinion of what is required, as well as if he was in the Assembly Chamber.

By this Report, N. 5, page 14, the Comptroller states the receipts to the General Fund for tke *current year*, from the auction and salt duties, - - - -		$200,000
From bonds for Oswego lands, - -		115,878
Sundry items of revenue, (particulars page 5,)		62,200
		$378,078
And pages 5 and 6, he estimates the ordinary expenses of the Government for the current year, at - - - - - - -	$384,660	
In this account it will be seen he charges the deficiencies in the lateral Canals which I propose to provide for, -	61,600	
		323,000

Here then is ample provision for the civil list for the current year.

In said Report, page 15, the Comptroller says: "If the General Fund is relieved from the amount of drafts upon it to make up the deficiencies in the revenues of the lateral Canals, the restoration of the auction and salt duties to this fund, will enable it hereafter to sustain the ordinary expenses of the Government;" and at pages 10, 15, it is seen the Comptroller includes the ability to pay the interest on the General Fund debt; and at page 13 he estimates the total nett revenues from auction and salt duties to be $350,000.

We have shown by the items in the Comptroller's Report ample provision for the ordinary expenses of the Government, as well for this as for future years. They are no visionary speculations. The Comptroller says, in so many words, "Give me but these revenues, and free me from the charge of the deficiencies of the lateral Canals, and they are sufficient." He has these revenues, and we propose to provide for the deficiencies in the lateral Canals: these amonnt to only $61,600, and are yearly decreasing.

We propose next to provide the ways and means for our annual expenditure of two millions for Internal Improvements: a vast difference between these and $350,000. Your scrutiny I invite—

your candor I shall count upon. If I miscalculate—if I do not allow sufficient for accidents, show where—correct the estimate. We have but one common end to attain: the prosperity of the whole State—the advancement of Internal Improvements with prudence. But if I am reasonable—if the whole system is upon a statesman-like view, prudent, yet liberal—husbanding the revenues, and yet providing means for aiding all parts of the State, then I count upon the support of all. I ask of Legislatures manfully to act upon it, and of our public journals of all parties, as the circulators and promoters of all legislation for the good of all parts of the State, to unite in recommending this system. It is in reality the only true and fair and patriotic system—a system which considers the whole State as equally entitled to the benefits of legislation. In consideration of so much moment, it is worthy the immediate attention and expression of every patriot.

By Canal Commissioners' Report 4, page 6, the estimated surplus for the current year, ending 30th Sept., 1836, will be $875,995. From page 7, we may consider $700,000 of this a disposable fund, and that this season will be spent in making surveys, contracts, &c., to enable the work to begin in 1837.

Said Report, N. 4—page 35:—

Sept. 30, 1835.—Tolls on Erie and Champlain Canals,	1,433,456 38	
Oswego Canal,	26,593 85	
Cayuga and Seneca Canal,	19,734 82	
Chemung "	4,167 40	
Crooked Lake "	1,822 64	
		$1,485,775 09
Expenses on Erie and Champlain,—*deducting* interest charged on loans, will be paid,	463,420 18	
Oswego—*including* interest, payable on loans,	36,045 51	
Cayuga and Seneca, " " "	23,087 33	
Chemung, " " " " "	28,036 09	
Crooked Lake, " " " "	10,065 99	
Chenango—interest on the whhole debt of two millions at 5 per cent.,	100,000 00	
		660,665 10
After paying the interest and deficiencies on all the Canal loans, there remains a nett revenue, in 1835, of		$825,109 99

In the Legislative Reports of last year, the Canal Commissioners estimate 12 per cent. as the annual average increase of Tolls upon those of the preceding year: this would give for 1836 an increase of $178,293. M. Beardsley, in his late Report in the Senate, meaning, as it would seem, to be within the estimate, takes $160,000. We will leave the $100,000 for contingencies, and take but the $60,000.

Upon these practical results, tested by the experience of years, we propose our scheme of Finance, for providing the *two millions* for our annual expenditures.

For 1837.—The first year, take nett revenue for 1835, round numbers,	800,000	
Increase for 1836, this season,	60,000	
Increase for 1837, work begins,	60,000	
Nett revenue for 1837,	920,000	
Commencing this year to expend annually two millions, *must borrow*	1,080,000	
	2,000,000	
Here we have provided two millions to be expended in 1837 on Internal Improvement, and created a debt of		1,080,000

For 1838.—2d year. The nett revenue for 1837,	920,000		
Increase	60,000—980,000		
Deduct interest on 1,080,000 debt, at 4½ per cent.		48,600	
		931,400	
Balance of two millions to be borrowed,		1,068,600	
Increase of debt,			$1,068,600
Expenditure for 1838,		$2,000,000	
Debt,			$2,148,600

For 1839.—3d year. The nett revenue for 1838,	980,000		
Increase,	60,000–1,040,000		
Deduct interest on 2,148,400 at 4½ per cent.		96,678	
		943,322	
Balance of two millions to be borrowed,		1,056,678	
Increase of debt,			1,056,678
Expenditure for 1839,		$2,000,000	
Debt,			$3,205,079

For 1840.—4th year. The nett revenue for 1839,	1,040,000		
Increase,	60,000–1,100,000		
Interest on debt 3,205,078, at 4½ per cent.,		144,228	
		955,772	
Balance of two millions to be borrowed,		1,044,228	
Increase of debt,			1,044,228
Expenditure for 1840,		2,000,000	
Debt,			4,249,306

For 1841.—5th year. Nett revenue for 1840,	1,100,000		
Increase,	60,000–1,160,000		
Deduct interest on 4,249,306 debt at 4½ per cent.,		191,218	
		968,782	
Balance of two millions to be borrowed,		1,031,218	
Increase of debt,			1,031,218
Expenditure for 1841,		2,000,000	
Total amount of debt on 30th Sept., 1841,			5,280,524

It is seen we have included all the Canals now a charge upon the Government, and paid all their deficiencies; and allowing the Chenango Canal barely to keep itself in repair, we have assumed to pay $100,000, the yearly interest on its two million debt, from this time, that we have not included in this estimate the $700,000 surplus of this year, and yet in five years we shall have expended ten millions on Internal Improvements, and contracted only a debt of five millions.

After the same progression in ten years, we will have expended twenty millions, and have only a debt of ten millions, with a nett

revenue, after paying the interest on this debt, of one million a year to redeem it in, *and all this from our present works.*

There is no reasonable calculation why the Contingent Fund should be drawn upon: if this is cast it will not vary much from three millions at the end of ten years, and be so much to deduct from the ten million debt. It is not intended this shall be kept a separate fund: it is set aside to show the ample means the system provides: and yet all these do not give the system its reasonable advantages. Before we shall have expended the twenty millions the Erie Canal will have been enlarged, *or made new;* the Black River, and the Olean Canals, or other works completed, all adding their revenues from this expenditure, not a dollar of which has been considered in this estimate; that when we take into calculation the proportional enlargement and capabilities of the Erie Canal, with the increase of tolls, from the great growth of our own and the Western States, and their Internal Improvements acting as so many feeders to our revenue, who can say he thinks the debt will then exceed ——: I submit to the good sense of others to calculate how much.

I have allowed so much for contingencies, that, if the estimate is objected to, I think the Legislature would find no difficulty in farming out the contract.

The Canal Commissioners this last season have been obliged to pay 24 per cent. premium to buy up their debt, to save this loss, or the alternative of lending surplus funds. I propose this difference in our system of borrowing: to pay 4½ per cent. interest, and the lenders, instead of bidding a premium, bid down the time we shall be free to pay in.

Let it always be borne in mind, the Legislature last season had voted all our revenues to the enlargement of the Erie Canal, and his Excellency the Governor, in his Message, and the Comptroller, in his Report, had no alternative but to let the Internal Improvements stop, or recommend a tax; and they did all that public officers could do in their situations. I may be excused in respectfully recommending a re-consideration of that appropriation, and to adopt a system which will afford that Canal all they would now get, and will also enable the Legislature to assist all other parts of the State. This system is now submitted for examination and an impartial opinion—it is so simple, it will take but little time to understand and decide its merits, if it has them—if approved of, let every journal, let every one who has interest, exert it to induce the Legislature to adopt it. If this system be adopted, shall we require any tax for Internal Improvements? Answer, then, in candor.

TAX OR NO TAX.

March 17, 1836.

LAKE ERIE STEAMBOATS.

The following article relative to the steamboats on Lake Erie, is extracted from the Bethel Magazine, published in this city. It is but a part of the original, but contains much useful information.—[Buffalo Jour.]

Table showing the Tonnage of Steamboats on Lake Erie, their Age, and Captains.

Names of Boats.	When built.	Tonnage.	Masters in 1835.
Walk-in-the-water,	1818	388	
Superior,	1822	346	
Caroline,	do	45	Baletine.
Henry Clay,	1824	301	
Niagara,	do	156	
Enterprise,	1825	219	
Sheldon Thompson,	do	241	
Pioneer,	do	129	
William Penn,	1826	250	Dwight.
William Peacock,	1829	120	E. W. Pratt.
Ohio,	1830	187	C. Burnet.
Gen. Gratiot,	1831	62	Clarke.
Perseverance,	1832	22	
Michigan,	1833	472	C. Blake.
Daniel Webster,	do	376	M. Tyler.
New-York,	do	325	R. C. Bristol.
Uncle Sam,	do	174	
Pennsylvania,	do	305	L. Allen.
Gov. Marcy,	do	161	S. Chase.
Detroit,	do	137	R. Gillet.
O. Newberry,	do	170	A. Pratt.
Washington,	do	609	
Delaware,	do	177	E. S. Cobb.
Gen. Brady,	do	66	J. Burtis.
Andrew Jackson,	do	65	F. Atwood.
Sandusky,	1834	327	T. J. Titus.
General Porter,	do	352	W. Norton.
United States,	do	366	A. E. Hart.
North America,	do	361	Appleby.
Monroe,	do	359	Whitaker.
Victory,	do	77	J. Hebard.
Maj. Jack Downing,	do	45	Bradley.
Thomas Jefferson,	1835	428	T. Wilkins.
Charles Townsend,	do	312	S. Fox.
Com. Perry,	do	352	Wilkinson.
Columbus,	do	392	A. Walker.
Mazeppa,	do	60	
Robert Fulton,	do	368	R. Hart.
W. F. P. Taylor,	do	125	C. Myrick.

Tonnage and Capital.—The whole number of steamboats which have been built and put in operation upon Lake Erie from the commencement of this kind of navigation, is 39. The amount of tonnage of these boats is 9,634 tons. Their original cost was not far from $1,150,000.

The present number of boats on the Lake is 34; the aggregate tonnage of which is 8,000 tons. The capital now invested in this stock, exceeds $1,000,000.

Expenses of Running.—The expenses of running those boats which perform regular trips through the lake, including wages of men, wood, provisions and ordinary contingencies, is from $100 to $150 per day each, making the yearly expenses of each boat $25,800. The time of running is usually seven months, from May 1st to December 1st.

Wood.—The amount of wood consumed by a steamboat during a trip, (through the lake and back,) is from one to three hundred cords, averaging, probably, 150 cords. Each boat performs between thirty and thirty-five trips in a season, and of course consumes 5,000 cords of wood. The whole amount consumed by 24 boats, the number usually engaged in regular trips through the lake, would be 120,000 cords. The smaller boats and those employed on the rivers, use probably 30,000, which makes the total amount consumed, 150,000 cords.

The price of wood varies at different ports from $1.50 to $2.00 per cord—average price $1.75, which makes the average cost of wood consumed by steamboats, over $25,000 a year.

Men employed and their Wages.—The number of hands employed on steamboats which run through the lake, is from 20 to 30 each. The smaller boats employ from 8 to 15 hands each. The whole number of men engaged in conducting the steamboat navigation of the lake is about one thousand.

The wages which the men receive, varies according to the rank and the kind of business which they perform, as follows:

The captain, per year,		from 600	to	$1,000
First mate, per month,		from 36	to	40
Second mate,	do	18	to	28
Stewart,	do	25	to	35
Engineer,	do	50	to	90
Wheelmen,	do	15	to	20
Firemen,	do			18
Sailors,	do			16
1st cook,	do			25
2d do	do			18
3d do	do			10
Other hands,	do	from 10	to	15

Towards the end of the coming May there is to be in Baltimore an exhibition of manufactured articles of all kinds, on the plan of the yearly exhibitions of the American Institute, New-York. To the public spirit of the managers and officers of the Baltimore Lyceum is our city indebted for this undertaking. Those gentlemen have already put forth to the public on a printed sheet, the rules and regulations to be observed at the exhibition, which will commence on the 25th of May, and continue for three days, from 9 o'clock in the morning to ten at night. Premiums will be given for the best specimens of a variety of articles enumerated.

We trust that all interested will engage in the scheme zealously. Such exhibitions, which are given annually in other cities, have an excellent effect in promoting a spirit of improvement in the useful arts.—[Baltimore American.]

STEAM VS. WATER.—The Portsmouth Journal makes a statement, based upon actual experiment, by which it appears that the manufacture of cotton by steam mills, in seaport towns, may very successfully compete with the best water power in the interior. The cost of operating a mill at Lowell, of 10,000 spindles, is put down at 150 dollars per week; that of a steam power, at 125 dollars—making a difference in favor of steam of 25 dollars per week.

RAILWAY IRON—*Advance in Prices.*—We have been favored with a letter from GERARD RALSTON, Esq. who was travelling in Great Britain, from which we learn that a great advance has taken place in the price of Railroad Iron. It could hardly be otherwise when so many Railroads are in course of construction.

STEAMBOATS.—By a communication in a late number of the Pittsburg Gazette, we learn that at that place, during the last year, 46 new steamboats have been built, with an aggregate tonnage of 8,200. This, we believe, is a larger amount than has been built by any other city of the Union in the same time.

PALMER'S PATENT EXCAVATING AND SELF-LOADING CART.

Fig. 1.

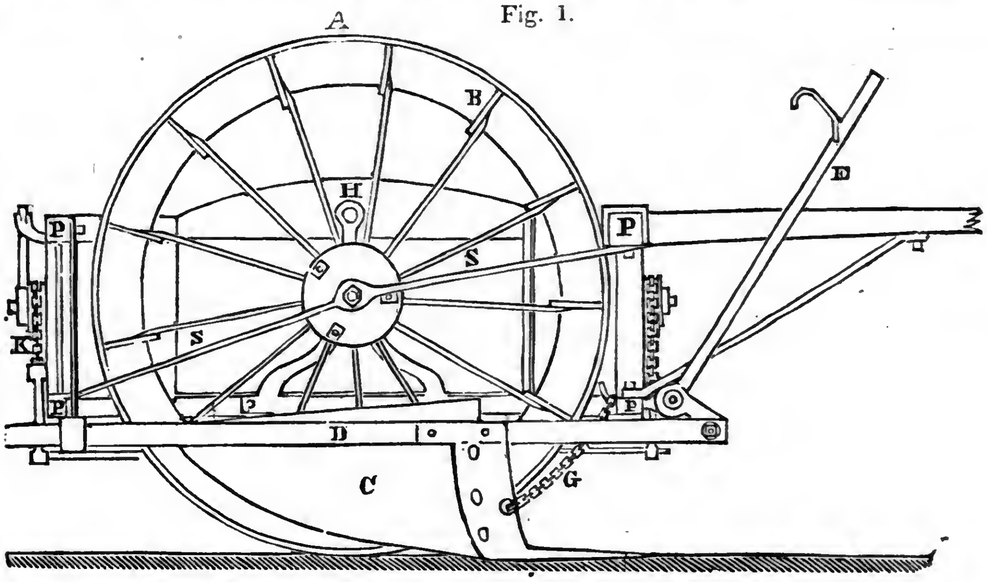


Fig. 2.

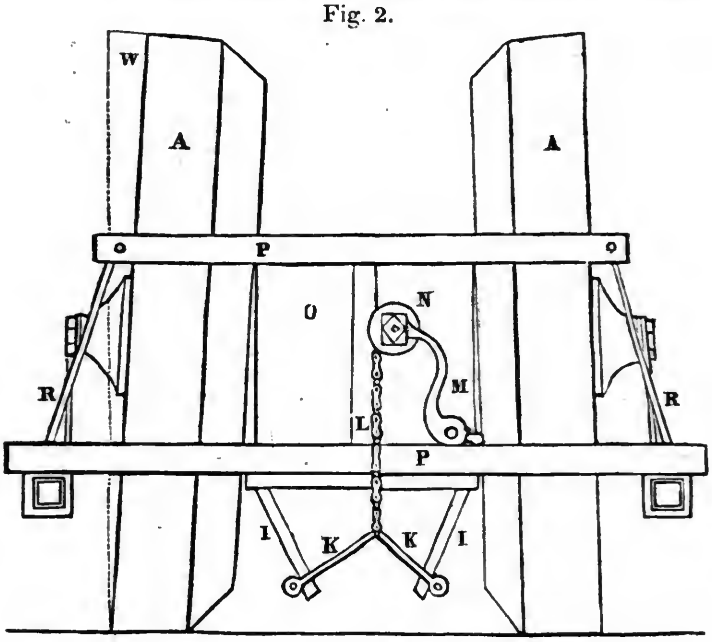
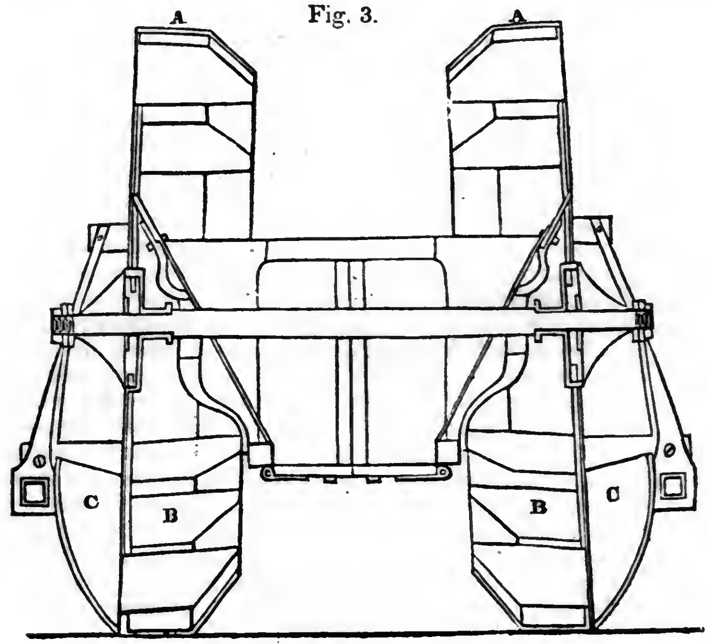


Fig. 3.



PALMER'S PATENT EXCAVATING AND SELF-LOADING CART.

In this railway age, an invention which is represented to be capable of effecting a saving of no less than "500 per cent." in the time and labor attending those fundamental railway operations, cutting and embanking, will be readily allowed to be one deserving of all possible attention. Whether so prodigious a saving could be actually realised by the apparatus we are about to describe, practice only can determine; and, for the present, we are inclined to think that to expect so much from it, is to take rather a sanguine view of its capabilities. But we are sure every mechanical reader will join with us, at all events, in admiring the ingenuity and skill with which it has been constructed.

Fig. 1 is a side-elevation of Mr. Palmer's excavating and self-loading cart; fig. 2, an end-view; and fig. 3, a sectional view through the axle.

The cart, it will be seen, is of the ordinary size; it may be drawn by one or two horses, and will hold half a ton. A A (fig. 2) are the wheels, the rims of which are hollow, open on the inside, and divided by the projecting partitions B B into as many separate chambers, as there are spokes; C C are iron cutters or excavators, resembling plough-shares, one to each wheel, which scoop out the earth, and throw it upon the projecting partitions B B, which, as the wheels revolve, discharge the earth into the body of the cart H; D is a beam, to which each excavator is secured by two strong bolts; and E, a lever, with a hooked termination, to which a chain G, proceeding from the excavator D, is attached, so that by the turning of this lever the excavator may be adjusted to any depth required, or raised altogether when the cart has completed its load. The means provided for emptying the cart are shown in fig. 2. The bottom is divided into two parts I I, which are connected by the bars K K to a chain L, which passes round a projecting iron rod or pully N. M is a winch-handle, which, being ap-

plied to the rod N, opens or shuts the bottom leaves of the cart at pleasure.—P P are strong horizontal bars made fas. to the body of the cart, both in front and at back; R R, diagonal braces, which connect the upper and lower bars P P; and S S, braces, proceeding from the nave of the wheel to the bars P P. On the uppermost of these bars, immediately above the letter O, there is a stopper to retain the winch-handle when necessary.

The cart is stated to have been "seen at work by many engineers, who have all given their most decided approbation of it." A model of it may be seen at Mr. Hendries', in Oxford-street.

Mr. George Vaughan Palmer, the inventor, is now, we regret to say, numbered with the dead. In a slight biographical notice of him, with which we have been favored by a friend, it is stated that he was a native of Worcester, where he was born, June, 1786; and a descendant of the ancient family of the Vaughans of Trebaried, county Brecon, and Hargest Court, Herefordshire. From early infancy he evinced a strong taste for mechanical pursuits; and, had he been longer spared to the world, would probably have risen to eminence as an inventor. Great part of his time was devoted, for some years previous to his death, to the construction of his excavating-cart; and he had but just completed, and secured his right to it by a patent, when he was seized with a rapid decay, of which he died in June, 1834, leaving a widow and four children, for whose benefit the patent is now to be sold. —[London Mechanics' Magazine.]

AGRICULTURE, &c.

AN ADDRESS TO THE ESSEX AGRICULTURAL SOCIETY,

At Danvers, September 30, 1835, at their Annual Cattle Show.

BY DANIEL P. KING.

Mr. President and Gentlemen:

The seventeenth anniversary of your Society has brought together the farmers of the county, to exchange their friendly greetings and heartfelt congratulations; it has given you opportunity to renew and extend your acquaintaince amongst men of common habits, feelings and pursuits—to take by the hand many practical and enterprising husbandmen in whom you have long been interested—men who have instructed and encouraged you by their precepts, their example and their success; it has redeemed one day from the busy round of a farmer's ever active life, and devoted it to social intercourse, and sober, manly enjoyment. Had your Society been productive of no greater benefits, it would still have deserved all the countenance and encouragement which it has received from the State and from an enlightened community. But social enjoyment and an occasional relaxation from the tediousness of business are not the only, nor the principal benefits which have resulted from your association. It has exerted a powerful influence, by awakening a spirit of inquiry and emulation, by introducing new varieties of vegetables and fruits, an improved stock of cattle and improved methods of husbandry, by exposing erroneous but long cherished opinions, by diffusing knowledge and encouraging enterprise and industry. A worthy clergyman, himself a practical farmer, says that the expense of cultivation in the county of Plymouth had been thought to exceed the amount derived from it; but that the Agricultural Society has proved that labor and skill can make even despised soils productive. "I suppose," says he, "that ten bushels of rye to the acre, twenty of Indian corn, one ton of English hay, and two hundred bushels of potatoes, were formerly considered as average crops. Since premiums have been offered, we have claims for from forty to fifty bushels of rye, from one hundred and fifteen to one hundred and twenty-two of Indian corn, from three to four tons of English hay, and from four to five hundred bushels of potatoes. Our improvements have not been confined to single acres; in several instances, the products of entire farms have been more than quadrupled." I will not say that the Essex Agricultural Society has effected so much good, or that it has effected all the good of which it is capable—but I will say, without the fear of contradiction, that your Society has done more good, much more good, than it has ever had credit for. And I ask the observing, experienced, practical farmers, who compose so large a part of this audience, if within fifteen or twenty years, the produce of many farms within their knowledge has not been nearly doubled? Have not the crops of hay, of corn, and of other kinds of grain, increased on an average from fifty to one hundred per cent.? Have not ploughs and other agricultural implements been much improved? Do not you more frequently hear of cows which yield from fifteen to twenty quarts of milk per day, and which make from ten to sixteen pounds of butter in a week? Are not working oxen of handsomer appearance, better trained and more powerful? If you answer yes, as I believe you will with united voices, to what causes will you attribute the improvement? I ask honest, practical, discriminating farmers to what cause they *can* attribute the improvement but to the influence of Agricultural Societies, to the impulse they have given to enterprise, to the spirit of emulation they have awakened, and to the knowledge they have been the means of diffusing? The influence of such associations is not always direct and obvious; like that of the dew and the air, it is a blessing too common, noiseless and unostentatious, to be felt or acknowledged by the inconsiderate and unreflecting. There are few men who will be long content to follow a rough, hilly and circuitous path, while their neighbor travels a smooth, direct and pleasant road, which brings him with more expedition and safety to his journey's end: there are few farmers who will be content to toil and drudge from year to year in the same dull round which their fathers followed for a bare subsistence, while they see their more enterprising neighbors in the full tide of successful experiment, becoming richer and more prosperous from having adopted the improved methods of husbandry. Does any farmer seriously complain that he has derived no benefit from Agricultural Societies, that he has not been instructed by their publications, that he has not been enlightened by the knowledge they have diffused? If tha. farmer has not connected himself with the Society, has not read its publications nor followed its recommendations, it would be no less unreasoable for him to complain that his corn would not vegetate before he had committed it to the earth and while it remained in his granary—it would be no less unreasonable than the complaint of the hypochondriac that he is not warmed by the sun, while he secludes himself in his chamber and bars his doors and his windows. Many farmers have suffered their minds to be prejudiced by an unfounded and an unreasonable distrust of Agricultural Societies, as encouraging and sanctioning book farming. It may not be unprofitable to inquire how books on husbandry are compiled. A practical farmer in Andover, for instance, has raised large crops or potatoes, another in Haverhill has had great success in the cultivation of rye, another in Newbury has raised superior wheat for successive years, and many other famers in various parts of the country, have been successful in the cultivation of the several crops to which they have given particular attention; actuated by the scriptural injunction to "do good and communicate," they write detailed accounts of their several methods of cultivation, and send them to a common friend, a farmer well read and experienced; he carefully examines the communications, received from sources which he knows are entitled to confidence, he arranges them, winnows out the grain, and garners it up in a book. And now is there any thing like legerdemain or cunning in this? Is there any thing suspicious about it? Had you visited any one of the farmers who have made a communication, and witnessed with your own eyes his field luxuriant with the growing crop, or burdened with the ripened harvest, and heard the detail of his management, you would not have hesitated to believe his statement, nor to adopt his practice. The mere act of publishing it cannot make his statement the less deserving your confidence, nor the improvement the less valuable. We will suppose that for the purpose of making further inquiries and explanations, the gentleman to whom the communications were sent, invites his friends in the different sections of the country to meet him on an appointed day; they come together and discuss what methods of husbandry are best calculated to make abundant harvests, and freely express their opinion on all subjects connected with rural economy. These practical farmers derive so much pleasure and satisfaction from the interview, that they resolve to have regular meetings at stated intervals, and for the sake of encouraging experiments, and promoting improvements and industry, they determine, from funds in their possession, to offer premiums to successful competitors. Here is an Agricultural Society, and here is a Cattle Show. Is there in all this any thing of combination or treason? Is

there any thing which threatens the liberties of the people or the safety of the Commonwealth? Your Society has to contend with the coldness and indifference of its friends, rather than with the malice of its enemies —it has no open and declared enemies, and I am sure that you have no wish to conjure them up merely for the sake of giving them battle. You have beat your swords into ploughshares and your spears into pruning hooks—you delight more to train the vine than to bend the bow, to swing the scythe than to wield the lance. The well cultivated field is the field of the farmer's glory; his highest ambition, to improve it; if he has doubled the produce of his farm, he feels that he has achieved a nobler victory than if he had conquered armies or subdued empires. And we invite the yeomanry of the country to join in this honorable competition—we invite practical farmers, the men of broad shoulders, muscular arms and strong hands, to connect themselves with the Society, and by their experience and their example, to help in the promotion of its interests and the advancement of its prosperity. Your united efforts can make this institution an honor and a blessing to the whole farming community. Will you not use your endeavor to strengthen and sustain a Society which was formed for your advantage, and which subsists only for your benefit? In recommending to you to try experiments and to study the periodicals and books devoted to husbandry, I do not advise you to an universal and indiscriminate adoption of any man's rules or opinions. I would not have a farmer go into the field with a book in one hand and a hoe in the other; such a practice would lead him to the result of a certain visionary farmer who complained "that the carles and cart avers make it all, and the carles and cart avers eat it all"—the labor and expense of cultivation more than balance the value of the crop. But the farmer should read and ponder and deliberate; he should study and reflect, and adopt such rules and methods as he finds applicable to his own soil and circumstances. A judicious practice, enlightened by sound theory and science, will effect wonders for Agriculture, the mother and nurse of the arts, as it has done for all her children and dependants. Unless theory and practice walk hand in hand, mutually helping and encouraging each other, we cannot hope that Agriculture will keep pace with the improvements of the day, or that she will ever arrive to the perfection of which she is capable.

But let it not be inferred from these remarks, that the public interest in the subject of agriculture has declined, that the permanence of this Society is in danger, or that its prospects are less promising than they have been. This large and respectable assembly would contradict such an opinion; the long and regularly increasing list of members would confute it. The number of animals in your pens, the well contested ploughing match, the products of the dairy, the exhibition of manfactured articles, elegant and varied in their qualities, are satisfactory evidence that the usefulness and prosperity of your Society have not declined. The fruits and flowers exhibited on this occasion are witnesses of the increasing interest in the object of your association, too welcome and beautiful to be overlooked. We hail these signs as omens of good for the future, not doubtful nor uncertain. From the examination of all these fruits and flowers, the products of the earth, the beasts of the field, the beautiful specimens of the cunning workmanship of ingenious hands—all made for man's use and enjoyment—from the liberal abundance of those well furnished tables, we have come up into this temple of the Lord to offer Him the incense of deeply affected and grateful hearts. By hymns, and solemn prayer, and thanksgivings, we have testified our gratitude for the regular return of summer and winter, seed time and harvest, for His loving kindness which has crowned the year, and for His tender mercies which are over all His works. But our professions of gratitude are like false blossoms on the vine, beguiling us with the hope of fruit, if they are not accompanied by grateful conduct as well as by grateful affections—they are like fungous ears on our corn stalks, fair in their outward appearance, but within full of all uncleanliness, if they are not followed by obedient, virtuous lives. To a benevolent benefactor, a proper improvement of the gift is the most acceptable acknowledgment. Have we as farmers made such a practical acknowledgment for the blessings by which we are surrounded? Have we no neglected corner over which the lazy demon of sloth has long brooded in sluggish inactivity, and which the busy hand of industry would make as blooming and as fruitful as a garden? Have we no meadow abandoned to bulrushes, flags, and croaking frogs, which a little draining and dressing would cover with valuable crops? Are not our pastures infested with briars, thistles and bushes? Are there not in our fields hosts of weeds contending with the corn and potatoes for the mastery, and which will certainly gain the victory unless we come to the rescue? Are there by our walls no belts of bushes, every year making wider and wider encroachment upon our cultivated lands? Are there in our fields, no loose rocks and heaps of stones, obstructing the plough and the scythe, and, like blotches on the fair face of beauty, disfiguring the prospect? Have we no ruinous dilapidated fences tempting cattle otherwise orderly and well behaved, to overleap the modesty of their nature, and to commit breaches against the peace of the neighborhood? Have we in our gardens no uninvited, intruding guests, plants which we have neither sowed nor watered, which we might offer as a most acceptable dessert to those epicureans of our establishment, who place the supreme good in pleasure—the pleasure of living at ease, of faring luxuriously, and of growing fat? Is it not our fault that these idlers have no better employment than to speculate and philosophize? Have we no rich alluvial deposits in ditches, swamp holes, or sunken meadows, from which we might make drafts that would return us a liberal interest? Have we no naked, hungry, exhausted fields with imploring accents begging us to come and dress, feed and recruit them? In balancing our accounts, do we find that we owe no man aught except love and good will? Every good farmer finds it pleasant and profitable to keep a journal in which he notes every day's employments and incidents; in reviewing ours, do we find no necessary labor neglected? Is the place where our example and influence are most felt, a pattern of order and neatness, of well regulated economy as well as of a liberal abundance? Is the place where our affections centre, where we most wish to be loved and hope to be remembered, is our home, the happy abode of peace and harmony and contentment? Have we discharged our social and moral obligations —our duties to ourselves and to our neighbor? We profess admiration and gratitude for the air we breathe, for the sun that warms and enlightens and cheers us, for the innumerable comforts of our existence, for this spacious, beautiful, and convenient world; but have we been faithful to that portion of His vineyard over which God has set us as stewards and overseers? If we can make satisfactory responses to these questions, then have we cause for accumulated gratitude, that, in the disposition and ability to improve and enjoy, He has given us the crowning blessing.

An orator, with a mind well freighted with learning, or whose lighter imagination soars on bold, rapid, and graceful pinions, would lead his delighted audience back into distant ages, and over into foreign countries —he would tell you of Italy, once the garden of the world, now as degenerate in morals as in husbandry—of England, made one great specimen farm by thorough cultivation and plentiful manuring—he would talk to you of Parnassus, and Tempe, and Helicon, of the beauties of nature, the decorations of art, and the embellisments of fancy. But I will not affect the learning I have not —I will not borrow wings which would but betray my awkwardness in the use of them. And it is not with foreign climes, nor antiquity, it is not with poetry nor fiction, it is not with Hesperian lands nor with Eastern lands, that we, as farmers, have to do. Let us recall our wandering thoughts, and fix them on our own times and neighborhood, on our own farms and homes. It is enough for us to know that farming has always been an honorable pursuit when it has been honorably followed; that it will always be an honorable, profitable, and fashionable occupation as long as men continue the somewhat inelegant, but not altogether unpleasant or unnecessary habit of eating and drinking. Let farmers remember that they have inherited a character distinguished for sobriety, honesty, temperance, industry, frugality, and manly independence; let them strive to sustain and elevate this character.

But my friends, a grave charge has been preferred against us, seriously affecting our character as good farmers and honest men, and I fear too many of us must plead guilty. We have been called extortionate and austere—not precisely charged with robbing widows' houses or with reaping where we have not sown, but with extorting too

many crops from our fields without making them a due return, with exacting too much of them and of withholding their deserved wages: we have been accused of cropping our lands severely without cultivating and manuring them in any reasonable proportion, of mowing our fields many years in succession till their over taxed, exhausted energies can yield us nothing more. The high prices of labor and manure, and the difficulty of obtaining them, have been alleged as excuses for this thriftless and cruel practice, and there is something of truth and more of plausibility in the defence. As a remedy for these evils, and a sure way of improving your land, I can do nothing better than to recommend to you the method practised for several years with great success by Elias Phinney, Esq., of Lexington. A farmer should use his eyes as well as his hands—he should be willing to learn from the experience of others as well as from his own. From the fields of Lexington we may learn lessons of husbandry as well as lessons of patriotism. There is nothing selfish or exclusive in the feelings of an enlightened and enterprising farmer; with him, next to the pleasure of receiving information, is that of communicating instruction. Without offering an apology to Mr. Phinney, I shall make an extract from his Address delivered before the Society of Middlesex Husbandmen and Manufacturers in 1830; nor shall I ask your indulgence for using the sentiments and words of another, for this may be the only part of my remarks which needs no indulgence. "In May, 1828, the field (the soil of which is thin loam upon a gravelly sub-soil) having lain three years to grass, and the crop of hay so light as to be worth not more than the expense of making, with a view of ascertaining the quantity of vegetable matter upon the surface, I took a single foot square of green sward, and after separating the roots and tops of the grasses from the loam and vegetable mould, it was found on weighing to contain nine ounces of clear vegetable substance, giving, at that rate, over twelve and a quarter tons to the acre. This convinced me of the importance of taking some course, by which this valuable treasure might be turned to good account. That a great part of this vegetable matter is exposed to useless waste, by the usual mode of ploughing, cross ploughing and harrowing, must be obvious to any one. In order, therefore, to secure this, as well as the light vegetable mould at and near the surface, which is liable to waste from the same causes, I had two acres of the green sward of this field turned over with the plough as smoothly as possible. After removing the outside furrow slices into the centre of the plough-land, and thereby effecting the double purpose of covering the vacant space in the middle, and preventing ridges at the sides and ends, the field was rolled hard with a loaded roller, by which the uneven parts of the furrows were pressed down, and the whole made smooth. It was then harrowed lengthwise the furrow, with a horse harrow, but so lightly as not to disturb the sod. Twenty cart loads of compost manure, made by mixing two parts of loam or peat mud with one of stable dung, were then spread upon each acre. It was then harrowed again as before, and then the poorer part of the soil, which had been turned up, and remained upon the surface, was thereby mixed with the compose manure. Corn was then planted in drills* upon the furrows, the rows being at the usual distance and parallel with the furrow. At hoeing time the surface was stirred by running a light plough† between the rows, but not so deep, at this or the subsequent hoeing, as to disturb the sod. What Mr. Lorain calls the "savage practice" of hilling up the corn, was cautiously avoided. In the early part of the season, my cornfield did not exhibit a very promising appearance; but as soon as the roots had extended into the enriching matter beneath and began to expand in the decomposing sward, which had now become mellow, and more minutely divided by the fermentation of the confined vegetable substances beneath, than it could have been by the plough or hoe, the growth became vigorous, and the crop, in the opinion of those who examined the field, not less than seventy bushels of corn to the acre. As soon as the corn was harvested, the stubble was loosened up by running a light horse plough lengthwise, through the rows, the surface then smoothed with a bush harrow, and one bushel of rye, with a sufficient quantity of herd's grass and red top seed, to the acre, was then sowed, the ground again harrowed and rolled. The crop of rye was harvested in July following, and the two acres yielded sixty-nine and a half bushels of excellent grain, and over five tons of straw. The grass seed, sowed with the rye, took well, and the present season I took, what those who secured the crop judged to be two and a half tons of the very best of hay from each acre.

Thus, with one ploughing, with the aid of twenty cart loads of compost manure to the acre, I have obtained two crops of grain, and stocked the land down to grass."‡

The great object of the farmer is to obtain the most valuable products, with the least possible labor, and at the same time to keep his farm in a state of progressive improvement; by this method large crops have been obtained with a small expense of labor and manure—but some of little faith may object that it is the result of a single experiment, that there may have been something peculiar in the soil or the seasons, that with others it would have been a complete failure, and that most likely the land soon became exhausted. But Mr. Phinney has practised and continues to practice the same kind of husbandry with the same success, and with increasing confidence. The field on which he made the experiment which he has so clearly and satisfactorily detailed, has remained in grass till the present season, and has continued to yield two tons of good hay to the acre, without any top dressing. Other farmers have followed the same method on a great diversity of soils, and although a plain field and a loamy soil may be best adapted to the purpose, there are none except very wet or very rough and rocky grounds which cannot be greatly improved by it. There is nothing unreasonable or unphilosophical in this method, and success would seem to follow it as naturally as effect follows cause. I know that there are many farmers who believe that the *good old way* is the best way, but let the most incredulous of these visit the farm of Mr. Phinney, which but fifteen years ago produced but nine tons of hay and which now produces seventy; let him go into those well mellowed fields and see the corn waving in its beauty and ripening into a golden harvest, yielding nearly one hundred bushels to the acre, and potatoes in equal abundance; let him witness all the improvements of that well managed and thoroughly cultivated farm, (which, in natural advantages, perhaps, does not exceed his own,) and that sceptical farmer, who went out hesitating and unbelieving, will come home with a settled conviction that Mr. Phinney is a farmer of great skill and enterprise, enlightened by a sound judgment: he will cheerfully admit that his method of cultivation is a great improvement, and he will apply it to his own farm as far as his circumstances will allow. I should not have dwelt so long on this subject, if, from my own observation and the experience of others, I had not been fully satisfied that the adoption of a similar method of husbandry would be beneficial to our own fields. Let the farmers of Essex try the experiment; the expense will be but trifling; the advantages may be great; and if, by chance, they should fail of success, they will have the satisfaction of having at least *attempted* an improvement.

The business of the farmer requires his constant care and inspection; he must not intrust it to another; if he expects his work to be well done, he must do it himself, or at least see it done. How many farmers have been misled by the notion that their respectability and consequence in society is commensurate with the number of their acres, forgetting that it is the *condition*, and not the *size* of their farms, which gives them a character. This desire to be considered the owner of a wide domain has been a fatal snare to many who might have enjoyed their homestead in peace and plenty—it has involved them in pecuniary embarrassments, which have driven them sorrowing from the very fields, perhaps, which their ancestors reclaimed from the wilderness, to seek for themselves and their little ones a habitation amongst strangers, or in some distant, solitary wild, where the voice of a stranger would be welcomed as the voice of a friend. When it is matter of choice, the best sized farm is that which the owner has skill, capital and energy to manage to the best advantage. A mistake similar to this, and of the same disastrous consequences, has led some farmers into extravagance in the size of their houses, extravagance in furnishing them, and extravagance in their style of living. How many kind hearted, pains taking, industrious farmers, forgetting that "it is the eyes of others, and not our own, which

* It might be planted in hills, if that course is preferred.

† Mr. P. now uses the cultivator instead of the plough.

‡ William Clark, jun., of Northampton, and Daniel Putnam, of Danvers, have adopted similar methods of husbandry, and have been very successful.

ruin us," have been lured by the false glitter to rivet on the chains which have afterwards galled them to the quick! No man, except a landlord, wants a larger house than will accommodate his family, and occasionally his friends. Let every farmer, then, who is about to build, first sit down and count the cost, then let him consider at how much less expense a house of moderate size is furnished and kept in repair, and how much less labor is required in sweeping and scouring, (it will be prudent to make the calculation, although it may not be prudent to intermeddle with the operation); and then let him seriously reflect how small a house will hold his tried, valued, and true friends. A man of ample fortune will consult his taste—he may think that a large mansion, costly furniture, and a corresponding style of magnificence will increase his happiness—let him try it, for bank bills are as worthless as the seared and withered leaves that are put into circulation by an autumn gale, and specie as valueless as the pebbles washed by the waves of the sea, if they do not contribute to the happiness of their possessor, or if they are not in his hands the means of conferring happiness on others. But before the man of wealth indulges in such profusion, if he is a philanthropist, he will remember that his example may be followed by those who cannot so well bear the expense; if he is a father, he will remember that his children will hardly be content with any situation or manner of living inferior to those to which they have been used under the paternal roof.

If I had not already trespassed too far on your patience, I would speak of the importance of domestic manufactures, as affording the only ready and constant market for the surplus productions of your farms, and as indispensable to the real independence of the country—I would say something of the cultivation of mulberry trees and the rearing of silk worms, as affording a profitable and pleasant employment at home for those members of your family whose health and whose virtue might be too much exposed abroad. There are many other topics of domestic economy of great interest, but most of them have been learnedly, or what is better, practically, treated by gentlemen who have addresed you on former occasions. But there is one subject which is becoming so important, and the evils of which are so general and serious, that you will be disposed to allow it a moment's consideration. I mean the difficulty of obtaining experienced, able and faithful *help*. The complaint has been growing louder and more frequent, and a remedy is most desirable. But a few years since, for the reasonable compensation and the kind treatment they always deserve, we could easily find diligent and faithful young men and young women who were willing to afford us their assistance—and a mutual benefit was received and conferred, and readily acknowledged—it was an exchange of good offices; while they cheerfully gave us their assistance and attention in the labors of the farm and of the house, they were learning the principles of good husbandry and good housewifery—they were preparing themselves for that station in life to which every young man and young woman should be looking forward, to the relation of husbands and wives, to the situation of masters and mistresses of families of their own. A well managed farm and a well regulated household are almost the only schools where this preparatory education can be acquired by the young; they must learn to obey before they can be fit to command; they must learn the lessons of good management before they can practise them. And let them be assured that there is nothing dishonorable or degrading in attending this school, or in learning these lessons, for there is no station or occupation which is not reputable when honorably followed, and they, and they only, are useful and worthy members of society who are engaged in some useful employment. Captivating as the charms of beauty may be, and fascinating as are some of the polite accomplishments, let no young woman rely so much on these means of obtaining admiration and securing affection, as on the ability to make herself useful; for although a lover may be blind, a husband has eyes—although music, and painting, and dancing, and embroidery may be very pleasant amusements, and afford gratification for a leisure hour, there are other hours besides those of dalliance and revelry, and other senses besides those of seeing and hearing—senses, too, which have more imperious demands; and there is danger that the wife or the mother who is not prepared to answer these constant demands, beautiful and elegantly accomplished though she may be, will not long appear graceful or lovely in the eyes of her husband. Some circumstances of fortune or station or delicacy of health may make it unnecessary or improper that a woman should perform active labor with her own hands, but there is no rank or station in which a lady can be placed where it is not desirable that she should know how the affairs of her household ought to be managed. I know that I give but cold and feeble utterance to the feelings of this Society in bidding a welcome, a cordial welcome, to that portion of the fairer and gentler sex who have honored this farmer's holiday with their presence—without their encouraging smiles and cheerful assistance, even farming would be dull business. I cannot offer for their consideration a better sentiment than that contained in the words of a learned, elegant, and distinguished foreign lady, who says, "the only celebrity that can increase a woman's happiness, is that which results from the esteem excited by her domestic virtues"—and I will add, there is no praise, no applause, no glory in the wide world more worthy a woman's ambition, than the fame of a well regulated household.

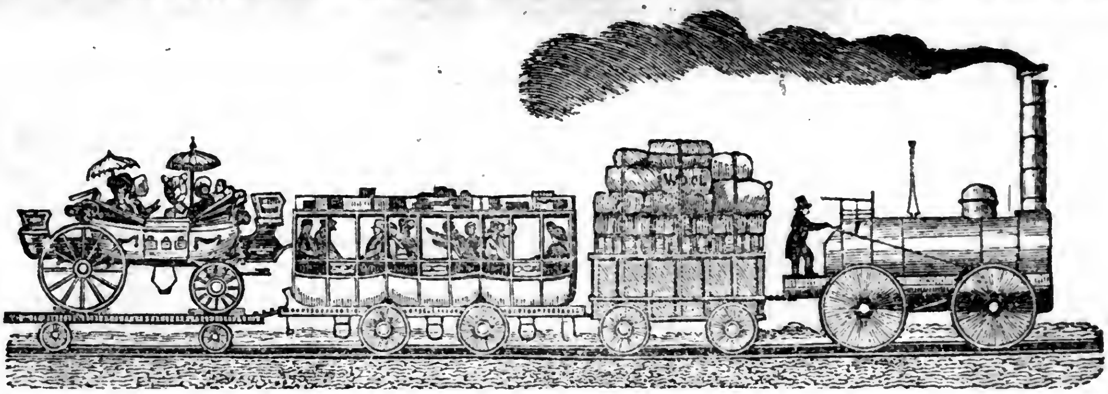
But pleasant, healthful, and indispensable as the labors of the field and of the kitchen and the dairy may be, and excellent as is the course of discipline, both for the body and the mind, there is danger that too many young men and women will prefer what they consider a more fashionable employment and a more elegant education. And you, as a Society, perhaps cannot do much to expose the mistake or to remedy the evil. It has, however, occurred to me that it would be no perversion of your funds if you were to offer suitable premiums to such faithful, diligent, temperate, and skilful man or woman as had remained for one or more years in the employment of any member of the Society; besides, as an additional encouragement and reward for their faithfulness, they might receive the Society's certificate, accompanied by some useful treatise on rural economy or domestic duties, such as Fessenden's Complete Farmer, for the males, and Mrs. Child's Frugal Housewife, for the females, so that the very means of rewarding should be an encouragement and guide to greater excellence.

But if, as members of this Society, you can do but little to remedy the evil abroad, as members of a more limited society, you can do much to remedy it at home. Fathers and mothers, you stand at the fountain; with the lightest trace of your finger on the yielding soil you can give a direction to the infant stream. You can send it gliding down through verdant fields and flowery lawns, imparting new fertility and beauty, and anon contributing its strength to propel the complicated machinery of industry: or you can send it dashing, foaming over precipices, to join with other impetuous, headlong streams, carrying devastation in their course: or you can suffer it to roll its sluggish way into some stagnant pool, affording a refuge for loathsome reptiles, and poisoning the atmosphere with its pestilential vapors. In infancy, and at home, the deepest and most lasting impressions are made; your children may have able and faithful instructors, but there are many lessons of practical wisdom which are not taught in the schools. The mind of your child is constantly busy—he will be learning a lesson of you when you least think of it. To your child your remark is wisdom; your observation, experience; your opinion, sound doctrine; and your word a law; your child is learning a lesson from every look and action—but most of all, your example is educating your child. It is a book constantly open before him, and which he is constantly studying. Be careful, anxious father, fond mother, that you insert no page which hereafter you may wish to tear, no line you may wish to blot—be careful that you admit into that much read volume no sentiment which you are unwilling your child should transcribe on the fair tablet within his own innocent bosom.

Fear not that I am about, at this late hour, to inflict on you a lecture on general education. Schools, academies, and colleges have been founded for the education of the mind and the heart; to these we must leave them; but what has been done to encourage the education of the hand? The heart and the mind should indeed be enlightened, pure and undefiled, but the hand must be busy and skilful. The great secret of happiness consists in never suffering the energies to stagnate. Fortunately, in the farmer's business there is no want of constant employment—if you can accustom your children to patient and cheerful labor, you have secured for them the means of happiness and independence. In other stations of life there may be unfortunates,

"Stretched on the rack of a too easy chair,
Who, by their everlasting yawn, confess
The pains and penalties of idleness"—

but this mortal sin should never invade a farmer's dwelling. In training your children to a willing industry, do not over-task their strength—let them feel that they can be useful, and that their assistance is valued.—There are various employments in the house, the garden, and the field, that are adapted to their tender years; never let their labor be such in kind or amount as shall make it disgusting, and if possible make them derive from their labor some compensation, in money or relaxation, or indulgence; never withhold the merited praise or reward. Accustom them never to expect another to do for them that which they can as well do for themselves, but to rely upon their own strength, and to trust their own energies.—Whatever may be their prospects in life, teach them to depend on their own resources. Help them to cultivate an affectionate, accommodating disposition, moderation in their expectations, and moderation in their pleasures. Teach them to reverence God and to love work—"neither to despise labor, nor husbandry, which the Most High has appointed." "Teach them to bear the yoke in their youth, and to do with all diligence whatever their hands find to do;" so shall you deserve their assistance in the management of your house and your farms; so shall you secure for them that competence and happiness of which the mischances of this world cannot deprive them. And when you shall have performed all life's duties and enjoyed all life's plasures, when your earthly tabernacle shall fall into ruins, when your wearied frames shall find quiet repose beneath the soil you have faithfully cultivated, and when your spirits, like shocks of corn fully ripe, shall be gathered into store houses not made with hands, eternal in the heavens—your grateful children shall arise and bless your memory; they shall be living monuments which shall bear record that you laid for them, in early habits of patient, cheerful, and contented industry, the foundation for a manly, virtuous, and honorable independence.



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, MARCH 12, 1836. [VOLUME V.—No. 10.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 12, 1836.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANICS' MAGAZINE, is removed to 132 *Nassau street*, opposite CLINTON HALL, and two doors *below Beekman street*.

☞ Will those Editors to whom the Journal is sent, do me the favor to notice this removal, send their papers in exchange, and request the friends of the Periodicals in the country to direct their orders to me at 132 Nassau street.

The favor shall be reciprocated at any and all times, by

D. K. MINOR.

March 23, 1836.

We give in this week's paper the result of the trial on the Baltimore and Ohio Railroad, by which it will be found that the locomotive then used performed the almost incredible task of drawing nearly 26 tons up inclinations above 220 feet per mile, and starts from perfect rest on a plane of 264 to the mile, (or 1 foot in 20,) with a load of 20¾ tons.

For the information of those who may be incredulous, we give the report of the Committee at length.

We need not call attention to the fact, that this development of the capacities of locomotives will lead to the most important results—the one, that the *valley of the Ohio may be reached from the seaboard without the use of stationary, or even additional power*, is, in itself, a splendid instance of the benefit of perseverance over every possible moral and physical obstacle that could be interposed.

We acknowledge the receipt of a number of public documents of considerable interest, for which we beg to return thanks. These, as well as several communications on hand, shall be attended to as soon as time and space will permit.

As much interest is felt on the subject of widening the Canal, we have given the Commissioners' report, and shall give so much of those of the Engineers' as relates to general location, &c.

To the Editor of the Railroad Journal:

Since my last communication I have witnessed the disappearance of the spots I then mentioned as being seen on the surface of the sun. Yesterday I again observed many more, and much larger ones. Seven very distinct spots could be counted. They are singularly grouped in threes, elongated, and directed parallel to the sun's equator.

Can there be any connexion between these phenomena and the singular weather we have experienced?

If, as Herschell maintained, their effect is to expedite vegetation, may it not be that they are to accelerate our tardy spring?

Would not experiments, as to the magnetical effects of the sun's rays at this time, be particularly important?

I throw out these hints for those who may take so much interest in these matters as to undertake to make these or similar observations. G. C. S.

New-York, March 28th, 1836.

For the Railroad Journal.

STRICTURES ON THE REPORTS OF THE STATE ENGINEERS.

No. I.

D. K. MINOR, Esq.:

The discussion upon the bill now before the New-York Legislature, relative to a loan to the New-York and Erie Railroad Company, recalls to mind some of the circumstances *connected* with the proceedings upon that subject during the last session.

Among other things, the Canal Commissioners were called upon to report upon the comparative merits and cost of Railroads and Canals. In the performance of this duty, they brought to their aid three individuals, viz: John B. Jervis, Holmes Hutchinson, and Frederick C. Mills, who, they say, are "Civil Engineers of experience in the construction of Canals and (!) *Railroads.*"

In the report made by these gentlemen, it is stated, p. 33, that "*experience* thus far has *settled* the cost of transportation upon Railroads at 3½ cents per ton per mile *on a level road,*" and that "this allows no profit or toll." On the page preceding, they say, that "the cost of transportation (*reduced to a level road,*) on the Baltimore Road, *we have found to be* $3\frac{5}{100}$ *cents per ton per mile.*"

These estimates, it will be perceived, are both for a *level road*. If the latter is true, the course of reasoning, by which the conclusion first stated was attained, is entirely beyond our comprehension.

Again it is stated, p. 27, that "the *actual* cost of transportation on the Mohawk and Hudson Railroad, for freight by locomotive and stationary steam, is 3¼ cents per ton

per mile." If this is the *actual* cost upon that road, the public would perhaps like to know why $3\frac{1}{2}$ cents is assumed as the "settled" price on a *level* road.

The explanation will be found on the page last referred to, as follows:—"All the ascent for the greatest trade, (being as 3 to 1,) is overcome by one stationary engine, which *does not materially enhance the cost over a level,* taking the whole road." Putting this into plain English, and it will read as follows:—

"All the ascent in the direction of the heavier trade (the weight of which is to that in the opposite direction as 3 to 1,) is overcome by one stationary steam engine, which does not materially enhance the cost of transportation, compared with a level road of equal length."

The process, by which the gentlemen mentioned arrived at their conclusions, respecting the cost on a level road, is therefore evident.

1st. They *assume* the *actual* cost on the Mohawk and Hudson Road to be $3\frac{1}{2}$ cents per ton per mile.

2d. They come to the very extraordinary conclusion, that the cost of transportation upon that road is *not materially greater than it would be upon a level road of the same extent.*

3d. They "find" that on the Baltimore and Ohio Road the cost of transportation, when reduced to a *level,* is but $3\frac{5}{100}$ cents per ton per mile; yet they nevertheless conclude, that "experience" has "settled" the cost at $3\frac{1}{2}$ cents.

The authority for the statement in relation to the Mohawk and Hudson Road is not known.

In respect to the conclusions in reference to that road, it may perhaps be well to devote a little attention.

The Mohawk and Hudson Road is $15\frac{7}{8}$ miles in length. It has two inclined planes, whereon stationary steam power is used.—The elevation overcome by these planes is, for the western one, $113\frac{2}{3}$ feet, and for the eastern $172\frac{1}{3}$ feet. The total ascent from the Erie Canal at Schenectady is $113\frac{2}{3}$ feet, and the descent to the Hudson River at Albany, is $325\frac{1}{3}$ feet—making a total rise and fall of 439 feet. The same proportion of rise and fall estimated for the New-York and Erie Railroad, the distance being 483 miles, would give 13,400 feet—an amount sufficient, so far as elevation is concerned, to carry it over the Rocky Mountains!!!

Between the inclined planes and the termini of the Mohawk and Hudson Road, horse power is required. Between the inclined planes, locomotive, steam, and horse power are both used. The peculiar arrangement of this road has required, therefore, the use of three kinds of power, to wit: horse power, *stationary* steam power, and *locomotive* steam power.

Aside from the extra expense of transportation, arising from the cost and repairs of the inclined planes, the expense of sustaining these several kinds of power on so short a road, must obviously very much increase the expense over a level road. The locomotive engines used upon this road *were not the most efficient of their class,* and in point of power and useful effect, were inferior to others which were in use at the time the report alluded to was written; yet no allowance was made, and nothing said as to anticipated or probable improvements, which have since been very great.

It seemed not to have been considered, likewise, that the extreme shortness of the road would make a difference in the cost of transportation,—that it required about the same number of horses and engines, the same expense and delay of loading and unloading, as for a much longer distance, and that the number of agents, superintendents, laborers, &c., necessary to conduct the transportation, would not be materially increased by adding to the length of the road, and likewise, that the freighting business, on that road, had previously been quite limited, and the arrangements for receiving and discharging freight at the two extremes of the road, were then, and still are, in a very incomplete state. Notwithstanding this, it is stated in the report under consideration, that the cost of transportation upon the Mohawk and Hudson Road, is not materially greater than it would be on a level road of the same extent, for the sole and *very profound reason,* that "all the ascent for the greatest trade (being as 3 to 1) is overcome by *one* stationary engine,"—and the price, $3\frac{1}{2}$ cents per ton per mile, on that road, is taken as the "*settled*" price of transportation on all level roads, no matter what their length—the amount of business upon them—the facilities for loading and unloading—economising, motive power, &c. &c.,—all these are of no consequence; and this opinion is given in the face of their own statements and conclusions, that the cost on the Baltimore and Ohio Railroad, reduced to a level, was but $3\frac{5}{100}$ cents per ton per mile.

As it regards the cost of transportation upon railroads, Mr. Knight, the Chief Engineer upon the Baltimore and Ohio Railroad, who possesses the superior qualifications of being a man of science, and whose connection with the business concerns of that road, enables him to speak understandingly as to the result of past experiments, estimates the rate of transportation on that road, when continued west to the Ohio River, with occasional acclivities of 50 to 100 feet per mile, at less (on the average) than *one and a half* cents per ton per mile. Reducing this to the cost on a *level* road, on the *principle* adopted in the report, and we shall have the *actual* cost derived, from the *best "experience,"* at about $1\frac{1}{4}$ *cents* per ton per mile.*

In confirmation of this we may state, that the transportation, for the past year, on the Ithaca and Owego Railroad, between the inclined plane and Owego, has averaged, if any thing, less than the amount last stated, although this part of the road is far from level, and one-half of it is still in an imperfect or incomplete state; and, moreover, that the total cost of passing the inclined plane has equalled that upon the remainder of the road. This road, we should not omit to state, is destitute of the *questionable advantage* of an "*ascending plane in the direction of the heavier trade,*" which upon the Mohawk and Hudson Road appears to constitute so *favorable a feature* in the judgment of the authors of the report.

From the preceding, the public will judge as to the soundness of the views taken in the report referred to, of Messrs. Jervis, Hutchinson, and Mills, and of the degree of confidence to be placed in the opinions which are therein advanced.

We have some further remarks to offer in relation to that document, and two or three others, that have emanated from the same source, which we shall give to the public from time to time, as opportunity presents, and as the public interest shall seem to require.

OSWEGO.

* A late report shows it under one cent per ton per mile.

For the Railroad Journal.

STRICTURES ON THE REPORTS OF THE STATE ENGINEERS.

No. II.

In the Report of John B. Jervis, Holmes Hutchinson, and Frederick C. Mills, on the relative merits and cost of Railroads and Canals, Doc. 296, of the last Session of the New-York Legislature, p. 33, is the following:

"The cost (meaning the cost of transportation, exclusive of profit and toll,) has been shown to be $3\frac{1}{2}$ cents per ton per mile on a level; and as Railroads are not often entirely level, it has been thought proper to a full understanding of the subject, to present a statement, showing the comparative economy in motive power by locomotive steam engines on Roads of different inclinations. In the calculations the engine is assumed to weigh $6\frac{1}{2}$ tons (13,000 lbs.)," &c. "The load carried is exclusive of the tender, and includes freight and wagons."

	Feet per mile.	Tons.
"On a level the gross load will be		75·25
On a road or section having an ascent of	10	49 53
" " " " " " "	20	37·35
" " " " " " "	30	27·24
" " " " " " "	40	20·22
" " " " " " "	50	17·04
" " " " " " "	60	13·92
" " " " " " "	70	11·31"

The fallacy of the first statement quoted above, as to the cost of transportation upon Railroads, was fully exposed in the prece-

ding number. We clearly proved, as we trust, to the satisfaction of our readers, that no reliance was to be placed upon the conclusions therein stated, as they were not based either upon facts as they existed, or deductions made upon principles of sound reason—but "in derogation of both."

We now invite attention to the latter part of the paragraph quoted above, in which a statement is presented of the relative effect produced by locomotive steam power upon level and inclined roads. This statement is faulty, inasmuch as the gross load on a level is rated too low.

The loads upon the several inclinations are likewise rated too low, and they are not properly proportioned to their respective inclinations.

The year preceding that on which the above report was written, was marked by very great improvements in the locomotive steam engine. These improvements were principally made under the patronage of the Baltimore and Ohio Railroad Company, and will be found described in the Railroad Journal of Nov. 29, 1834, three months previous to the time when the report under consideration was presented to the public. Several new engines were constructed in that year on an improved plan. The one called the *Arabian* was deemed the most perfect, and weighed (including fuel and water in boiler) 7½ tons, being a little heavier than the engine assumed in the report. The Arabian "ran 50 days between Balti-"more and the Parr Ridge, a distance of 82 "miles daily, making 4,100 miles without "requiring repairs, or showing any per-"ceptible deterioration," and "conveyed, "at the rate of 11$\frac{79}{100}$ miles per hour, on a "level part of the road, a train weighing, "including cars, but *excluding* the weight "of engine and tender, 112⅞ tons." "More-"over, this engine advanced with this load, "at one half the above speed, up an ascent "of 17 feet per mile, extending ⅘ths of a mile, "and curved with a radius rather less than "1,000 feet"—which, upon a straight road, would not be less than equivalent to an inclination of 25 feet per mile.

Comparing the performance of this engine with the exhibit of the State Engineers above given, and we find a very great and striking difference. They assume for the gross load conveyed upon a level *only* 75·25 *tons*, whereas, in the instance above stated, the Arabian engine actually conveyed 112⅞ *tons*, being an excess over their estimate of 50 *per cent*. One item they have omitted, viz. the speed or velocity. This omission is the more surprising, as the item is an important and essential one, and whatever it was assumed to be, could not probably have exceeded 14 miles per hour, the rate at which the 112⅞ tons was conveyed by the Arabian. Again, the load which is estimated in the Report as adapted to an inclination of 25 feet per mile, is but 33 tons, whereas the gross load conveyed by the Arabian up an inclination equivalent to that, is 112⅞ tons. This, it is true, was conveyed at a diminished speed; but making all due allowance on this account, and there remains an immense disparity in the actual performance of the Arabian, over and above the amount assumed in the Report. For an inclination of 70 feet per mile, the gross load given in the Report is only 11⅓ tons, while an equal load was conveyed by the Arabian, upon the inclined plane of the Parr Ridge, a distance of ⅜ths of a mile, at the average rate of 10 miles per hour, the ascent being 264 feet, nearly *quadruple* the elevation assumed in the Report for producing the same effect.

We have been thus particular in bringing into the comparison the performances on the Baltimore and Ohio Railroad, as those performances were the result of improvements made the year preceding that on which the Report of the State Engineers was rendered.* There could, therefore, have been no excuse for not refering to them, and the circumstance of their not being noticed is the more strange, as their bearing upon the subject upon which they were giving a professional opinion, was all important to its full and correct elucidation.

The improvements on the Baltimore and Ohio Road were not only not referred to or described, but the public were not even apprised, through the medium of the report, that any had been made, or that there was even probability of farther improvement. It would seem, likewise, that the system of locomotion upon Railroads had attained, in the imperfect condition in which it was exhibited in the report, the last degree of perfection of which it was susceptible.

Admitting that the improvements mentioned had been fully and fairly described as they existed at the time the report was written, which they were not, still it was incumbent upon the writers of the report to have stated that Railroads were in their infancy—that improvements in locomotion for the last ten years had far exceeded those of any equal period in the history of man—that Railroads, as a general means of intercommunication, had sprung into existence within that period—that scarcely one half that time had elapsed since locomotive steam power had been applied with success —that it would, therefore, have been unsafe to assume that further improvements were not to be expected, and that the ingenuity of mankind, now in the full tide of its greatest success, was not to produce results still more important and surprising. A statement similar to this was not only due to the inventive character and spirit of the age, but it was particularly required in reference to Railroads, where the object was to exhibit their permanent and ultimate advantages and disadvantages, compared with Canals, the range for future improvements upon which, from causes which it is not necessary to explain, are comparatively limited.

That we are correct in this opinion, the year which has just elapsed conclusively shows. Chief Engineer Knight, in his last report on the Baltimore and Ohio Railroad, (see Railroad Journal, vol. 4, p. 773,) states that the engines built for that Road within the past year, "have come forth with a power of steam and traction hitherto unequalled, weight for weight, in the operations of the locomotive steam engine." The George Washington engine, weighing 8½ tons, ascended 5 consecutive miles, the inclination being 20 feet per mile, at the rate of 11½ miles per hour, with a gross load of 113 tons—being *treble* the load allowed upon the same inclination in the report under consideration, and equivalent to a gross load on a level of 211 tons, moving with the same velocity, which is likewise *treble* the load presented in the report, for a level road.

This latter comparison is made to show that improvements *are going forward* in the department of locomotion upon Railroads, of which fact there is no intimation in the report. The very great contrast between the actual state of those improvements, at the time the report was made, and for months previous, as compared with the statements therein given, has been fully set forth.

It illustrates clearly the fact that the authors of the report were ignorant of the subject on which they undertook professionally to enlighten the public, or that they intentionally refrained from communicating the whole truth, and to one or other horn of the dilemma they are inevitably driven.

It may be asked why we have turned aside to examine at all into the merits of this report. We reply that we have done so for two reasons. The report was brought to light under the wing of the Canal Commissioners, as a public document. The character of our State, and of the profession to which we belong, is, therefore, to a certain extent, implicated. It was ushered into being, likewise, when the advocates of a great State and National work were earnestly urging their claims for aid upon the Legislature, and whether so intended or not, its influence in respect to that project was exceedingly prejudicial.

Now that our Legislature are again called to act upon the same subject, we are desirous that the character of this report should be exhibited in its true light, and we have no fears but that when thus stripped it will be completely divested of its power of doing harm.

We must defer, to another opportunity, the illustrations which we intended to give of the disproportion of the loads to the different inclinations, as exhibited in the report. We will now only say, that we

* We might have referred to the important improvements in the locomotive engine, made in Philadelphia, the year previous—but the single example adduced is sufficient for our purpose.

shall prove that the estimates on this head were empirical, and could not have proceeded from any calculations based upon accurate scientific principles.

OWEGO.

WILMINGTON AND RALEIGH RAILROAD.

Meeting of Stockholders.

Pursuant to public notice, the Stockholders in the Wilmington and Raleigh Railroad, met at the Court House in Wilmington, N. C., on the 14th March, 1836, and were organized by the appointment of Wm. D. Mosely, Esq., as Chairman, and Gen. James Owen as Secretary.

After the objects of the meeting were explained, the following proceedings took place.

On motion, Resolved, That Gen. E. B. Dudley, Gen. Alex'r MacRae, and James S. Green, Esq., be a committee to examine such proxies as may be presented. This committee reported that 1296 shares are represented by proxy,* and 3360 by individual stockholders.

Resolved, That the salary of the President of this Company be fixed at $2000 per annum.

Resolved, That the offices of Secretary and Treasurer be filled by the same person, during the present year, at a salary of $1000 per annum.

Mr. Lazarus, Chairman of the Commissioners, submitted their report, which was accepted.

The meeting proceeded to elect a President and ten Directors. A ballot being had, Gen. E. B. Dudley was elected President, and Andrew Joyner, W. D. Mosely, James S. Battle, A. Lazarus, A. Anderson, Wm. B. Meares, P. K. Dickinson, James Owen, R. H. Cowan, and Thomas H. Wright, Directors.

Whereas, subscriptions to the capital stock of this road have been made along the contemplated route, as well as at Wilmington—therefore,

Resolved, That the President and Directors be authorized to have the road commenced both at Wilmington and Halifax, due regard being had to the amount subscribed north and south of Contentnea creek; and that the President and Directors be instructed to commence the work with as little delay as possible.

Resolved, That the President and Directors be hereby directed to cause the road to be located on the most eligible route from this place to Halifax.

Resolved, That a general meeting of the stockholders shall be held in this place on the first Monday in November next, and thereafter, annually, on the first Monday in May.

Adjourned to 10 o'clock to-morrow.

TUESDAY, March 15.

Stockholders met at the Town Hall.

Resolved, That the President and Directors be authorised to re-open the books of subscription, at such times and places as they may deem expedient, and under the superintendence of Commissioners, to be appointed by them, for an amount of stock not exceeding 2,000 shares.

Resolved, That a Committee of three be appointed by the Chair, to draft and present, for the consideration of the Stockholders, at their next general meeting, a code of Bye-Laws for the regulation and government of the Company.

Whereupon, W. B. Meares, A. Lazarus, and A. Anderson, were appointed said Committee.

On motion of Gen. Blount,

Resolved, That the Engineer be instructed to examine a route touching at or near the town of Waynesborough, on Neuse River, and thence at or near Rocky Mount, the great Falls of Tar River, and report thereon to the President and Directors—[this resolution amended on motion of Gen. A. Mac Rae]—and also by Duplin Courthouse, Rockford on Neuse, and Tarborough, and such other routes as may be suggested or approved by the President and Directors.

Resolved, That the thanks of the Stockholders be tendered to the Chairman of the Commissioners, and the Chairman and Secretary of this meeting, for the zealous and able discharge of their respective duties.

The meeting adjourned, to meet in this place on the first Monday in November next.

W. D. MOSELY, Chairman.

JAMES OWEN, Secretary.

Immediately after the adjournment of the meeting of Stockholders, the Directors met, and appointed Gen. ALEXANDER MAC RAE Superintendent of the Railroad, and JAMES S. GREEN, Esq., as Secretary and Treasurer. They also instructed their President to engage the services of WALTER GWYNN, Esq., as their Principal Engineer; and in pursuance of authority given by the Stockholders, have determined forthwith to re-open books of subscription for an amount not exceeding 2,000 shares.

The services of Major GWYNN have been engaged, and the survey will be commenced immediately.

* The proxies were, Hon. Wm. D. Mosely, representing the Lenoir stock; Robert Soutter, Esq., the Norfolk do.; Gen. Blount, of Nashville, the Nash and Edgecombe do.; Dr. Andrews and Mr. Lane, of Waynesboro', the Wayne do.; and Gen. Alex'r Mac Rae, the Edgecombe do.

RAILROAD AND CANAL INTELLIGENCE.

UPPER CANADA.

The Toronto and Lake Huron Railroad bill has passed the Assembly by a large majority, and will, we have no doubt, receive the sanction of the other branches of the Legislature. 35,000*l.* have also been voted, by resolution, for the continuance of the macadamization of Yonge street and of Lot street, east and west of this city; 15,000*l.* to be expended on Yonge street, 10,000*l.* on Lot street, east, and 10,000*l.* on Lot street, west. His Majesty's Receiver General will be authorised to borrow this amount, on the credit of the tolls derivable from the roads, and in case of deficiency, on the general credit of the District.—[Correspondent and Advocate.]

MASSACHUSETTS.

A Railroad from Providence to Woonsocket Falls is proposed.

A very favorable opinion is held of the usefulness of this route, and its relation to the proposed Worcester and Hudson, a "Great Western Railroad."

NEW-JERSEY.

Elizabethtown and Somerville Railroad.—A public meeting of the friends of this road is advertised in the Somerville papers for Saturday next, at 3 o'clock, P. M. We are told that the Board of Directors have resolved to complete the whole road from Elizabethtown to Somerville, during the present year, and have already appointed an agent, who is now contracting for the railing and other materials, necessary for the prosecution of the work. It is in the contemplation of the friends of this enterprise to extend the road from Somerville to Belvidere, and Easton, Pa., and thence to connect with the N. Y. and Erie Railroad.

The Elizabethtown Journal is authorised to say that the section of the road from that place to the Point, will be completed by the 4th of July next.

The city council of Trenton, alive to the interests of their fellow-citizens, and aware of the great importance of a direct communication, by means of a railroad, with the city of New-York, at a recent meeting, appointed a committee of three on their part, to address the Camden and Amboy Railroad, and Delaware and Raritan Canal Companies, and request them to make their lateral road through that city, subject to the ordinances to be hereafter passed concerning railroads.

MARYLAND.

An account of the surprising performance of the locomotive on the plains of the Baltimore and Ohio Railroad, will be found in another column.

NORTH CAROLINA.

Wilmington and Halifax Railroad.—At a meeting of the Subscribers to the Wilmington and Halifax Railroad, held in the town of Wilmington, N. C., on the 14th and 15th inst., the company was organized by the appointment of

GEN. EDWARD B. DUDLEY, *President.*

ANDREW JOYNER,
WM. D. MOSELEY,
JAMES S. BATTLE,
A. LAZARUS,
A. ANDERSON,
W. B. MEARES,
P. K. DICKENSON,
R. H. COWAN,
T. H. WRIGHT,
JAMES OWEN,
} *Directors.*

WALTER GWYNN, *Engineer.*

It is intended that the road shall be commenced at Wilmington and Halifax at the same time, regard being had to the amount of subscriptions at each end. As soon as the survey is completed, the work is to be prosecuted without delay.

OHIO.

Cleveland and Warren Railroad.—In the (Cleveland) Daily Herald of the 15th inst., we find the report of Col. S. Dodge, on the survey of this route.

From this we find that the ground in general offers unusual facilities in location.

The grades are moderate—no curve less than 2,000 feet radius need be allowed.

The estimate of a road bed, 20 feet wide, with proper slope, and for a double track

is $364,747 54. Yellow poplar and red cedar are abundant on the lake, and along the line. The rail is to be of wood, protected by bars of iron.

BALTIMORE AND OHIO RAILROAD—LOCOMOTIVE ENGINES.

CITY COUNCIL—FIRST BRANCH.

Wednesday, March 24th.

Mr. Barnes, from the Joint Committee appointed to witness experiments upon the power of the Locomotive Engines, at the inclined planes, submitted the following report:

The Joint Committee of the City Council of Baltimore, appointed to witness experiments upon the power of the Locomotive Engines, on the Baltimore and Ohio Railroad, at the inclined planes, respectfully report:

That your Committee left Baltimore on the morning of Tuesday last, accompanied by a committee of the Board of Directors of the Company, a committee of the Board of Trade, and other individuals, in all amounting to 42 persons. The train consisted, besides the engine and its tender, of a double 8 wheeled passenger car, constructed to accommodate 44 persons, and 3 four wheeled passenger cars, capable of containing 17each. After some delay, occasioned by coming in contact with the leaders of a burden team, who being alarmed, sprung before the engine from off the adjoining track, the train arrived at the foot of plane number 1, at the distance of 42 milts from Baltimore. The instructions given to the engineer had been, as your committee are informed, to stop here, and, disengaging the double car, to attach the three single cars to the engine, and to ascend the planes with them, and with 50 passengers, this being a demonstration of the power of the engine, which, it was believed, would satisfactorily prove its efficiency for use, where the elevation was at the rate of 200 feet per mile. Confident, however, in the power of the engine, the engineer, without stopping at the foot of the plane, commenced its ascent, with the train that had left Baltimore. The impetus acquired on the level, was lost in the first 300 feet of the ascent, after which, the engine drew its load steadily to the summit of the first plane, at the rate of from four to five miles an hour, accumulating speed as it approached the top. This plane is 2150 feet in length; 2050 feet of which ascend at the rate of 197 feet per mile, and 100 feet at the rate of 201 feet per mile. From the first plane the train proceeded to the second, which is 3000 feet in length; 2800 feet of which ascend at the rate of 170 feet per mile, 100 feet at the rate of 227 feet per mile, and 100 feet at the summit, at the rate of 264 feet per mile. The engine and its train ascended at the rate of from 5 to 6 miles per hour, to within thirty feet of the summit of this plane, when, while on the grade of 264 feet to the mile, it stopped. The three small cars, weighing 5 ton 100 weight, were then cast loose, when the engine starting, without assistance, on this grade, drew the double car and passengers to the summit with the greatest apparent ease. The steam escaped in volumes from the safety-valve, as well when the engine reached the summit of the planes, as when it left the foot of them. The weight drawn up the planes was as follows, according to actual weighing:

Paterson,	1.	10.	2.	0.
Patapsco,	1.	15.	2.	0.
Carroll,	1.	15.	2.	0.
Double Car,	4.	17.	0.	0.
45 Passengers,	3.	0.	0.	0.
Tender,	4.	7.	0.	0.
Tons,	17.	5.	0.	0.
Engine,	8.	10.	0.	0.
Making a gross weight of	25.	15.	0.	0.

This weight of 25 tons 15 cwt. was drawn up the grades before mentioned, the steepest of which was 227 feet per mile, with much ease, and by the inherent power of the engine, without the assistance of the impetus of previous high speed—and the weight of 20 ton 15 cwt., deducting from the above the weight of the three cars cast off on plane number 2, was drawn with equal ease up a grade of 264 feet to the mile,—the engine starting the train from rest on this grade. At the summit, two car loads of pig iron, weighing each 4 tons, were attached to the train, and the whole, weighing then 33 tons 15 cwt., was made to descend the plane, on the return to Baltimore, by the action of the engine alone, and without the assistance of a brake, at such speed as the engineer pleased, and was several times stopped, on the way down, to show the command in which the engine was held.

With such results as the above, it is unnecessary to add, that your committee are equally gratified and surprised; and from what they themselves witnessed, they have no hesitation in expressing their conviction, that the engines of the Baltimore and Ohio Railroad are capable of drawing with ease, at least 50 passengers, up ascents of any length, of from 200 to 220 feet per mile.

From the account thus given, it will be at once seen, that the performances of the best engines in England have been far surpassed; and although your committee are aware, that calculation was competent to prove the practicability of ascending grades like those at the planes, with engines of the weight and power used on this occasion, and with similar loads, yet it was reserved for the company in question to prove that machines of such giant power could be constructed, combining with their great strength, the important qualities of speed, durability, facility of repair, and capability to use anthracite as their fuel.

Your committee are glad to have an opportunity of expressing their sense of the obligations, which the efforts of the Baltimore and Ohio Railroad Company have conferred upon the railroad system generally, and more especially in reference to it as connected with the city of Baltimore. It is now a matter of common parlance to assert, that the Alleghanies can be passed by locomotive engines, by the Potomac route, without the use of stationary power; and your committee entertain no doubt of the fact. It is this which gives to Baltimore the vantage ground, in the competition with her sister cities, for the western trade; and yet this is owing, not more to the geographical depressions of the mountain range, than to the engines perfected by the company just named. Excepting the engines manufactured by them, there is probably not one in the United States, although some of the best ever made in England have been imported, which is capable of ascending the grades and passing the curves for any profitable purpose, which must occur among the mountains on the road in question. While nature, therefore, has done much to facilitate the intercourse of Baltimore with the west, the Baltimore and Ohio Railroad Company has not done less.

Your committee make these remarks as an act of justice; and they do it with the more pleasure, because it enables them to bestow a deserved compliment upon the American mechanics, who have so well illustrated their capacity and skill in the manufacture of the Engines in question—proving, satisfactorily, that in this, as well as in the other departments of human industry, their inventive genius is capable of the most elevated and useful flights. It is now but a few years since the universal voice called upon the Baltimore and Ohio Rail road Company to follow the example of their neighbors, and import their engines; and their perseverance in refusing to do so, although founded upon the very best and truest appreciation of circumstances, was stigmatized as folly or obstinacy. The result has fully justified their course, and showed that their confidence in the skill of the artisans of this country to produce a more perfect machine than had yet been manufactured in England, and better adapted to the Road from Baltimore to the Ohio, was fully warranted.

The capacity of a locomotive engine, when employed in heavy drafts, depends upon three things:—1st. Its weight, which gives it the adhesion on the rails that is requisite.—2d. The capacity of its cylinders to use the adhesion to its utmost limit.—3d. The ability of the boiler to supply the cylinders with steam equal to their capacity. Where the power is applied to but one pair of wheels but half the adhesion is used, supposing the weight to rest equally on the four wheels. Where the power is applied to both pair, the weight of the whole engine is made effective to produce adhesion. The English engines generally have but one pair of wheels geered. The engines of the Baltimore and Ohio Railroad Company have both pair geered. The weight of the engines, therefore, being equal, and there being enough steam to overcome the adhesion of both pair of wheels, the Baltimore engine must be double the effective power of the English engine. The larger the cylinders, in stroke and in diameter, there being steam enough to supply them, the greater the power they afford—and the cylinders of the Baltimore engines being twelve and a half inches in diameter, and twenty-two inches stroke, while the English engines rarely exceed ten or eleven inches in diameter, by seventeen or eighteen inches stroke, the former are, of course, the most effective, since the daily experience of the Baltimore and Ohio Railroad Company shows the ample supply of steam, which the peculiar construction of the boiler affords at all times. At the end of 9 months of constant use, the tubes of the Baltimore boiler have been found on examination as perfect as when they were inserted, while in the English engine, the renewal of tubes is a constant source of expense and vexation. The number of tubes in the Baltimore engine is four hundred, while in the English engine it rarely exceeds 120, causing a proportionate difference in the fire surface, or capacity for generating steam, the heat applied in the furnace being the same.

Your Committee state these facts, which are of easy comprehension, to show that the superiority of the Baltimore engine over the English one of the same weight, is not a matter of accident only, or about which there can be any mistake, but an inevitable consequence of well known philosophical and mechanical principles.

The engines of the Baltimore and Ohio Railroad Company are manufactured by Messrs. GILLINGHAM and WINANS, at the

Company's shops. Both of these gentlemen were, for many years, in the service of the Company, in the Department of machinery, before they became contractors; and to them, together with the late PHINEAS DAVIS, the former contractor, is to be attributed the perfection of the present locomotive. Their establishment is a large one, employing upwards of an hundred workmen, and of itself is of great benefit through the employment that it gives, and the money which, necessarily, it is the means of circulating. The Company has a prior claim to the services of the contractors, paying a stipulative price for the engines, ($5000,) and the machinery which are obtained from them, and paying for repairs by the time which they consume. The expenses of the shops are borne by the contractors, who build and manufacture for others as well as the Company. The shops and permanent machinery have cost the Company about $10,000,—which sum has been already returned to it in the reduced price for which the contractors build the engines, in consideration of the advantages of the use of the shops, the proximity to the road, and the opportunities of working for other companies.

In the annual report of the Baltimore and Ohio Railroad Company, the power of their engines has frequently been mentioned, and the authority and character of these reports have been quite sufficient to authenticate the facts therein stated. Your Committee are aware, however, that the incredulous as to the ascent of the plains at Parr's Spring Ridge, have not been few, and, perhaps, the very importance of the results stated, so far exceeding all previous experience, has been the cause of doubt; or in other words, "the news was held to be too good to be true." Your Committee, however, are witnesses, with many others, to the surprising efforts and efficiency of the engines in question, and they are glad that an opportunity has been afforded them to add their testimony in corroboration of that which reflects so much credit upon the mechanics of our country, and to express their approbation of the persevering and patriotic individuals who, in the management of the Baltimore and Ohio Railroad, have called our native talent into play, and done so much to develope and increase the efficiency of the Railroad system.

All of which is respectfully submitted.

SAMUEL BARNES,
WALTER BALL,
SAMUEL HARKER,
J. B. SEIDENSTRICKER,
JOSHUA DRYDEN,
JOHN SCOTT,
HENRY MYERS,
} Committee of the First Branch.

WILLIAM REANEY,
SAMUEL READY,
JAMES FRAZIER,
F. LUCAS, Jr.
} Committee of the Second Branch.

REPORT OF THE CANAL BOARD, UNDER THE ACT PASSED MAY 11, 1835, IN RELATION TO THE ENLARGEMENT OF THE ERIE CANAL.

To the Legislature of the State of New-York:

The Canal Board, under the act entitled "An act in relation to the Erie Canal," passed May 11, 1835, respectfully submit the following

REPORT:

The first section of this act authorizes and directs the Canal Commissioners to enlarge and improve the Erie Canal, and construct a double set of lift locks, as soon as the Canal Board may be of the opinion that the public interest requires such improvement.

By the second section the dimensions to which the Canal and locks shall be enlarged, are to be determined by the Canal Board; and the third section authorizes an independent Canal to be constructed in passing cities and villages, and at other places, instead of enlarging the present works, if the Canal Board shall decide that the public interest will be thereby promoted.

The first meeting of the Canal Board under said act was held at the Canal Room in the Comptroller's office, in the city of Albany, on the 20th day of June last. On the third day of July the Board adopted the following resolutions:

1. *Resolved*, That the public interest requires the enlargement and improvement of the Erie Canal, and the construction of a double set of lift locks therein.

2. *Resolved*, That the doubling of the locks, and the works connected therewith, ought to be commenced without delay, and prosecuted with all reasonable diligence, beginning with that portion of the Canal between the village of Syracuse and the city of Albany.

3. *Resolved*, Pursuant to the 10th section of said act, that the enlargement of the Canal should be commenced immediately after a sufficient sum shall have been collected and invested from the Canal revenues, to discharge the Erie and Champlain Canal Debt.

4. *Resolved*, That the Canal Commissioners proceed without delay to make surveys for all the improvements contemplated by the said act, and that they make the necessary appropriation of all lands, waters, and streams for the purpose aforesaid.

5. *Resolved*, That the Canal be enlarged so as to give six feet depth of water, and in general sixty feet width of water on the surface, with a slope of two feet to one in the banks.

6. *Resolved*, That the locks be enlarged so as to be one hundred and five feet long between the quoin posts, and fifteen feet wide in the clear, and in other respects be adapted to the enlarged Canal.

7. *Resolved*, That the aqueducts be constructed, so as to give at least forty feet water way, except that the Rochester aqueduct may, in the discretion of the Canal Commissioners, be constructed with a water-way not less than thirty-six feet wide.

8. *Resolved*, That in other respects than those provided for by the foregoing resolutions, the Canal Commissioners make such improvements in the Canal and the works connected with the same, as they shall deem expedient.

9. *Resolved*, That the Canal Commissioners be requested to cause such examinations and estimates to be made as the time will permit, for the purpose of ascertaining the practicability and probable expense of an enlargement of the Canal, so as to give the several sizes of six and seven feet depth of water: the width at surface to be in general ten times the depth of water.

10. *Resolved*, That the Board, when it adjourns, will adjourn to meet at this place on Tuesday, the 20th day of October next, to hear the report of the engineers, and consider further of this subject.

On the 6th day of July the Board of Canal Commissioners at a meeting held in the city of Albany adopted the following resolutions:

Resolved, That, for the purpose of making the survey of the improvement of the Erie Canal as contemplated by a resolution of the Canal Board of the 3d inst., said survey shall be commenced at the following places: at the city of Albany, and proceed west; at the upper lock in the village of Frankfort, and proceed east; at the upper lock in the village of Frankfort, and proceed west; and at Buffalo and proceed east.

Resolved, That the charge of the survey commencing at Albany and proceeding west, is confided to the charge of John B. Jervis: That the charge of the survey commencing at Frankfort and proceeding east, is confided to Nathan S. Roberts: That the charge of the survey commencing at Frankfort and proceeding west, is confided to Frederick C. Mills, and that the survey commencing at Buffalo and proceeding east, is confided to Holmes Hutchinson. Each of whom is hereby appointed and designated as the engineer for the purpose aforesaid.

At a meeting of the Board of Canal Commissioners, held at Utica on the 17th day of July, the following regulations were adopted in reference to the surveys of the Erie Canal, with a view to its enlargement.

1st. The surveys shall be of such a description as will enable the engineers to report the probable comparative expense and opposing obstacles of enlarging the Canal to 6 feet deep and 60 feet wide, and also 7 feet deep and 70 feet wide: said report to be made by the 20th of October next, or at an earlier day if practicable.

2d. At all difficult and expensive points, such as the perpendicular bluff of rocks east of the three locks below Schenectady, at Flint Hill, at the bluff of rocks below the two locks at Philip's, at Yankee Hill, at the bluff above Fultonville, at the little and big nose, at Dieffendorf's hill, at the Little Falls opposite Herkimer, at the Cayuga marshes, at the Irondequoit, Sandy creek, Otter creek, and Fish creek embankments, and from Lockport to Buffalo the width may be limited to 50 feet.

3d. The quantity of water to be appropriated shall be sufficient to supply the maximum amount of business which can be done on the enlarged Canal, calculating 150 cubic feet per minute per mile for the eastern section, and 100 cubic feet per minute per mile on the middle and western sections, for a Canal of the dimensions of the present Erie Canal, to which is to be added the lockage water.

4th. The survey shall be made in reference to a feeder from the Mohawk river, at the four locks above the Cohoes, at the upper aqueduct; at some convenient point between Schenectady and Fort Plain, at the Minden dam; from the Palatine creek, at the Little Falls on the south side of the river, and also on the north side.

ROME SUMMIT.

A feeder from the Mohawk river, from the Black river, and Fish creek, and the Canaseraga creek.

JORDAN SUMMIT.

To report on the expediency of making a reservoir of the Skaneateles lake, either by raising the water or cutting down the outlet, and also of making a reservoir of the Owasco Lake and a feeder from the Owasco creek.

A feeder from the Genesee river and the Tonawanta and Oak Orchard creeks.

5th. The Engineers shall furnish themselves with convenient transcripts of the map made by Holmes Hutchinson under the statute directing the survey of the Canals: designating thereon the exterior bounds of the survey made by Mr. Hutchinson for doubling the locks.

6th. A berm shall be formed at all places except where deep rock excavations occur, and the drainage water shall be conducted under the Canal by culverts, or into it by regular sluices, formed for that purpose with a cess pool outside the bounds of the Canal to receive the deposit.

7th. The banks to be raised 3 feet above the surface of water on the inner edge, and 2 feet on the outer edge, and the towing path bank to be 12 feet wide on the top, with slopes on each side of two feet horizontal base to every foot rise; and the berm bank is to be 8 feet wide on the top with the same slopes.

8th. In cities and villages where the Canal cannot be widened to the required width without removing buildings at a great expense, examinations shall be made for a separate Canal.

9th. As far as practicable the pound reaches between the locks shall be so large that two lockages of water shall not depress the surface more than six inches.

10th. The engineers are requested to report plans for bridges having a water way of 50 and 60 feet under them.

11th. To examine and report on the question how far the new lock can be most conveniently located from the present lock, in reference to the convenience of navigation.

12th. To report on the expediency of making the towing path of sufficient width to enable two horses to tow abreast.

13th. To report such suggestions as may occur to them, in reference to the duties submitted to their charge.

14th. To report an opinion of the dimensions of a lock best adapted to economy in transportation, in reference to the enlarged canal on either plan.

The engineers completed the surveys, and their reports were submitted to the Canal Board on the 20th day of October, with estimates of the cost of the contemplated improvement on both plans for the enlargement, and of all the feeders and reservoirs directed to be surveyed. These reports and estimates are herewith submitted.

The aggregate of the estimates including the cost of a double set of lift locks on the whole line, is,—

		per Mile.
For the largest canal,	$12,416,150 17	=$34,204 37
For the smaller canal,	10,368,331 48	= 82,562 90

The difference is $2,047,818 .69

A little more than 20 per cent.

In presenting this estimate it is proper to remark, that it is not contemplated to construct a double set of lift locks on the enlarged plan, until the business on the canal shall be so increased as to render it necessary, excepting in situations where the present locks require to be rebuilt, or where in making the enlargement the line is so changed as to render the present locks useless.

These estimates include the expense of removing buildings from the line, but nothing for damages.

The estimate from Utica to Lyons, is not confined to the expense of the enlargement and the necessary additional feeders, but includes the cost of rebuilding nearly all the aqueducts, and some of the culverts and bridges, on account of their decayed condition, and of all the additional feeders and reservoirs which have been surveyed. East of Utica the estimates include the cost of rebuilding the lower aqueduct across the Mohawk river, a portion of the bridges and other mechanical structures; and also of a new line and aqueduct at the Schoharie creek, and a new line at the nine locks.

These improvements to the canal are necessary, even though it were not enlarged. If the amount estimated for this purpose and such part of the expense for feeders and reservoirs as may not be required were deducted, it would reduce the aggregate which has been presented, but how much cannot now readily be determined.

The plans on which the estimates are based, are of the most substantial character, comprising much better and more expensive work than the plans on which the Erie canal was originally constructed. The locks will cost nearly 100 per cent. more.

These estimates were, no doubt, made with all practicable care and correctness; but it is difficult to speak of them with much certainty. Great allowances should be made, on account of the short time allotted for this service, and the difficulty of estimating the value of work, which must be done under circumstances like those attending the improvement in question.

On the basis which was furnished in the directions to the engineers, it is estimated that the enlarged canal will require an additional quantity of 14,546 cubic feet of water per minute for the Rome summit, and 7,990 cubic feet per minute for the Jordan summit. This computation is made on 250 lockages, every twenty-four hours, for the Rome summit, and 220 for the Jordan summit.

The additional feeders and reservoirs which have been surveyed, and which are available to supply these summits, are estimated to furnish as follows:

FOR THE ROME SUMMIT.

From the Black river, cubic feet per M.	14,681
From the Fish creek, cubic feet per M.	13,725
From the Canaseraga creek, cubic feet per M.	327
	28,733

FOR THE JORDAN SUMMIT.

From Skaneateles reservoir, if raised two feet (for 120 days,)	4,840	c.ft.per.M.
The addition by depressing the outlet, 3 feet (for 120 days,)	7,260	do
From the Owasco outlet,	4,800	do
From the Owasco reservoir,	3,549	do
From the Nine Mile creek,	3,000	do
	23,449	

These estimates were made during the past season, when the streams of the country were much above their ordinary minimum flow; but deductions, proper in the opinion of the engineer, were made from the guaged quantity on this account. The examinations show that a much larger quantity of water is available for the Rome and Jordan summits, than the largest canal which has been contemplated will require, for the extent of business which can be done with double locks.

On the western section it is expected that the principal supply for the canal must be drawn from Lake Erie, and it is intended to give the canal such capacity as will render this practicable, without creating a current which may impede the navigation.

The surveys have shown that additional feeders may be taken from the Mohawk river, and there can be no doubt about obtaining a supply for the eastern section.

The Canal Board at their meeting in October, reconsidered the decision made in July, in reference to the extent of the enlargement of the canal and locks.

The Board, after a careful examination of the information derived from the surveys, and the facts submitted to their consideration, decided that the canal should be enlarged to seven feet depth of water, and 70 feet width of surface; and in the present month, they agreed on a lock 110 feet long between the quoin posts, and 18 feet width of chamber.

To decide on the dimensions to which the canal and locks shall be enlarged, has imposed a question of high responsibility, not free from doubt, and about which there is some diversity of opinion.

To change the boundaries of the canal, imposes a delicate interference with private property; and the Canal Board are aware that in fixing on the limits to which the canal should be enlarged, they were deciding a question which should be considered definitely settled. The idea of disturbing the bounds of the canal for a second enlargement cannot be entertained.

The prospective, business, and every consideration connected with this subject, unequivocally indicated, that the enlargement of the canal and locks should be such as would furnish the greatest facilities to busi-

ness, and the cheapest rate of transportation.

The amount of cargo which approaches nearest the maximum that can be transported on a canal, with the greatest economy, experience has no where pointed out with certainty.

The Commissioners here refer to various experiments to determine the relative proportion of the transverse section of a boat and canal, in reference to the power of traction. Such different data have been used in making the calculations, that they disagree materially.

(To be continued.)

Applications of Chemistry to the Useful Arts, being the substance of a Course of Lectures delivered in Columbia College, New-York, by James Renwick, Professor of Natural Experimental Philosophy and Chemistry.

III.

SALTS OF COMMERCE.

1. COMMON SALT.

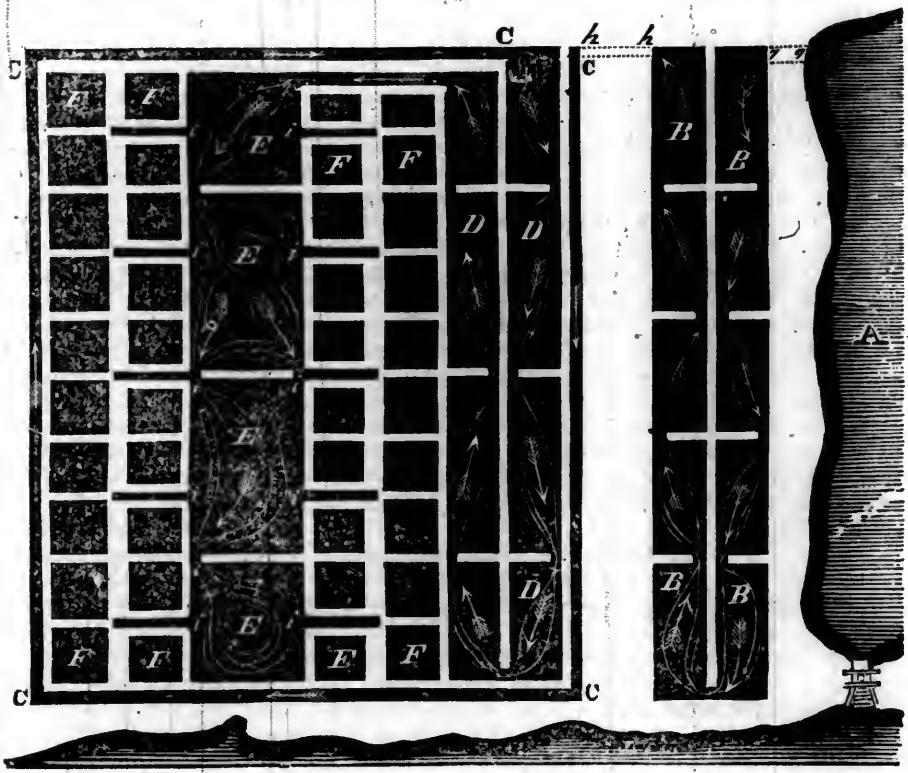
The sources whence common salt, (*chloride of sodium,*) is derived, are, the water of the ocean; salt springs, which are found issuing from certain geological formations; and beds of rock salt. The two former may be separated from the salt they hold in solution, either by spontaneous or by artificial evaporation.

MANUFACTURE OF SALT FROM SEA-WATER BY SPONTANEOUS EVAPORATION.

AUTHORITIES.—FOURCROY. Traite de Chimie.
DUMAS. Chimie appliquee aux arts.

There are some warm and dry climates where, from these favorable circumstances, salt is formed by spontaneous evaporation from natural basins, which have an occasional communication with the sea at the highest state of the tides. From such basins it is only necessary to rake out the salt as it forms from time to time at the surface. In less favorable climates, artificial salt-pans are formed by embanking portions of salt meadow, and dividing the embanked space, by dykes, into a number of basins, into which the water being successively admitted, and caused to expose a large surface, is finally evaporated. The first basin is of considerable size, and serves as a reservoir, receiving water from the ocean at spring tides, and retaining it for use. From this reservoir the salt water is conveyed into the first of a series of rectangular basins, called *beds*, by a tube laid under ground. This tube enters at the corner of the first bed, and is directed by the arrangement of the openings in the separating dykes, diagonally across each of them to the end of the series. From the last bed it is passed by another subterranean tube into an open canal, which is directed in such a manner as nearly to enclose a square. The tube is admitted at one of the angles of this square, and the channel drawn from it around the square until it comes again into a basin, which is separated from the first branch of the canal by a dyke. This basin is the first of a second series, of the same extent as the first series, which go by the name of *tables*. After traversing the tables, the water passes by a short canal into a larger basin, called the *muant*, along two sides of which are arranged a number of smaller ones, in two rows, called the *areas*. These have floors of clay or plaister impervious to water. Canals are formed in such manner that each leads the water from the muant towards the common corner of four of the areas, but is still separated from them by their surrounding dykes. A temporary communication being made with these canals, the water is permitted to flow upon the areas to the depth of about an inch, after which the entrance is stopped. In these areas the salt begins to crystalize at the surface, and as soon as a crust is formed it is broken up, and either finally raked out, or removed after the whole of the water is evaporated to dryness. In the former case the salt is tolerably pure, in the latter it is bitter and disagreeable; nor could it be advantageously disposed of, were it not that the use of it is compelled in countries where salt is a government monopoly. The object of the complex arrangement of canals and basins, as we have described it, is, that when the operation is in regular train, the water, in its passage from the reservoir to the areas where the evaporation is completed, shall expose a large surface to the air, and at the same time have such a degree of motion as may bring it regularly in contact with fresh air. The arrangement of a set of salt pans may be understood from the annexed plate.

PLATE I.



A, reservoir.
BBB, beds.
CCC, canal enclosing a square space.
DDD, tables.
EEE, muant.
FFF, areas.
gg, subterranean communication between the reservoir and the beds.
hh, do. between the beds and canal.
ii, canals, each of which conveys water from the muant to the common angle of four of the areas.

It is proper that the pans should be placed in such manner as to receive most advantageously the currents of the principal winds.

In the north of Europe the use of such salt pans begins early in March, and may continue until the end of September. The water which is first admitted into the areas, remains for eight days before it is completely evaporated. The next charge will take a less time, for the water in the beds, tables, &c., will have been somewhat concentrated; and at the height of the season, the areas may be changed daily.

The salt raked out of the areas is piled on the neighboring ground in pyramidal heaps, where it is permitted to drain, in order to separate the water which adheres, with such matter as it holds in solution, and it attracts water from the air, which dissolves a certain soluble and deliquescent substance which, as we shall see, is contained in sea-water. These heaps are thatched with straw or bushes, in order to prevent the entrance of rain.

The salt manufactured by spontaneous evaporation, even under the most favorable circumstances, is not as pure as some other descriptions, but has the advantage of being formed in regular cubic crystals, which makes it better fitted for keeping meat and curing fish than any other description. Such salt is imported into this country in large quantities from Spain and Portugal, from Turk's Island, and the Cape de Verds. A large natural salt pan also exists within our own territory at Key West.

The impurities of which we have spoken are contained in sea-water, and are but par-

tially separated in the process, or the subsequent draining. In 100 pts. by weight of sea-water, there are dissolved about 3 1-2 of solid matter. This matter, obtained by rapid evaporation to dryness, is composed of

Common salt,	2.54—72.
Chloride of magnesium,	0.35—10.
Sulphate of magnesia,	0.58—16.
Carbonates of lime and magnesia,	.02—00.67
Sulphate of lime,	.01—00.33
	3.50 100.

Of these substances, the carbonates of lime and magnesia being held in solution by excess of acid, will be deposited in warm weather in consequence of the escape of the acid when a large surface is exposed to the air. The sulphate of lime being but sparingly soluble, will, after the few first days of the process, be left behind in the tables, &c., before the water reaches the areas. It will also determine the conversion of a part of the sulphate of magnesia into sulphate of soda; the latter will unite with the sulphate of lime to form a double salt. The remaining sulphate of magnesia, having a solubility in cold water about one half more than that of common salt, but being not much more than one-fifth in quantity, will not begin to crystalize until more than six-sevenths of the water which remains after the salt begins to crystalize is evaporated. Up to this time, then, the salt, if well drained, would be nearly pure. The chloride of magnesium is deliquescent and highly soluble; it will therefore not begin to crystalize until after the sulphate of magnesia, and the discharge of the water that remains after the first appearance of the bitter taste of the sulphate in the salt, will carry off both, except what may adhere mechanically to the crystals. Even if a part of the chloride of magnesium have been formed in the solid state, it may be separated in consequence of its deliquescence, by virtue of which it will attract moisture from the atmosphere, and this moisture will also dissolve some of the sulphate of magnesia. This moisture is separated by permitting the salt to drain.

So far as mechanical impurities adhering to the crystals are concerned, the salt formed in large crystals by spontaneous evaporation, is superior to all others, for it will expose a less surface under equal weight. These impurities, if deliquescent, will be also much more easily removed.

The best salt manufactured in this manner contains 95 per cent. of chloride of sodium, while that made at an unfavorable season has not more than four fifths of its weight of true marine salt, and upwards of 7 per cent. of sulphate of magnesia.

MANUFACTURE OF SALT FROM SEA-WATER BY CONGELATION.

When water holding but little common salt in solution, is exposed to a temperature below freezing, the water is separated into two parts, one of which is nearly pure, and passes into the state of ice, the other remains liquid and retains the whole of the salt in solution. As the temperature decreases, a further separation takes place, until the liquid becomes highly concentrated, and the soluble matter may be obtained at a small expense of fuel by artificial evaporation. This method is used in the northern and eastern parts of Siberia, but the salt obtained is of inferior quality,—although not necessarily so, were the process skillfully conducted.

Note.—Both of the above methods are practicable in the northern and eastern parts of the United States. Our summers and autumns would give us at least six months of weather in which the evaporation by exposure to the sun and air might be successfully practised, and if our spring be less advantageous for the purpose than those of the south of Europe, this is more than compensated by the superior dryness and steadiness of our autumnal climate. Our winters, also, equal in cold those of the same latitude in eastern Asia, and the method of congelation might no doubt be applied to advantage. Salt is manufactured on the shores of Massachusetts Bay, but we are under the impression that the evaporation is performed by artificial heat.

MANUFACTURE OF SALT FROM SEA-WATER BY ARTIFICIAL EVAPORATION.

This manufacture is generally conducted on a small scale, and with little skill, and it is only under peculiar circumstances that it has been profitably pursued. Thus the fishermen of the shores of Scotland are permitted to use salt manufactured on the spot, free from the heavy excise with which it is loaded in other parts of the kingdom. It appears probable that their art consists in little more than evaporating salt water almost to dryness in iron kettles, for the product obtained is extremely impure.

A tolerably pure salt is manufactured in the north of France from sea-water, which has been filtered through sand that has been thrown up by the sea beyond the usual reach of the tides, and which is also within reach of the spray. As the water evaporates from this, it remains charged with various proportions of solid salt. The liquid, after passing through the sand, usually has a density of 1.14, but sometimes as much as 1.17. It is evaporated in leaden vessels, and boiled rapidly over a wood fire. The liquid rises into froth, and must be continually stirred to prevent it from boiling over. The surface is occasionally cooled by throwing on cold brine, in order that a scum which forms may be skimmed off, until the salt begins to crystalize. The evaporation is continued until the whole of the water is driven off, the solid deposit being continually stirred, in order to prevent the lead of the boiler from melting. The salt thus obtained is in fine powder, but is still very impure. In order to separate the soluble impurities, the salt is put into baskets, which are suspended over the boilers while the succeeding evaporation is going on. It is thus exposed to the action of a large quantity of steam, which penetrating between the crystals is condensed, and dissolves the deliquescent impurities along with other soluble matters, and a portion of common salt. The salt is then permitted to drain by placing it on a floor covered with sand, whence the salt has been obtained by filtration. Here it loses about 25 per cent. of its weight by drainage. The salt is then of a fine grain, white color, and agreeable taste.

The coarse or bay-salt, which is formed in large crystals by spontaneous evaporation, is best suited, as has already been stated, for curing meat, in the dry way, and particularly for packing fish. In the latter process, the cavities whence the entrails of the fish have been removed, are filled with the salt, and the barrels are filled with alternate layers of salt and fish. The only solvent is the liquor which exudes from the fish, and it appears that the more slowly this is drawn off by the salt the better. The capillary attraction of fine salt would render this process too rapid. But the salt of Spain and Portugal, and still more of France, although well crystalized, is far from pure. The inhabitants of Holland, therefore, to whom the fisheries are a most important object of national industry, subject the imported bay-salt to a process of purification.

For this purpose, it is dissolved in sea-water, and evaporated at a moderate heat; the evaporation being rendered more slow by covering the large shallow pans of sheet-iron in which it is heated, with planks.

It is to the great care that is taken in the preparation of this salt that the very superior quality of the fish cured by the Dutch is, in a great degree, owing. They also kill and clean the fish the instant it is caught, on which account it is better than that which is permitted to die in consequence of a change of element.

In the curing of meat, also, it cannot be questioned that the method of rubbing and packing in dry salt in large crystals is much to be preferred to steeping in a pickle prepared by dissolving salt.

SALT FROM SALT SPRINGS.

AUTHORITY.—DUMAS. Traite de Chimie.

More attention has been paid to the manufacture of common salt from salt springs, by scientific men, than to any other of the sources whence this article has been obtained. The salts obtained by analysis from several springs are, besides the chloride of sodium, chloride of magnesium, sulphate of magnesia, carbonate of lime, and sometimes carbonate of iron. Together they make up about 16-1000th parts of the weight of the water of the spring of Moutiers, and are in the following proportions, with the exception of the carbonate of iron, which is deposited as soon as the water is exposed to the air:

Carbonate of lime,	0.05 per ct.	3.125
Sulphate of lime,	0.27	16.875
" of magnesia,	0.06	3.625
" of soda,	0.13	8.125
Chloride of sodium,	1.06	66.25
" of magnesium,	0.03	2.000
	1.60	100

These waters, as well as those of the sea, contain also the iodides and bromides of magnesium.

Rationale.—When the process of boiling this water is followed with attention, it is found that one fourth part of the water has been evaporated and the density increased to 1.14, before the sulphate of lime begins

to be deposited. The deposit then gradually increases until 5-6ths of the water has been evaporated, after which it begins to diminish, and when 17-20ths of the water has been evaporated, ceases altogether. The deposit, when examined, is composed of sulphate of lime and sulphate of soda, in nearly equal proportions, forming in fact a double salt, and nearly as much common salt as of both united. At a density of 1.23, when about 9-10ths of the water has been evaporated, common salt begins to crystalize at the surface, if the action of the fire be moderate; if not, it will also be precipitated. The salt which crystalizes first is nearly pure, but gradually becomes less so, and is finally affected by a bitter taste, arising from the sulphate of magnesia. If the evaporation be stopped as soon as this taste becomes sensible, there remains a thick viscid liquid containing a portion of common salt, along with chloride of magnesium, sulphate of soda, and the iodides and bromides of magnesium. A farther quantity of common salt may be obtained even from this, by the aid of lime. This earth decomposes the chloride of magnesium, and a chloride of calcium results; the latter chloride and sulphate of soda are incompatible, so that a double decomposition results, by which chloride of sodium and sulphate of lime are formed; the greater part of the last of these is precipitated in consequence of its small degree of solubility. By farther evaporation, not only the chloride of sodium thus formed, but a part of that which previously existed, is obtained free from the bitter taste of the sulphate of magnesia, and chloride of magnesium, and from the deliquescent character of the latter. This mode of getting rid of the chloride of magnesium, which is the most injurious both to the taste and value of the salt, might be used to great advantage in all cases, and it is only unfortunate that the chloride does not exist in sufficient quantities to admit of the decomposition of the whole of the remaining sulphate of soda.

Process.—The mode of obtaining salt from the salt springs of the continent of Europe is in strict conformity to the principles deduced from the preceding observations. About 9-10ths of the water, of the density of 1.01, are usually evaporated by exposure to air.

This spontaneous evaporation is performed in three different ways, by that of hurdles; that of tables; and that of cords. The advantages of these are nearly equal, if we have regard to the quantity and quality of the salt, and the rate at which it is crystalized; the only consideration then is their relative cost in different places.

In the first method, hurdles or bundles of twigs of a thorny shrub are piled in open frame buildings covered by a roof. The water is pumped up to the top of these buildings and then distributed in small streams upon the upper course of the bundles of twigs. The direction of these buildings is such that the principal prevailing winds may be at right angles to their length; and the gutters which convey the water are so formed, that it may be distributed in greatest abundance on the windward side. The water having fallen over one series of hurdles, is again pumped up and falls over another series in the same building, until it has descended nine or ten times.

In the method of cords, the water is made to trickle over ropes stretched in a vertical direction from the upper beams of an open frame building to a basin which receives it beneath.

In the method of tables, a number of shallow wooden troughs are arranged in a lofty building. Each of these is inclined sufficiently to allow the water to run gently over its surface, to the lower end, where it passes to the trough beneath, whose inclination is in the opposite direction, and thus in succession till it reaches the bottom.

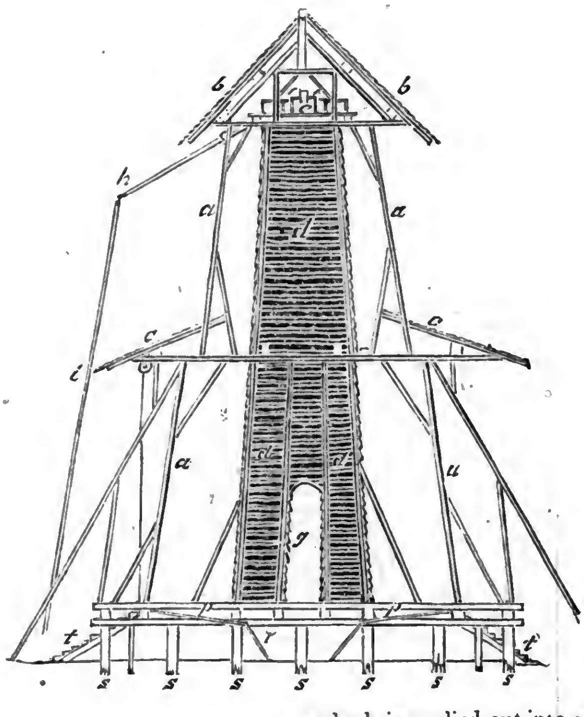
In either of these ways, the water is brought to a density of 1.14; about 9-10ths of its original quantity being evaporated. It is then conducted to large reservoirs, where it deposits the insoluble matters which were mixed with it.

Artificial heat is next employed. The brine, after having become clear, is introduced into boilers made of sheet-iron, and of great size. In some cases, the whole process is completed in one of these. But in the most perfect establishments, two are employed. In the first of these, the water is rapidly boiled and concentrated until the salt begins to crystalize; and during this operation, the greater part of the double sulphate of lime and soda is deposited. As the liquid wastes, more brine is added, which is also freed from this sulphate, and the boiling and addition of brine are continued until the vessel is filled with brine of the density of 1.23. In the next vessel the evaporation is conducted by a gentle heat, the liquid being barely kept at a boiling temperature, and as the salt forms at the surface, it is removed by rakes, until it manifests signs of the presence of the bitter sulphate and chloride. At or previous to this epoch, lime might be added, and the quantity of salt obtained would be increased.

The mother waters, which remain after the salt becomes impure, are set aside, and permitted to stand over a winter, exposed to the influence of frost. At a low temperature the sulphate of magnesia is decomposed by chloride of sodium, and sulphate of soda results. The several substances in the mother water form three successive deposits, of which sulphate of soda is the last, and the only one of any value.

A section of a building containing hurdles, for the purpose of concentrating water holding salt in solution, by spontaneous evaporation, with a part of the machinery, is represented in the annexed plate.

PLATE II.



a, *a*, *a*, frame.
b, *b*, upper roof.
c, *c*, lower roof.
d, *d*, *d*, piles of hurdles.
e, main channel for the brine.
f, *f*, lateral channels to distribute the brine upon the hurdles.
g, open space for the circulation of air.
h, *i*, jointed brake, by means of which the brine may be admitted from the main into either of the lateral channels at pleasure, or distributed in variable proportions in each, according to the direction of the wind. For this purpose, notches are cut on the side of the main channel, and to each side of it a plank is applied cut into similar and similarly situated notches. These planks are caused to slide along the side of the main channel, and, according to their position, may close the notches altogether, leave them partially or wholly open.
p, *p*, inclined planes to catch the brine as it falls from the ends of the hurdles.
r, reservoir.
s, *s*, *s*, piles which serve as foundation.
t, *t*, steps to ascend to the inclined planes.

At one of the European establishments, the spontaneous evaporation is carried farther during the summer months. For this purpose, a building is constructed about

* 18° of Beaume. † 28° of Beaume.

300 feet in length. A number of troughs extend along the upper part of this building, and from holes in their lower surfaces, a number of endless ropes proceed and pass around sleepers at the level of the ground. Beneath these is a reservoir for the brine.

Brine brought, in either of the modes we have mentioned, to the density of 1.14, and then concentrated by boiling to 1.23, is introduced, without being permitted to cool, into the troughs, and thence flows over the cords. It is then pumped back and permitted to flow down a second time; at each passage salt is deposited upon the cords, until the fluid assumes the viscid character of which we have spoken, when it is permitted to escape into the receptacle provided for the mother water. In this way, the crystalization of the salt, which occupies from seven to eight days in the method of slow boiling, may be completed in seventeen or eighteen hours, and the salt is of superior quality. There will form, also, in the reservoir beneath, large white crystals of salt. The cords are about a third of an inch in diameter, and when the thickness of the deposit upon them brings the joint diameter to about 2½ inches, the salt is removed by an instrument contrived for the purpose of breaking it off, and falling into the reservoir beneath, which must, of course, be then empty, may be collected.

When the first part of the process only is conducted by spontaneous evaporation, no more than 9-10ths of the fuel which would be required to boil away the whole of the water, need be used, and by the mode of crystalization upon ropes, even the half of this is saved, so that the saving is 19-20ths of the whole. Whenever, therefore, a cheap power for the purpose of raising the water, in order that it shall perform its several passages over the ropes, hurdles, or tables, can be obtained, the advantages of these methods are enormous. But it would even be a saving to use steam for raising the water; for, the evaporation of a single cubic foot of water in the boiler of a steam engine will raise eighty cubic feet to the necessary height; and the fire which raises the steam may be at the same time concentrating brine, if the boiler be filled with it instead of fresh water.

In the first attempts to make salt from the brine springs in the State of New-York, no other method than artifical evaporation was thought of. This was performed in the iron vessels made for the manufacture of potash. A better boiler was subsequently introduced, in which the smoke and heated air was made to circulate in tubes. The salt obtained in the earlier manufacture was much impaired in quality by the deliquescent chloride of magnesium, and was not free from the bitter taste given by it and the sulphate of magnesia. In this stage of the manufacture, Dr. McNiven was requested to propose a remedy, which he found in adding 1-1000th part of its weight of boiling water to the salt placed in bins, whose bottoms were inclined.—This quantity of boiling water being just sufficient to dissolve the impurities which a careful analysis showed to exist, and the solubility of common salt being but little increased by boiling, the separation was made at the least expense of that substance.

More recently, a method styled that of solar evaporation, has been introduced. In this the salt is placed in shallow pans beneath moveable roofs, by which the sun may be admitted and rain is excluded. It does not, however, appear probable that this method can be as rapid or as economic as those we have mentioned above. It must, in addition, occupy a vast extent of ground.

At the salt-lick on the Kenhaway, in Virginia, the brine is of great strength, 70 gallons of the water yielding a bushel of salt. This is 5 or 6 times as much as is usually furnished by the salt springs of Europe. Coal is also abundant in the immediate vicinity, and can be obtained at a low price. When these springs were first opened,* the waters drawn from a small depth was less rich, and the fuel used was wood. The evaporation was at first rapid, and performed in common potash kettles. To these succeeded shallow pans, first of sheet, and finally of cast iron, which are still employed.

The water drawn from the tubes, which are sunk 80 or 90 feet into the rock, is first exposed for a few days to the sun and air, by which the carbonic acid with which it is charged is dissipated, and the carbonates of lime and iron, held in solution by excess of that acid, are deposited. The clear liquor is then boiled to dryness, and the salt allowed to drain.—The salt thus obtained is of course in fine grains. Salt in large crystals is also made at the same place by heating the brine to a moderate temperature in large shallow pans, by means of tubes in which waste steam from other operations circulates.

ROCK SALT.

Rock salt is sometimes so pure that it may be used without any preparation except crushing. In order that it may be transported as an article of merchandise, it is cut into masses of the figure of a barrel, which are then enclosed in staves and hoops. The lesser pieces are used in the neighborhood of the mines. Such is the quality of the salt from the mines of Wieliczska in Poland, and Cardona in Spain.

In other mines the rock-salt is mixed with earthy matter, whence it must be separated by lixiviation; and that of Cheshire in England contains liquid solutions of deliquescent salts, which make it necessary to dissolve and re-crystalize. For the solution of the rock-salt in Cheshire the waters of salt springs which issue from the same formation are employed, or the rock-salt is carried to Liverpool, where it is dissolved in sea-water. In either of these ways the evaporation, which is always by artificial heat, may be performed at the least possible expense of fuel. The process is conducted with great skill, as is evident from the great purity of the salt it produces, which is more free from other saline matter than any other which is an article of commerce. Of this salt there are two varieties: one in small grains, (blown salt,) and of great whiteness, the other in cubic crystals, (ground salt.) The latter, however, is less perfect in form, and the crystals of less size than are obtained by spontaneous evaporation, hence it is of less value for curing fish, or for packing meat in the dry way.

Blown or stoved salt is made in Liverpool by the rapid evaporation of the solution of the rock salt of Cheshire in the tide waters of the Mersey, in large shallow pans of sheet iron. The original boiling point of the solution is 236° Fahr. The salt, as it forms, is drawn out and put into large baskets of a conical figure. After these have been permitted to drain for a time, they are placed in a stove and dried.

The coarse or ground salt is prepared by heating the solution only to 170°, at which it is kept until the evaporation is completed.

A variety, in still larger crystals, is manufactured for the use of the fisheries by evaporating at the constant temperature of 100°.*

In all the three cases the process ceases when the solution becomes viscid; the remainder is rejected under the name of *bittern*.

* See Silliman's Journal for 1834.

* See Henry, on Salt.

To be continued.

AGRICULTURE, &c.

It is a matter of wonder that so little is said and done with respect to breed in so important an animal. We think any thing which throws light on so important a subject, will be acceptable to our readers.

From the Baltimore Farmer and Gardener.

THE MULE.

[Copied by request from the American Farmer, Vol. 7, No. 22.]

PRIZE ESSAY.

[The premium of a silver cup, of thirty dollars value, offered by Robert Oliver, Esq., to the author of the best essay on the natural history of the Mule, and its value for the general purposes of agriculture, in comparison with horses, was awarded by a committee appointed by the Trustees of the Maryland Agricultural Society, to the author of the following Essay:]

A DISSERTATION ON THE MULE,

With the view of promoting an improvement in the breed; and of demonstrating the utility of employing him as a substitute for the horse, in the labors of husbandry, canals, &c. By Samuel Wyllys Pomeroy.

"——Opinion is the queen of the world; it gives motion to the springs and direction to the wheels of power."—John Quincy Adams.

"Knowledge is power."—Bacon.

Soon after the accession of Charles III. to the crown of Spain, his subjects were prohibited, by a severe edict, from wearing *flapped hats* and *long cloaks;* which caused an *insurrection* that obliged him to flee from Madrid, after witnessing the massacre of nearly one hundred of his Walloon guards;

and might have terminated in a revolution, but for a speedy revocation of the edict and banishment of his ministers. An eminent writer introduces the history of the occurrence, by observing that "it is easier to conquer half the world than to subdue a single prejudice or error, most nations having a superstitious attachment to those habitudes which they derive from their ancestors, that seemed to come along with them into the world, and with which they were nursed and brought up."

Perhaps it may be deemed by many quite as visionary or absurd, to attempt an introduction of the mule as a substitute for the horse, for the purposes of agriculture and hackney employment, as was the project of the Spanish monarch for compelling his subjects to wear the *French costume*, to the exclusion of one they had been so long accustomed to look upon "as a *distinction* which was the birth-right of every true Spaniard," and, as we may suppose, so congenial to the indolent habits for which that nation had long been proverbial.

It must be acknowledged that there are serious, though I trust in this age of improvement, not insurmountable impediments—for we have to combat not only hereditary prejudices, or, to speak more correctly, such as have proceeded from a deficiency of means and want of knowledge, to develope the valuable properties and to subdue propensities of a contrary character in this hybrid race, but we are met at the threshhold by the same species of pride which the Spaniards manifested in regard to their costume, founded on the enthusiastic, I may almost say superstitious attachment to the horse.

It is believed that a vast portion of our fellow-citizens, and I may with propriety add the people of Great Britain, from whom we have derived some inveterate prejudices, as well as those illustrious examples that have had such a powerful influence in leading our country to the high destinies that await her, do not consider that a *mule*, especially a well bred one, would be in himself and in their view, one of the best formed and most distinguished of animals, if they had never seen a horse—they must admit, however, that he holds the second rank instead of the first—and it is principally from this circumstance that so little attention has been paid to him in both countries. Comparison is the chief cause of his degradation—they look at and give their opinion not of himself, but comparatively with the horse. They seem not aware that he is a *mule*—that he has all the qualities of his nature, all the gifts attached to the connecting and final link of two distinct species, and think only of the figure and *qualities* of the horse which are wanting in him, and that he ought not to have; for he possesses those of more intrinsic value, which the Supreme Author of nature has denied to both of his parents.

There are few subjects of animated nature that have engaged the attention of the most eminent naturalists, more than the genus *Equus*, to which the horse and ass, with their *hybrid* offspring, are assigned. *Linnæus*, with a view to establish, by new arguments, his doctrine or theory of the *sexual system* of plants, which *Spallanzani* had attempted to overturn, illustrated their generation by pursuing the chain of nature from the animal to the vegetable kingdom; and has taken prominent examples from the two different productions of mules. He says, "From the mare and male ass proceeds the mule, properly so called, which in its nature, that is, in its medullary substance, nervous system, and what *Malpighi* calls the keel, (*carina*,) *bottom*, in sportsmen's language, is latent in, and derived from, the mare. But in its cortical substance and outward form, in its mane and tail, resembles the ass. Between the female ass and the horse, the other kind of mule is engendered, whose nature or medullary substance resembles that of the ass; but its outward form and cortical structure, or vascular system, that of the horse."*

The latter kind was called *Hinnus* by the ancients; hence the modern name *Hinny*. They were not held in much estimation by the Romans, according to Pliny, who describes them as difficult to manage, and so slow that little service could be derived from them. *Buffon* has noticed this animal, which, he says, "is smaller than the mule, as it preserves the diminutive stature of the ass." Hinnys were seldom propagated; but it is said that a number have lately been bred in Spain, probably in consequence of the destruction of mares in the peninsular war, and are represented of good size, and more beautiful than the mule; that is, they resemble the horse much more. I understand a few have been bred upon the Spanish Main, no doubt from a similar cause that led to the system in Spain; and if my information is correct, some have recently been shipped to the West India Islands, but are by no means esteemed so hardy, or valuable for service, as mules.

Notwithstanding mules have a disposition to propagate, there have been but two or three well authenticated instances recorded of their having *bred;* and those productions were considered monsters. *Buffon* was indefatigable in his researches on the subject; and although he admits that it is possible for both males and females to propagate, he is confident that their parents are of a species distinct from each other. He says, "The ass is not a horse degenerated," as some had supposed; "he is neither a stranger, an intruder, nor a bastard—he has, like other animals, his family, his species, and his rank; his blood is pure and untainted, and although his race is less noble, yet it is equally good, equally ancient as that of the horse." This profound naturalist continues a very minute and eloquent comparison between the horse and the ass—some of his expressions I have taken the liberty to apply to the *mule* and the horse in a preceding paragraph.

It may promote the object in view to enter extensively upon the history of the ass, and we commence with the supposition, that when men became so far civilized as to have burdens to *carry*, or required to be *carried* themselves, this animal was the first domesticated for that purpose—and it is reasonable to infer that those of the least *spirit* and most *tractable*, were put in requisition in the first instance; when by breeding *in and in*, without any care in the selection of *sire* or *dam*, became in process of time degenerated to a very inferior grade. Be this as it may, it is an unquestionable fact, that different races of the ass now exist, possessing properties as distinct as are found in the species of *camel*. For instance, the *Bactrain* or single hunched camel, called the *dromedary*, by far the most numerous race, being lightly formed, exhibits great activity, and is able to traverse vast tracts with the speed of a *high mettled race horse*. The *Arabian* camel, with two protuberances on his back, is considerably larger, of much stronger form, travels at a pace seldom exceeding three miles an hour, and is capable of conveying such burdens, that the Arabs style him, emphatically, the *ship of the desert;* yet they are of the same species—a cross between them breed and constitute another variety, which multiply, and according to Buffon, have the most vigor, and are preferred to all others.

Ancient writers recognize three or four distinct varieties of the ass. According to the learned Dr. Harris, four different races are indicated in the original Hebrew Scriptures, viz. *Para, Chamor, Aton*, and *Orud*.*

The wild ass, (*Para*,) was a native of *Arabia Deserta*, and those countries which formed the great *Babylonian empire*. They are now found in *Southern Tartary*, in the mountainous districts and saline plains of *Persia*—are migratory in large herds, visiting in winter the northern parts of *India*, and said to be so fleet that no horse can overtake them in the chase. This race are frequently alluded to by the inspired *poets* and *prophets;* and afford *similies* diametrically opposite to those drawn from the domestic race. The sublime description of the former in the book of Job, exhibits such a contrast, that I trust its insertion in this place will not be deemed improper.

> "Who from the forest ass his collar broke,
> And manumized his shoulder from the yoke?
> Wild tenant of the waste, I sent him there
> Among the shrubs, to breathe in freedom's air.
> Swift as an arrow in his speed he flies;
> Sees from afar the smoky city rise;
> Scorns the throng'd street, where slavery drags her load,
> The loud voic'd driver and his urging goad;
> Where e'er the mountain waves its lofty wood,
> A boundless range, he seeks his verdant food."
> [SCOTT'S VERSION.]

We find, that at a very early period of sacred history, the common domestic ass (*Chamor*,) was employed in all the menial labors of a patriarchal family, while a nobler and more estimable animal (*Aton*), was destined to carry the patriarchs, *the well born*, and those on whom marks of distinction were to be conferred. They constituted an important *item* in a schedule of the pastoral wealth of those times; of course, attracted particular attention and care. *David*, we are told, had an officer, apparently of high dignity, appointed expressly to superintend his stud of *high bred asses*, or *Atonoth*.

There was another race that has been mentioned by *Aristotle*, and by *Theoprastus*, whom Pliny quotes, which they denominated the *wild mules* that *bred* (*hemi-onos*,) and were found in Cappadocia and Africa. There can be but little doubt but this is the *Hemionus*, or *wild mule* of the Mongalian Tartars, so particularly described by professor *Pallas;* and that it is not a *hybrid*, but actually of the species of ass resembling a mule. This race is identified by Dr. Harris with the *Orud* of Scripture.

The wild ass of Northern and Western Africa, whose flesh was so much admired by the Roman epicures, may, I believe, be ranked as another distinct race. Adanson, a French naturalist, who visited the river

* See "A Dissertation on the Sexes of Plants," by Sir Charles Linnæus—read before the Imperial Academy of Sciences at St. Petersburgh, Sept. 6, 1760, and which obtained the premium of one hundred ducats.

* See the "Natural History of the Bible, by Thaddeus Mason Harris, D.D., 1 vol. 8vo., Wells and Lilly, Boston." A work I would earnestly recommend to those readers of the sacred volume, who are desirous to be better acquainted with many allusions to subjects of natural history, founded on their nature, habits, and characteristic qualities, developing beautiful similies, which would otherwise lie concealed—and enabling them to judge more correctly of the propriety of such allusions.

Senegal more than half a century ago, describes those brought from the interior by the Moors, as so essentially different from any he had seen in Europe, (probably those of Spain, Savoy, or parts of France adjoining,) it was with difficulty he could recognize them to be the same species—neither do they answer the description of the wild ass of *Asia*, of which we have been speaking. But his account of them corresponds with the *diminutive* domestic race introduced from Africa, particularly those from *Senegal* and the *Cape de Verd Islands*; and from which the small race now in Europe and in this country, may with great probability claim their origin.

The *Arabian* ass, like the horse of that country, is considered as the most estimable of his species—and there are strong reasons for concluding that he is descended from the Hebrew *Aton*, so highly valued by Abraham and by the patriarchs, judges, and kings, at subsequent periods of sacred history; and that the same race has been preserved in the ancient *land of Uz*, in some degree of purity to the present time. Indeed, there can be but little doubt on the subject, if we admit the fact, that the habits, manners, and pursuits of the descendants of *Ishmael* have continued, with scarcely an *iota* of variation, from the day they took rank among the nations of the earth. The position is greatly strengthened by the information I received some years since, from an intelligent traveller of undoubted veracity, who had visited *Arabia* on the south-western side of the peninsula to *Mocha*; and on the eastern, as far as the mouth of the *Tigris*. He represented the *superior* race of asses of that country as most beautiful—of perfect symmetry, great spirit, activity, and vigor. He had seen those that could not be purchased for less than *four or five thousand dollars*—an enormous price, considering the value of money among these people.* I understand from him, that the Arabs were as tenacious of preserving the *pedigree* of their *horses*, as the most careful breeder for the *turf* in England—and not less so of their *asses*. The descent of some of them they trace to those in the train of the queen of Sheba, when she visited Solomon—as they also do that of their *horses* to the numerous *stud* of that wise and gallant king.

Dr. Harris supposes the *wild ass* (*Para*,) to be the *Onager* of the ancients; and that the *Aton* was of a different kind. My impressions coincide with the opinion of the learned divine—but may not writers of different periods have confounded the wild ass with the Aton in their representations of *Onager?* for it is not improbable, but that the *Aton* was of the most improved breed known, produced from crosses of a choice selection of the domestic, the wild ass, and the Hemionus, or wild mule—which last professor Pallas recommends to complete the perfection of the species. This supposition is supported by *Buffon*, who infers as a certain fact, that by a cross of the remotest of different races of the ass, the most beautiful productions are obtained.

Mules were in use and highly esteemed at a remote period of antiquity; and are mentioned in Scripture as of importance in the equipage of princes. Herodotus, who is styled the *father of profane history*, frequently speaks of them; and it is known that they were introduced in the *chariot races* at the Olympic games, in the seventieth Olympiad, about five hundred years before Christ. The Romans well knew their value. Pliny informs us, from Varro, that *Q. Axius*, a Roman senator, paid four hundred thousand sesterces, upwards of *thirteen thousand dollars*, for a *mule ass*, for the propagation of mules. And he says further, that the profit of a *female ass* in breeding stock for the same purpose, was estimated in *Celteberia*, now the kingdom of Valencia, in Spain, at a like sum. We may infer from a passage in *Tacitus*, and in Plutarch's life of *Marius*, that *mules* were generally employed to transport the baggage of the Roman armies; and that it is not improbable the superior officers rode those of a high grade, having their horses led, except when they engaged an enemy. It seems that the *dilletanti* of Rome held them in great estimation; as we are informed that the mules of *Nero* and *Poppea* were shod with *gold* and *silver*—not *plates*, as iron shoes are now formed, but the *whole hoof* enclosed.

Columella, who in the reign of Emperor Claudius published the most valuable treatise on the husbandry and economy of the Romans that has been handed down to us, has given very particular directions for breeding *asses* and *mules*. He was a native of *Cadiz*, and owned estates in Spain, where it appears that the finest mules were then bred.

As it is not requisite to pursue our history of the mule any farther among the ancients, we shall drop their appellation of *male* and *female ass*, and adopt the modern one of JACK and JENNET.

Spain has continued to support the reputation for a superior race of mules to the present period; and it is probable that the Arabian breed of Jacks were introduced by the Moors, when they held possession of that fine country, which, by crosses, and the effects of climate and soil, have formed two valuable races: which we shall notice in the sequel. The Portuguese race have been generally considered as differing but little from the Spanish; those, however, that have come within my view appear evidently inferior. It was not until near the close of the sixteenth century, that *coaches* were used in France; before which, it is said, the nobles rode to court, parliament, &c., on *mules* that were brought from the vicinity of the Alps and Pyrenees. They were usually black, of large size, well made, and mostly bred from fine *Spanish mares*. Savoy has long been noted for an excellent breed of mules. None very extraordinary are found in Italy, those used by the *Velterino*, are strong and of a respectable size, but of a sluggish and debased spirit. Very little can be said of those animals in Great Britain. The Catholic prelates brought over a number of superb mules, prior to the Reformation, but in the reign of *Elizabeth* so little was known of them, that a writer of that peaiod says, "in Devonshire some were produced by a *Jack* brought from France, and were *knoeked on the head* by the people, who viewed them as monsters." A superior race of mules were bred in *Flanders*, from Jacks introduced by the Spanish monarchs while they held dominion in that country. Fifty of them were brought to England by the *Duke of Cumberland*, presented him by the *Empress Queen*, and from their beautiful appearance engaged the attention of a few individuals; but the spirit soon subsided. Notwithstanding those who bred and used them, were warm in praise of their utility.

Among a voluminous mass of treatises on agriculture and rural economy, published in that country for near a century past, scarce a line can be found devoted to the mule, except by *Dr. Anderson*, who, in his "Recreattons in Agriculture," has made a few judicious remarks on the subject.

In Sir George Staunton's account of Lord Macartney's embassy to China, we are told that mules are valued in that economical empire, at a much higher price than horses. In our own country, prior to the war of the revolution, a few Jacks of an ordinary kind were imported—a small number of mules bred; and all exported to the West Indies. I have reference to New England, as I am not aware that any attention was paid to the system in the Middle, or Southern States, though it is not improbable that valuable mules may have been raised by the farmers and planters for their own use. When peace took place, the price of mules in the West Indies excited attention to the breeding of them, which was principally confined to Connecticut; and several cargoes of the small race of Jacks were imported from the Cape de Verd islands, and St. Michael's, one of the Azores. It should be observed that the exportation of Jacks from Spain, or any of her colonies, was strictly prohibited, and continued to be until after the Peninsular war. There might have been, however, a few smuggled from the Spanish part of Hispaniola into Cape Francois, and from thence introduced, but they were vastly inferior to the Spanish Jacks. From this miserable stock a system of breeding mules commenced, the best calculated to deteriorate any race of animals that has been, or could be devised, since their creation. The purchaser of a *Jack* when about to commence *mule dealer*, made little inquiry concerning him but of his capacity to *propagate* a mule. He placed him in a district where there was the greatest number of mares of qualities so *inferior*, that their *colts* would not compensate their owners for the expense of taking them to a *horse*, and contracted to purchase their mules at four months old. Those are kept in herds, with precarious shelter in winter, having ample opportunities afforded them to mature and transfer that propensity for *kicking*, which seems at first merely playful, into an habitual means of defence, to be exercised when the *biped* or any other race of animals approach them. In this *kicking seminary* they remain two years, and are then driven to market. At subsequent periods, a few Jacks of higher grades were procured, from which a small number of good sized mules were bred, and a few of them broke. The breed of Jacks have somewhat improved, and *mule dealers* are now locate in most of the New England States, and some parts of New York. But the system as above detailed, with few exceptions, has continued; and it is from such a race of Jacks, and such a system of breeding and management, that the mules have been produced, with which the farmers and planters of *Maryland*, *Virginia*, and the *Southern States*, have been supplied from New England; and such have furnishad a criterion for a great portion of our countrymen to form an estimate of the value and properties of this degraded animal. It affords great pleasure to be enabled, for a short time at least, to pursue our investigations in a higher sphere.

Several of my friends who had viewed the Jacks and mules at Mount Vernon, in the life time of Gen. Washington, gave such glowing descriptions of them, and understanding that part of that stock was inherited by George W. P. Custis, Esq., I was induced to address a few queries to him on this subject; this gentleman with his characteristic

* Neibuhr remarks, "there are two sorts of asses in Arabia: the smaller, or lazy ass, as little valued there as in Europe; and a large and high spirited breed, which are greatly valued, and sell at a very high price; I preferred them to the horse." See Neibuhr's Travels in Arabia.

urbanity, very promptly furnished replies, with liberty to make such use of them as I pleased, and I cannot do better than to transcribe them from a letter received about three years since. Mr. Custis observes:

"The ROYAL GIFT and KNIGHT OF MALTA, were sent to General Washington about the year 1787;—the *Gift*, with a JENNET, a present from the King of Spain; and said to have been selected from the royal stud. The *Knight* I believe was from the Marquis de la Fayette, and shipped from Marseilles. The *Gift* was a huge and ill shaped Jack, near sixteen hands high, very large head, clumsy limbs, and to all appearance little calculated for active service; he was of a grey colour, probably not young when imported, and died at Mount Vernon but little valued for his mules, which were unwieldy and dull. The *Knight* was of a moderate size, clean limbed, great activity, the fire and ferocity of a tiger, a dark brown, nearly black colour, white belly and muzzle; could only be managed by one groom, and that always at considerable personal risk. He lived to a great age, and was so infirm towards the last as to require *lifting*. He died on my estate in New Kent, in the State of Virginia, about 1802 or 3. His mules were all active, spirited, and serviceable; and from *stout mares* attained considerable size.

"General Washington bred a favourite Jack called COMPOUND, from the cross of Spanish and Maltese. The *Knight* upon the imported Spanish *Jennet*. The Jack was a very superior animal; very long bodied, well set, with all the qualities of the *Knight*, and the weight of the Spanish. He was sire of some of the finest mules at Mount Vernon, and died from accident. The General bred mules from his best coach mares, and found the value of the mule to bear a just proportion to the value of the dam. Four mules sold at the sale of his effects, for upwards of $800; and two more pairs at upwards of $400 each pair; one pair of these mules were nearly sixteen hands high. The only Jacks I know of at present, of the genuine Mount Vernon stock, are, one sold by me to Judge Johnson, of South Carolina, for five hundred dollars, at two years old; one given by me to William Fitzhugh, Esq., of Ravensworth, and one which I believe is possessed by my uncle, George Calvert, Esq., Riversdale.

"The Jack purchased by Judge Johnson, I have understood, has a very high reputation in the south.

"Upon losing my groom, (Peter) who was the first and last groom to the Mount Vernon Jacks, I parted with my stock.

"There are many Jacks that have come into the country of late years, but of their value and properties I am unable to speak: though I rather presume that they are generally small, and only fitted to get mules for the cotton cultivation in the light lands of the south. Some very fine mules are raised about Hagerstown, Maryland, from Jacks of the old breed; they are bred from stout wagon mares.

(To be continued.)

From the American Gardener's Magazine for March.

CULTIVATION AND FORCING OF THE CUCUMBER; TAKEN FROM HORTICULTURAL MEMORANDA, AND EXHIBITING THE STATE OF THEIR PROGRESS FROM JANUARY UNTIL SEPTEMBER. BY THE CONDUCTORS.

JOURNAL.

January 20th, 1832.—The weather, all the month, up to this date, has been very fine, and accompanied with but little severe cold, the thermometer indicating an average temperature, at one o'clock, P. M., of about 4° above freezing (32°). Considerable snow lies upon the ground, which fell in the month of December last. Preparations, however, have been made, to put the pit into operation. The soil which remained in the bed (about four inches in depth) being somewhat frozen, the sashes have been placed on, and the front doors covered with straw or hay: at night, the sashes have been covered with mats and hay, in order that the heat from the sun during the day might be retained. One or two squares of glass which were broken have been repaired, and every thing put in readiness to proceed with the forcing. [We have memoranda taken from the year 1830 to the present time. The reason why we select that of 1832, is, that we were more successful in our mode of cultivation than the two years previous. The quantity of fruit was considerably greater, and the vines much more luxuriant; the forcing was also commenced nearly two months sooner. From the latter cause alone, we have selected the above named year, as the later forcing is commenced, the easier it is carried on,—the inclemency of our winters, the great quantity of snow which often falls, and the severe cold, rendering it extremely difficult and uncertain in the months of January and February; and where the old hot bed system is pursued, the labor and uncertainty is still greater. In the following notes, extracted from our Journal, we have occasionally added some observations. But we think this method will be better understood, than if we made no reference to dates, and merely detailed our mode of cultivation.]

Jan. 21st. The snow, which commenced falling last evening, and continued through the night, covering the ground to the depth of about two and a half inches, has rendered it somewhat inconvenient to add the manure to the pit to-day. Temperature in the open air, at sunrise, 33°.

23d. This morning the mercury fell as low as 5°. The soil in the bed still remains partly frozen; but the sun shining very bright, has thawed the surface. Ten barrows of manure, fresh, and in a good state of fermentation, were added to-day. The doors were closed tight, and hay and straw put against the crevices, and in front of them, by placing up square pieces of board. The sashes were covered at night with one thickness of bass mats; on top of these, soft hay, to the thickness of three or four inches, and on the hay, one more thickness of mats. A few narrow strips of boards were then put on, to prevent the wind from blowing the covering off, should it blow violently during the night.

24th. The weather to-day moderate; temperature, at sunrise, 29°; cloudy, and little misty. Added eight barrows more of manure, and stirred the whole well together. Covered up as on the previous evening.

25th. Rainy; temperature 50°, and today the heat in the bed began to rise; temperature 50°, at sunrise. The sashes covered, as mentioned the 24th, every night.

26th. Temperature, at sunrise, zero; snow fell during last night, to the depth of five inches. Temperature of the bed, at sunrise, 50°.

27th. Temperature, 13° below zero. In consequence of the extreme cold, could not open the bed without the fear of losing much heat. Temperature of the bed, 54°.

28th. Thermometer 8° below zero. Cucumber seed planted to-day. The kind best adapted to forcing being considered the *true* Southgate, this kind was planted. The soil in the beds being composed almost wholly of well decayed leaves (but a small portion of common garden earth being added), pots four inches in diameter at the top, and four deep, were filled with it: two or three small pieces of broken pots we first placed over the hole in the bottom of each.

The seeds were then sown, three in each pot, covering them about half an inch deep: the pots were then plunged under the centre light, in the middle of the bed, bringing them up as nigh as possible to the glass, that they might receive all the benefit of the air admitted into the bed. Thus prepared, the sashes were shut tight, and at night covered up warm. This variety (the Southgate) we have found to be the best, having tried it for several years: the seed is rarely to be found of genuine quality; and, from this cause, it has been pronounced inferior, by some growers; but we believe no kind to be earlier, or give a greater quantity of fruit. Temperature of the bed, 65°; of the soil, 75°.

29th, 30th, 31st. Weather more moderate, with rain; the air in the bed has now acquired a greater heat, as also the soil.

February 1st. The heat of the bed today is very brisk. The bright sunshine and the moderate temperature of the weather, combined, air is admitted in greater quantity. From the want of this, the plants which appeared above the soil in the pots this morning, are somewhat drawn up, and show the greater necessity of giving air when the seeds are in the first state of vegetation, as well as when the plants are in a more advanced and progressive age. It is a striking instance of the want of air, as well as light, to see the cotyledons, or seed leaves, of plants thickly sown, as soon as they appear above the ground, stretch forward eagerly to cath the first glance of the sun's reviving rays, each one seeming to advance above the other, as if fearing it would be deprived of an equal portion of his refreshing power. Air was admitted about 11 o'clock in the forenoon, by tilting up the sashes at the back of the pit about half an inch. If the air is sharp, a bass mat should be laid over the apertures, to prevent the plants being too suddenly chilled. A pan of soft water was placed in the bed this morning, to become heated to the same temperature, in order to water the plants as soon as needed. The plants looking thus flourishingly, if the weather continues moderate, a good growth may be expected. To give the temperature of the air in the bed, as well as the soil, as taken three times each day, would occupy considerable room; we have therefore concluded, from the want of space, to give the temperature every three or four days (three times each day, viz., morning, noon and night), it varying very little in the intermediate time. We think this a better mode than to give a long table of figures for each month. The dates will, also, only be given when any thing of importance has occurred; as, often, for two or three days, nothing was done but to give air each day; watering the plants, if requiring it, and covering up the sashes at night. The covering up of the sashes is very important, as it tends greatly to keep an even temperature. That which we have found to answer the best purpose, and guard against the cold in the most efficient manner, was a covering of mats and hay, laid on as mentioned previously: this should be continued until April, on no account omitting a single night, however favorable the weather may be at sunset; for we have repeatedly known the thermometer to stand at 32° at that time, and fall as low as zero before daylight.

4th. Temperature of the air in the bed, 64°, 75°, 66°; of the soil, 75°. Air was admitted in greater quantity to-day, the sashes being opened an inch at the back. The plants were slightly watered. Three pots more of cucumber seeds were sown to-day, in order to have a few plants to replace the others, should they meet with any accident by which their growth would be retarded. We have sometimes had those of the first sowing damp off when the weather had continued cloudy for some days, especially when they were first hilled out, it being very difficult to prevent this; while those still growing in pots can be kept dry or moist at pleasure; and answer, as a resource, in any case.

7th. To-day, two barrows of fresh manure were added, the heat having subsided a little. Temperature, 60°, 64°, 60°; of the soil, 70°; this being too low for their successful growth.

10th. The plants of the last sowing, up to-day; look healthier than the first, from their longer time of vegetating. The temperature of the open air being moderate, (above 32°,) and the weather fine, more air was given; the plants acquiring more strength and vigor every day.

14th. Added four barrows of manure to the pit to-day: Temperature, 64°, 65°, 63°; of the soil, 75°. Cucumbers of the first sowing, show their rough leaves.

17th. Heat brisker, and more air admitted. Temperature, 66°, 66°, 64°. The plants being in a vigorous state of growth, a barrow of soil, composed of two thirds leaf mould, and one third light loam, was added to the bed, and placed under the centre of each light, that it might become heated, and ready for hilling the plants into, in a day or two.

20th. Plants hilled out to-day. The soil was raised up to within eight inches of the glass; a hole sufficiently large to receive the plants was made in each hill, and turning them from the pots, very carefully, so as not to disturb the soil, were placed therein; the earth was drawn up round the stems of each, close to the seed leaves, as from the stems roots proceed; and the plants grow much more stocky and strong, and are less liable to damp off. A light sprinkling of water should be given, and the sashes closed, that a gentle steam may be generated, which will greatly refresh the plants. This operation should be performed in the middle of the afternoon of a fair day.

24th. The sudden change of the weather since yesterday, has caused a decline of the heat in the bed, and four barrows of fresh manure were added to-day; the ends of the roots of the plants having protruded through the soil, and shown themselves on the surface, more earth was drawn up round the hills, and the plants sparingly watered. Temperature, 60°, 60°, 60°; of the soil, 70°.

27th. The second rough leaves of the plants begin to show themselves to-day; the heat of the bed having become very brisk, since the addition of the last manure, the plants are growing rapidly; the weather being more moderate, considerable air was admitted. The pan for containing water should be kept constatly filled, ready for use.

March 1st. During the last month the covering was taken off of the bed, between nine and ten o'clock in the morning, according to the severity of the weather; but oftener at the latter than at the former hour; it was also covered up as soon as the sun's rays left the sashes. During this month, the sun shining with greater power, it should be uncovered as early as nine o'clock in the morning, the former, and at half past eight, the latter part of the month, and should be covered in the afternoon, as early as five o'clock in the former, and at half past five the latter part of the month. A quantity of leaf mould and loam should, on the first opportunity, be collected together, and in readiness to earth round the plants. No kind of soil answers so well for cucumbers, during the first month of their growth, as decayed leaves; indeed, we have seen it alone recommended as the best throughout the growth of the plants, from the sowing of the seed to the maturing of the fruit: we have, however, always found that the plants run too much to vines in such a soil, and, although the fruit was the largest, of the deepest tint of green, and in every way superior, both as regards appearance and quality, still we believe a small portion of light loam added to the above named soil, when the plants have been hilled out a week or two, renders the vines more prolific of fruit, and less luxuriant and rapid in their growth. We have measured leaves on our vines *fifteen inches* in diameter. We once had the pleasure of showing our plants, when in a vigorous state of growth, to an excellent practical gardener, who had grown cucumbers for many years; he appeared astonished at their luxuriance, and hinted that some extraordinary pains had been taken with them; the soil showed for itself, and pure water alone had been made use of; but so certain was our friend that they had received *stronger food*, that, although we most positively averred such was not the fact, we could not convince him to the contrary, and he left us firm in his own suspicions.

The plants were all topped at the first joint, at this time; this is an operation upon which there is a variety of opinions; some stating that it injures the vines, without attaining the end in view; others that they are benefitted in a great degree; some, that it is a matter of little consequence, neither forwarding nor retarding the forcing; and others, that the period of producing fruit is materially shortened. The object of the operation is to keep the plants from running too much to vines,—thus filling the bed without produting fruit,—and to render them at once fruitful, by forcing them to throw out, first, blossoms, and afterwards, runners. We have tried both methods, as well as the experiment of pinching off some plants at the first, some at the second, and some at the third joint: as regards the three latter modes, there is but a slight difference; indeed, at the first or second joint, none; but to let the plants grow without stopping them at all, we have found a very bad practice, and one which we cannot too strongly guard the young practitioner against pursuing. We would here suggest to those, who would wish to satisfy themselves fully upon this subject, the propriety of instituting a series of experiments, which may be thus performed:—Let four hills of plants be taken; pinch off the plants in one hill, at the first joint; in the second, at the second joint; the third, at the third joint; and in the fourth, let the plants take their own course: when they come into blossom, let the time be noted down, as also, when they come into fruit; this will give a correct and satisfactory view of the practice. It is from such observation that we are enabled to state actual results. There has been so much written upon this seemingly trifling subject, and so much doubt still exists, with many gardeners, that we have been thus particular in our remarks. Temperture, 68°, 72°, 68°; of the soil, 78°.

5th. The weather becoming more mild, the bed retains the heat; the plants are daily sprinkled with water warmed to the temperature of the bed, and the sashes shut down early in the afternoon, in order to cause the steam to rise, as this greatly refreshes the plants. There is no better sign that they are in a flourishing state, than when, on opening the sashes in the morning, small drops of water stand on the edges of the leaves; when this is not perceived, the air is not moist enough, and a slight sprinkling of water should be given, upon closing the sashes at night. The plants, till the middle of the month, should be watered about ten o'clock in the morning. Temperature, 68°, 80°, 68°.

7th. A barrow full of soil (leaf mould and loam) was added to-day: the roots again showing themselves on the surface of the hills, as soon as it became well warmed, it was drawn up over them; the plants look strong, and now require considerable water. Temperature, 66°, 68°, 66°.

10th. To-day, three barrows of the old manure were taken out, and three of fresh added in the room. The plants have now attained a good size, and begin to show flower buds. More soil was drawn over the surface of the hills, and the plants watered more freely. Temperatuae, 62°, 78°, 70°; of the soil, 80°.

13th. Weather continues moderate; the heat of the bed very brisk, since the addition of the last manure. More soil was added, to be in readiness to earth round the plants; it is very important that this should, as well as all soil that is added, be put in three or four days before wanted for use; always placing it near the back of the bed, in order that it may be easier warmed, the sun shining with its full force upon it. The moisture is sooner evaporated, than it would be in the front of the bed; and as, early in the season, it often happens, that it cannot be procured only in a very wet state, it is desirable to place it in this situation. Temperature, 66°, 82°, 70°; of the soil, 85°.

17th. Heat still continues rather brisk, and the plants are growing very finely. The roots again showing themselves on the surface of the hills, the soil was drawn over them, which was placed in the bed three or four days since. The object in hilling up the plants from time to time, as well as the addition of soil to the bed at different periods, rather than adding all at once, is to prevent dampness, and a diminution of heat from the quantity of moisture which the soil would contain. The plants now require considerable water, which should be given, from time to time, as soon as the sun's rays leave the sashes. Temperature, 65°, 65°, 63°; of the soil, 70°.

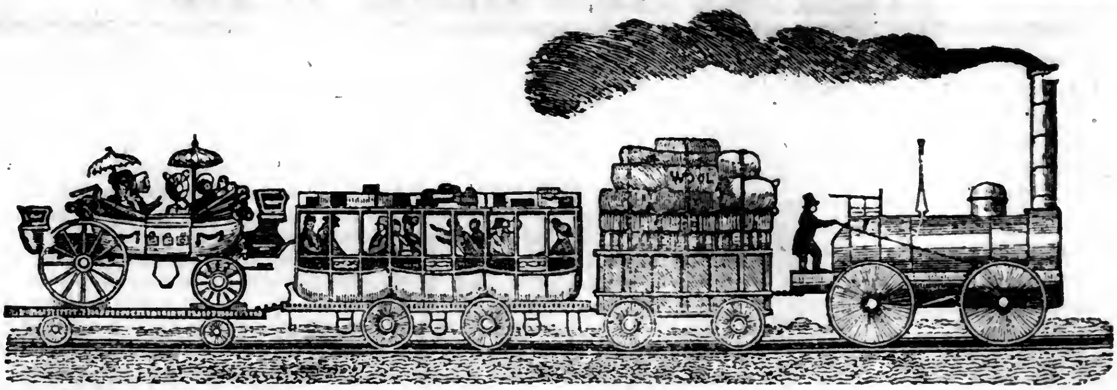
20th. The inclemency of the weather, the last three days, has caused the heat of the bed to abate considerably, and, in consequence, two barrows of old manure were removed, and three of fresh added. We would here mention, that, when fresh manure is added, it should be in a moist state: to put it in, as it is frequently taken away from the stable heap, in a *dry* heat, is a very injudicious practice, and should be carefully avoided. When, however, no other is at hand, the barrows full, as they are taken to the bed, should have two or three pails of water added to each, and the whole, when thrown into the pit, well forked together. We have occasionally opened the doors, and thrown in several pails of water, and after the whole was well forked up, the heat would be brisk for four or five days. This should not be forgotten, as it is a saving of considerable manure, where it is not easily to be had, but is brought from a considerable distance.

23d. Heat very brisk. Temperature, 69°, 86°, 76°; of the soil, 85°. Plants in a vigorous condition, and some flower buds almost expanded. A barrow full of compost of the same kind as before used was added to the bed. Water freely supplied to the plants in fine weather. Some small pegs must now be prepared, to fasten down the vines, as they proceed in growth; this practice is very beneficial to the successful cultivation of the cucumber, as in the latter part of the forcing, when the vines have filled the bed, the roots, which are thrown out into the soil at every joint, where pegged down, greatly assist in giving additional food and nourishment to the plants as they extend. The old portion of the vines near the root sometimes becomes cankery, and in particular when this is the case, the fibres at the joints afford that support which is cut off from the main roots. These pegs may be made of any small pieces of brush, by taking the part where the branches fork out. Use one at every joint.

27th. The weather has become very moderate; the thermometer, in the open air, indicating 70°. The heat of the bed has been well retained, and less covering at night required. The roots of the vines have again appeared, and the soil was drawn round the hills to the thickness of about three inches, fully covering all the extreme fibres of the roots: it is astonishing with what rapidity they now extend themselves: we have seen them run through a thickness of soil of one inch during the night. One or two staminate (or male) blossoms opened to-day, and several buds, with embryo fruit, are nearly ready to expand. Temperature, 70°, 76°, 70°; of the soil, 82°.

30th. Removed three barrows of manure, and added three of fresh. The pistillate (or female) flowers, those which show the embryo fruit, have opened to-day, and the operation of "setting the fruit," as it is generally termed, was performed. The propriety of this operation having been disputed by many, and as there are various opinions respecting its usefulness, we intend to make some remarks in relation to it; but, as we have extended this communication to a greater length than we expected, or than we have space, at the present time, we leave it until a future opportunity.

(To be continued.)



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, MARCH 19, 1836. [VOLUME V.—No. 11.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 19, 1836.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANICS' MAGAZINE, is removed to 132 *Nassau street*, opposite CLINTON HALL, and two doors *below Beekman street.*

☞ Will those Editors to whom the Journal is sent, do me the favor to notice this removal, send their papers in exchange, and request the friends of the Periodicals in the country to direct their orders to me at 132 Nassau street.

The favor shall be reciprocated at any and all times, by

D. K. MINOR.

March 23, 1836.

AERIAL NAVIGATION BY BIRDS.—A curious article on this subject appears in the December No. of the London Mechanics' Magazine. The writer is of the opinion that a sort of light wicker work may be drawn through the air by about 30 eagles. He thinks that young eagles might be trained in the same manner that poodle dogs and monkeys are in Naples—where he has seen them perform various amusing tricks.

We agree with him that to "realize a desideratum of this nature, it requires a person of property, who would devote his whole time (and money he might have said) to the pursuit; as the expense of purchasing and rearing up the eagles, together with able assistants, would be *considerable*."

One method proposed for the guidance of this *team* is, by means of a long pole hung after the fashion of a rudder *before* the car; to the end of this, a piece of meat is to be fastened, and by varying the position of the pole the eagles are to be guided to one side or the other. Now setting aside this bird's aversion to any thing but *fresh* prey, we shudder when we think of the effect of a mental ejaculation of those eaglets equivalent to our "*sour grapes.*"

The writer himself thinks that "the subject in its childish state may appear to border on the ridiculous."

We do not mean to discourage any reasonable attempt to "navigate the air," but we do think it a fortunate circumstance that this gentleman is not a "man of property."

TRUE PATRIOTISM.—It appears from the Philadelphia National Gazette, that Bird Patterson, Esq., of Pottsville, Pa., has offered ONE THOUSAND DOLLARS A TON FOR TEN TONS OF GOOD IRON, SMELTED WITH ANTHRACITE COAL. This gentleman seems determined to go to work liberally, in bringing into play the resources of our country. It is the right way. We wish him success.

Extract of a letter, dated Hudson, April 5th.

Dear Sir,—As soon as spring opens fairly we shall have the whole line of our Railroad under contract. The whole distance from this to West Stockbridge is about 32 miles. The grading of the eastern half of the road is nearly complete; that of the western half is light, and will be finished before another winter, and by the middle of June, 1837, we expect to see our cars freighted with marble to beautify your metropolis. It appears now well understood that the Albany Road will intersect ours, and that half of our Road will be the joint stock of the Hudson, Albany, and Troy Companies. The Western Road from Boston will soon be built, and meet ours at Stockbridge. Passengers from New-York to Boston may then leave New-York in the evening boat, reach Hudson by daylight the next morning, take the morning cars for the east, and be in Boston at two o'clock, P. M.—do their business, and return the next day to New-York.

With great respect,
Yours, &c.,

J. W. F.

To the Editor of the Railroad Journal:

SIR,—In Vol. v., No. 7, of your valuable Journal, I find in the annual report of the Canal Commissioners to the Legislature of the State of New-York, on the subject of the *enlargement* of the Erie Canal, the following:—"With a view to the improvement of "the Erie Canal, the Commissioners have "divided the line into four sections," &c. * * "So far as the surveys made *last* "*season* [during only four months] have "developed the practicability of enlarging "the Erie Canal, and executing a perma-

"nent work, *without* MATERIALLY *interrupting the navigation*, nothing has appeared "insurmountable; * * it is, however, a "*difficult*, and, in some respects, *a fearful* "*undertaking*." To the candor of the Board, and the pen that drew these remarks, all praise is due: it is truly a "fearful undertaking;" and how far the city of New-York or the West can submit to any "material," or even *limited* curtailment of the navigation of the short period allowed us in this northern latitude, I leave you and your readers to determine. That *practical-men* and engineers of the first order of talents are opposed to the project of an enlargement, and have fearlessly pronounced a *separate* and *distinct* work *better* and *cheaper*, is too public to be disputed. Engineers in the service of he State have also said that they were not called on for an opinion, or to estimate the cost of a separate and even parallel work to the Erie Canal from the Hudson to Buffalo; that such a work was more desirable for any engineer to undertake. It would certainly present less difficulties, and at probably not a greater expense than the enlargement, with the benefit of two separate and distinct canals, to provoke competition, and can be executed in much less time.

An appeal to the representatives of the people in relation to the enlargement of the Erie Canal, with the signature of *Oswego*, has been placed in my hands. I have read it with much interest. In the pen of the writer *I think I can discover* the comprehensive mind of a talented individual and old acquaintance, and I therefore extract a few remarks, to draw the attention of the public, and particularly the citizens of this State, *to the difficulties* which must present themselves to the most common eye, as to the *enlargement of the Erie Canal*, except at an expenditure *not to be justified*, and which would, beyond the shadow of doubt, furnish us with two canals to the "Far West;" and this, too, even without "*the aid*" of the General Government, to make the desired Ship Canal around Niagara Falls.

"The importance of making speedy and ample provision for the great and rapidly increasing trade between the East and the West, has for some time been apparent.—The means proposed for the accomplishment of this object have appeared to us inadequate and unsuited to the purpose. * * *

There is another very important consideration. The work must, most of it, be done at unfavorable seasons, and from the necessarily frequent interruptions, the cost must be much greater than would naturally be anticipated. In very many places the present channel must be abandoned, and an entirely new one constructed, and, as the work is to occupy a period of 12 or 15 years!! considerable allowance must be made for the increase in the mean time of the number of bridges, &c., rendered necessary by future improvements, and the greater amount of damage from the enhanced value of lands. To this must be added quadruple the usual allowance for the services of engineers, superintendence, &c., owing to *the extraordinary length of time required in making the enlargement.*

We are not alone in the preceding views. They are (and we speak not without knowledge,) *the disinterested opinions of three-fourths of the ablest Engineers in the country, men who are uncommitted on the subject.* * * * * * *

A most important item in the absolute cost of the enlargement remains to be considered. The benefit of the enlarged canal cannot be fully realized, until the improvement is effected throughout its whole extent. Neither the State or the public will therefore be materially benefitted by it until the expiration of the 12 or 15 years, when the work is to be completed. The interest, therefore, upon the one million of dollars, more or less, expended annually from year to year, for 12 or 15 years, must be estimated in the cost, and by uniting it with the other items above stated, and adding thereto the cost of the Erie Canal, which of course is merged in the enlargement, the total cost of the canal as enlarged, will not be rated by any rational, thinking man, at less than *twenty-seven millions of dollars.*

The question may now be asked, how are all these difficulties to be avoided? We answer, by opening an entire new channel from the Hudson to Lake Erie, by the way of Lake Ontario.

The total extent of artificial canal required on this route, if the course along the Mohawk valley—through Lake Oneida—the Oneida and Oswego Rivers be adopted, is only 150 miles, while by the Erie Canal it is 363 miles, making a difference of 213 miles of canal. Or if the route via Syracuse to Oswego be taken, as is not improbable, since it would present the advantages of a towing path the whole distance, and accommodate the Salt and Plaster trade, &c., a saving would still be made of nearly 170 miles of artificial canal.

The expense of opening a navigation on this latter route, having a depth of water not less than *eight feet*, with a width of surface of *ninety feet*, which is as small a width as should be allowed for that depth, will not, by the most liberal computation, exceed eleven millions of dollars, to wit:—$5\frac{1}{4}$ millions from the Hudson to Utica—$3\frac{3}{4}$ millions from Utica to Lake Ontario—and 2 millions from Lake Ontario to Lake Erie—around the Falls of Niagara.

This channel may be opened within five years from the period of its commencement. We shall, therefore, by adopting this course, obtain the benefit of a much larger navigation in about two thirds less time, at an expense not much exceeding the half of what it would cost to make the proposed enlargement from Albany to Buffalo. *The obstruction to the navigation so much dreaded will be avoided:* a better and more durable work will be obtained, as the masonry will be built, and embankments formed, under the most favorable circumstances; and when done, the State, instead of having but *one* Canal, at a cost of nearly 27 *millions* of dollars, *will have two Canals*, the combined cost of which will not vary much from 20 *millions.* The new Canal, if properly located, may be rendered much straighter than the present one, an object of importance, when it is considered that the boats which are to navigate it are to be of much larger dimensions, having treble or quadruble the tonnage of the present boats.

The number of the locks may likewise be very materially reduced by increasing their lifts. On the Erie Canal the average lift of the locks is about 8 feet. Should this average be increased to 12 feet, or thereabouts, as it may be with the greatest propriety, one third would be saved in the number of the locks. The expense for repairs and lock tenders, and cost of the locks, would thereby be lessened, and much time saved in passing them, which, to those engaged in navigation, would be deemed a very important consideration.

In exhibiting thus far the comparative merits of a separate channel, we have supposed that the Erie Canal would or could be *enlarged* to the size proposed according to the strict meaning of the term.

We do not hesitate to express the opinion that (setting aside the idea of a separate Canal,) *it would not be expedient to adhere to or enlarge the channel of the Erie Canal for a very considerable portion of the distance.* Independent of the bad location in many points of the present Canal, arising from the want of that experience in the construction of such works which our engineers have since obtained, *it is well known that a large Canal requires for its location entirely different ground from a small one.* This is necessary to its security and for other purposes. If the additional depth of water required to convert a four feet Canal into one of seven feet in depth, is obtained by raising the banks, the large body of water composing the Canal must be sustained at a greater elevation, compared with the natural surface of the ground; if, by depressing the bottom, there results an interference with the free passage of streams, and the drainage of the adjacent lands.

Independent of this difficulty, there are others in the case of the Erie Canal, which would render an enlargement of its channel in many places improper.

Those who are familiar with the ground on which it is located, and the section of country through which it passes, will readily perceive the propriety of this assertion.

From the Hudson to Schenectady, or some other point higher up the valley of the Mohawk, a new channel is demanded by the character of the intervening country, by which the crossing and recrossing of the Mohawk shall be avoided—the Canal straightened—and the distance materially lessened." HARLEM.

SLATE FLOORS.—The following notice from the London Penny Magazine, will probably be the means of introducing a new and valuable article for floors, for stores, factories, shops, &c., which possesses the advantage not only of durability, but also of *incombustibility;* and must therefore, we think, come into common use.

With a view of testing its advantages, an enterprising gentleman, who is an advocate for (not in the *common* acceptation of the term, but in *reality*) "fire proof buildings," has ordered several hundred tons of the article from England, to be laid in stores *now* erecting, and soon to be commenced by him.

SLATE.—Experiments have been made to ascertain the applicability of slate to other uses than the covering of houses. The result has been the discovery that, as a material for paving the floors of warehouses, cellars, wash-houses, barns, &c., where great strength and durability are required, it is far superior to any other known material. In the extensive warehouses of the London Docks it has been used on a large scale. The stones forming several of the old floors, having become broken and decayed, have been replaced with slate two inches thick; and one wooden floor, which

must otherwise have been relaid, has been cased with slate one inch thick; and the whole have been found to answer very completely. The trucks used in removing the heaviest weights are worked with fewer hands. The slabs being sawn, and cemented closely together, as they are laid down, unite so perfectly, that the molasses, oil, turpentine, or other commodity which is spilt upon the floor, is all saved; and, as slate is non-absorbent, it is so easily cleaned, and dries so soon, that a floor upon which sugar in a moist condition has been placed, may be made ready for the reception of the most delicate goods in a few hours. Wagons or carts containing four or five tons of goods, pass over truck-ways of two-inch slate without making the slightest impression. In no one instance has it been found that a floor made of sawn slate has given way; in point of durability, therefore, it may be considered superior to every other commodity applied to such uses. The consequences of this discovery have been, that full employment is found in the quarries which produce the best descriptions of slates, and that additional employment has been given to the British shipping engaged in the coasting trade.—[From a Correspondent.]

RAILROAD AND CANAL INTELLIGENCE.

MASSACHUSETTS.

The bill authorizing the Treasurer of the Commonwealth to subscribe *one million* of dollars to the Western Railroad has passed one branch of the Legislature, by a vote so strong, as to leave no doubt as to its final success.

This Company has a charter for a road from Worcester to West Stockbridge,—forming a most important link in the chain of communication between Albany and Boston.

NEW-YORK.

A large meeting held at Delhi, has passed a series of resolutions, urging the immediate advancement of the Erie Railroad, and requesting the Senator of the district to vote for the bill.

MARYLAND.

The difficulties in the location of the *Baltimore and Port Deposite* Railroad have been removed at last by the Legislature. The question was, as to the right of the Company to select a certain route—contrary to the wishes, it appears, of the inhabitants. No suspension of the operations has taken place, and it is thought that the work will be completed sooner than was originally contemplated.

Maryland Internal Improvement Bill.—This bill, providing ten millions for the improvement in the State, has been referred to the next General Assembly, much to the sorrow of the good Baltimoreans.

PENNSYLVANIA.

The canal navigation has opened, with unusual spirit, it is said.

VIRGINIA.

Great rejoicing attended the opening of the Winchester road; the following is from the Republican:

☞ Our town begins to show the good effects of the railroad already. All seem to be on the look out for happier and finer prospects. Our depot presents quite a business appearance: goods for all quarters are daily arriving there, and any of our country friends who have idle wagons, would find plenty of employment, and ample remuneration, if they should be inclined to make a trip to Wheeling—$3 per hundred is now paid for transportation from Winchester to Wheeling.

So great was the accumulation of produce upon this road, that the motive power of the Company was found inadequate.

The Baltimore and Ohio Company very promptly sent them assistance in the shape of a locomotive.

SOUTH CAROLINA.

This State having appropriated $10,000 to the survey of the Cincinnati and Charleston Railroad, has also appointed Commissioners to advance the measure. It is understood that several of the United States Engineers have volunteered their services, and that the Secretary of War will suffer all such as can be spared to report themselves to the Commissioners for service.

The members of the Kentucky Legislature have held a meeting, and appointed delegates to the Convention at Knoxville, to be held next 4th of July.

MISSISSIPPI.

Jackson and Brandon Railroad.—Books were opened on the 2d instant, in Jackson and Brandon, for subscription of stock in this company. One thousand shares, of $100 each, were allotted to the people of Rankin county, which were taken before night on the first day. This really looks like "going ahead."

Steam-Plough.—At a meeting of the Grantham Agricultural Association, Mr. Hanley stated that he had seen a steam-plough at work in Lancashire, which did its work remarkably well, and turned up an acre of wet land, at a depth of nine inches, in 1 hour and 50 minutes.—[London Mechanics' Mag.]

Centrifugal Force.—At Little Green Logwood mill, Middleton, near Manchester, occupied by Mr. George Wolstencroft, there is a grindstone used for grinding the rasping knives for cutting logwood, upwards of 15 feet in circumference, and 11 inches and upwards thick. On the 24th ult., as Mr. John Wolstencroft, the son of the occupier, and another young man, were grinding the knives at the stone, the young man had screwed the machine in which the knife is held for grinding, rather too tight; this being observed by Mr. John, who also saw that the stone was revolving at a tremendous speed, he desired the young man to be cautious. No sooner had the words dropped from his lips, than the stone broke in several pieces, one of which, weighing not less than 6 or 7 cwt., forced its way through a wall a brick and a half thick, and drove a large quantity of the bricks upwards of 20 yards from the wall.—[A similar accident occurred some years ago. See vol. xviii. p. 32.]—[London Mechanics' Magazine.]

Wilmington and Raleigh (N. C.) Railroad.—We published, in our last, an account of the organization of this Company, and intended to have called the attention of our readers to the subject.

We republish it at the request of a friend, and are gratified to be able to learn that they have engaged Walter Gwynn, Esq., as Chief Engineer, and that it is the intention of the Company to prosecute the work with energy.

WILMINGTON AND RALEIGH RAILROAD.

Meeting of Stockholders.

Pursuant to public notice, the Stockholders in the Wilmington and Raleigh Railroad, met at the Court House in Wilmington, N. C., on the 14th March, 1836, and were organized by the appointment of Wm. D. Mosely, Esq., as Chairman, and Gen. James Owen as Secretary.

After the objects of the meeting were explained, the following proceedings took place.

On motion, Resolved, That Gen. E. B. Dudley, Gen. Alex'r Mac Rae, and James S. Green, Esq., be a committee to examine such proxies as may be presented. This committee reported that 1296 shares are represented by proxy,* and 3360 by individual stockholders.

Resolved, That the salary of the President of this Company be fixed at $2000 per annum.

Resolved, That the offices of Secretary and Treasurer be filled by the same person, during the present year, at a salary of $1000 per annum.

Mr. Lazarus, Chairman of the Commissioners, submitted their report, which was accepted.

The meeting proceeded to elect a President and ten Directors. A ballot being had, Gen. E. B. Dudley was elected President, and Andrew Joyner, W. D. Mosely, James S. Battle, A. Lazarus, A. Anderson, Wm. B. Meares, P. K. Dickinson, James Owen, R. H. Cowan, and Thomas H. Wright, Directors.

Whereas, subscriptions to the capital stock of this road have been made along the contemplated route, as well as at Wilmington—therefore,

Resolved, That the President and Directors be authorised to have the road commenced both at Wilmington and Halifax, due regard being had to the amount subscribed north and south of Contentnea creek; and that the President and Directors be instructed to commence the work with as little delay as possible.

Resolved, That the President and Directors be hereby directed to cause the road to be located on the most eligible route from this place to Halifax.

Resolved, That a general meeting of the stockholders shall be held in this place on the first Monday in November next, and thereafter, annually, on the first Monday in May.

Adjourned to 10 o'clock to-morrow.

Tuesday, March 15.

Stockholders met at the Town Hall.

Resolved, That the President and Directors be authorised to re-open the books of subscription, at such times and places as

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*The proxies were, Hon. Wm. D. Mosely, representing the Lenoir stock; Robert Soutter, Esq., the Norfolk do.; Gen. Blount, of Nashville, the Nash and Edgecombe do.; Dr. Andrews and Mr. Lane, of Waynesboro', the Wayne do.; and Gen. Alex'r Mac Rae, the Edgecombe do.

they may deem expedient, and under the superintendence of Commissioners, to be appointed by them, for an amount of stock not exceeding 2,000 shares.

Resolved, That a Committee of three be appointed by the Chair, to draft and present, for the consideration of the Stockholders, at their next general meeting, a code of Bye-Laws for the regulation and government of the Company.

Whereupon, W. B. Meares, A. Lazarus, and A. Anderson, were appointed said Committee.

On motion of Gen. Blount,

Resolved, That the Engineer be instructed to examine a route touching at or near the town of Waynesborough, on Neuse River, and thence at or near Rocky Mount, the great Falls of Tar River, and report thereon to the President and Directors—[this resolution amended on motion of Gen. A. Mac Rae]—and also by Duplin Courthouse, Rockford on Neuse, and Tarborough, and such other routes as may be suggested or approved by the President and Directors.

Resolved, That the thanks of the Stockholders be tendered to the Chairman of the Commissioners, and the Chairman and Secretary of this meeting, for the zealous and able discharge of their respective duties.

The meeting adjourned, to meet in this place on the first Monday in November next.

W. D. Mosely, Chairman.
James Owen, Secretary.

Immediately after the adjournment of the meeting of Stockholders, the Directors met, and appointed Gen. Alexander Mac Rae Superintendent of the Railroad, and James S. Green, Esq., as Secretary and Treasurer. They also instructed their President to engage the services of Walter Gwynn, Esq., as their Principal Engineer; and in pursuance of authority given by the Stockholders, have determined forthwith to re-open books of subscription for an amount not exceeding 2,000 shares.

The services of Major Gwynn have been engaged, and the survey will be commenced immediately.

COPY OF A LETTER FROM BENJAMIN CHAMBERLAIN, FIRST JUDGE OF CATTARAUGUS COUNTY, TO THE HON. E. MACK, CHAIRMAN OF THE RAILROAD COMMITTEE OF THE SENATE OF NEW-YORK.

Albany, March 16, 1836.

Dear Sir,—In compliance with your request, that I should state the facts within my knowledge, relative to the navigation of the Alleghany river, and the lumber products in its vicinity, I beg leave to inform you that I removed into the present county of Cattaraugus, about twenty eight years ago, being at that time seventeen years of age, where I have ever since resided, and during the whole of the time within three miles of the river in question. My business has been that of rafting lumber down that stream, which I have descended every year during that period, at least once a year—and in some years four or five times.

From the knowledge thus acquired, I am enabled to state, that the navigation of the river always remains open in the fall until late in December, and frequently into January. It was not closed the present year until after the 20th of the latter month. In the spring it is also most invariably clear of ice by the 1st of March, and sometimes earlier; and I never knew it to be later than the 10th of March. I was on its banks on the fifth day of the present month, and the ice then was out of the river, and the navigation open and uninterrupted.

The stream, leading into the Ohio, forms the only direct communication between this State and the valley of the Mississippi; and several years ago, it used to form one of the principal channels through which the emigration to the far west was conducted. Emigrants were in the habit, until diverted by the opening of the Erie canal and by other channels through Pennsylvania, of embarking at Olean, in our county, and I have known from four to five hundred arks to leave that place in a single season. An ark built water tight, and securely covered, so as to carry fifty tons of merchandise, can be built for fifty-five dollars. Its draft of water will not exceed 16 inches, and there is hardly any season of the year in which there is not that depth of water in the river, all the way from Olean to Pittsburg. In order to raft lumber to advantage, a greater depth of water, say from two to three feet, is requisite; and this will explain why the running of lumber in rafts is frequently delayed for a week or a fortnight after the river is clear of ice in the spring, and sufficiently deep for arks carrying merchandise. I have never during the last twenty-eight years, known the river to fail to be navigable during the month of March, both for arks and rafts. The channel of the river is free from rocks or other obstructions. The bed of the stream consists of gravel or rounded pebbles, rendering its descending navigation usually secure, and much superior in that respect to the Susquehannah, and even to the Ohio itself below Pittsburg.

The width of the river at Olean is about 20 rods; at the State line, betwen 30 and 40 rods; at Warren, (18 miles below the State line, and where it receives an important branch from the outlet of the Chautauque lake,) between 40 and 50 rods; and at Pittsburg, upwards of 100 rods. At an average state of the water, the current flows at the rate of 5 miles an hour, but at its low stages, not more than 3 and an half. From the State line to Pittsburg, the distance by the river is 192 miles, and from Olean 42 miles further. In a fair state of water, arks can be run from Olean to Pittsburg in less than three days, and in any stage when the river is navigable, in 5 days. The ark is worth, at Pittsburg, as much as it costs at Olean, and if desired, it could continue down the Ohio with its load of merchandise, to Cincinnati or Louisville. It would reach Cincinnati from Pittsburg, in the spring, in 5 or 6 days. The expense of running merchandise on arks as above mentioned, from Olean to Pittsburg, will not exceed 15 cents, and probably not over 12½ cents per 100 pounds.

Steamboats have occasionally ascended the river as far as Warren, and upon one occasion as high as Olean.

In respect to the price of lumber lands in the vicinity of the river, I have to state that the average quantity produced upon them will not vary much from 15,000 feet of boards to the acre; though I have known a single acre to yield from 50 to 70,000 feet. There cannot be less than 500,000 acres of land thus covered within 30 miles of the route of the New-York and Erie Railroad. Of this lumber an unusual proportion is of fine quality. From my personal knowledge of the quantities sawed at the different mills in the vicinity, I estimate the amount annually exported down the river to be from 150 to 200,000 feet. Of that amount at least one fifth is what is termed "*pannel stuff*," worth at Olean, in average years, $7 per thousand; at Cincinnati, from 12 to 14 dollars, and in the city of New-York (as I am informed) from 28 to 36 dollars per thousand. The streams of our county afford hydraulic power sufficient to manufacture more than double the amount of lumber now sent to market.

In conclusion I beg leave to add, that very little, indeed scarcely any, of the lands of Cattaraugus or Alleghany counties can properly be denominated *waste land*. Although our inhabitants have been principally engaged in the manufacture and export of lumber, the soil of a great part of their lands is capable, with proper cultivation, of producing good wheat, and it presents capabilities for grazing not surpassed by any part of the State. We are, nevertheless, laboring under great disadvantages for want of the means of cheap transportation. The wagoning of our salt and plaster, which we are compelled to draw from Buffalo and Batavia, distances of 60 and 70 miles, costs as much as the salt and plaster themselves, and yet you will perceive that the population of our county, which in 1825 amounted to only 8,643 inhabitants, had increased in 1830 to 16,726, and, according to the census of 1835, just returned, has reached to 24,986.

I am respectfully yours,

B. Chamberlain.

Hon. Ebenezer Mack, Ch'n
Railroad Committee of the
Senate of New-York.

REPORT OF THE CANAL BOARD, UNDER THE ACT PASSED MAY 11, 1835, IN RELATION TO THE ENLARGEMENT OF THE ERIE CANAL.

Continued from our last.

The necessity of adding to the capacity of the Erie Canal, has for several years been apparent; and so forcibly was this matter impressed on the Legislature of 1834, that an act was passed authorizing the construction of an additional set of lift locks from Albany to Syracuse.

An additional set of locks would increase the capacity of the Erie Canal about 80 per cent., and might prolong the absolute necessity of enlarging the Canal a few years. But when the circumstances under which the enlargement must be made are properly considered, it will readily be seen that several years must necessarily be occupied in the execution of the work. Hitherto the business on the Canal has exceeded the public expectation. If we take into view the unparalleled fertility and increasing productiveness of that immense country, the commercial intercourse of which with the Atlantic must be carried on by the Erie Canal, it is not difficult to imagine a constant and rapid augmentation of business, and it is more than probable that the improvement in question will be required as soon as its execution can be accomplished on the present plan of operations.

Another important consideration which is entitled to great weight, in determining the question of time, within which the im-

provement of the Canal should take place, is, that a large Canal is not only desirable and beneficial, in reference to the amount of tonnage which may be carried upon it, but because it materially lessens the expense of transportation. This circumstance exerts an important influence in increasing the amount of tonnage on a Canal. It creates an accession of business, and consequently enlarges its usefulness to the country through which it passes, in the transportation of coarser and cheaper articles, and extends the business in a relative proportion over a larger district.

The enlargement of the Canal and locks to the proposed dimensions will lessen the expense of transportation, exclusive of toll, about 50 per cent. This difference applied to the business of the past year, assuming the aggregate expense of transportation to be 20 per cent. greater than the gross amount of tolls, (which is believed to be a low estimate,) would be a saving of $826,007 81, and in ten years, calculating the same rate of increase to the tolls that has taken place in the past ten years, it would amount to $12,793,221 30.

The enlargement of the Canal is intimately and necessarily connected with the utility of a double set of lift locks, and hence the propriety of commencing the work as soon soon as practicable, and of prosecuting it with as much diligence as the funds appropriated to this object will admit.

The funds at the disposal of the Canal Commissioners for the purposes of the law under which they are now acting, will be too limited to justify a commencement of the work on every part of the line, and as speedy a prosecution to its completion as an unlimited appropriation would admit. It is therefore deemed advisable to confine the operations to the line between Albany and Syracuse, until such time as the funds will justify a beginning on the other parts of it, without interfering with the speedy completion of the work on the line above referred to.

This arrangement will render available the advantages of the enlarged Canal before the whole is completed, as it would no doubt be a saving in the expense of transportation to tranship the cargo in most cases from the small to the large boats.

The proposed width of lock will permit the convenient passage of boats 17 feet wide, and a little exceeds the transverse ratio of boat and Canal most favorable to the power of traction, but is about six feet narrower than would correspond with the proportion which the present locks bear to the Canal.

It is stated that the locks on the present Canal to conform to the rules governing the "economy of traction," should be a little less than 10 feet wide, and the cargo but 32 tons; whereas, 45 or 50 are sometimes to be advised on the score of economy.

It should, however, be borne in mind, that on a Canal as large as the one proposed, where the business is such as to require the frequent meeting and passing of boats, and sometimes three abreast, there is a much greater necessity of restricting the width of boats to proper limits than now exists on the Erie Canal. It is quite apparent that the boats are now too wide for the present Canal. Boats are constantly coming in contact with each other, or are driven against the towing-path by the passing boat. Much injury to boats, and some interruptions to the navigation, are occasioned by this circumstance. This difficulty should be obviated on the enlarged Canal, as the injury would be more extensive by reason of the greater magnitude and weight of the boats.

At a meeting of the Canal Board on the 23d of November last, the Canal Commissioners submitted the report of Nathan S. Roberts, John B. Jervis, and Holmes Hutchinson, who had made the necessary examinations in reference to the most favorable location for a new aqueduct over the Genesee river at Rochester, and also for a suitable location for a new weigh-lock. Their report is herewith submitted.

In the fall of 1834, the Canal Commissioners had adopted a plan for constructing a new aqueduct on the present location, by turning new arches under the old ones, and extending them a sufficient distance above and below the present aqueduct, to obtain 36 feet of water-way and new parapet walls. The aqueduct was designed for five feet depth of water.

With the proposed enlargement of the Canal, the present location of the aqueduct in several respects would be objectionable. The short curve in the Canal at the east end of the aqueduct, renders the passage of boats inconvenient. This objection would be much more formidable for large boats. The width of the water-way in the aqueduct could not be increased without material injury to the extensive flouring mills of Harvy Ely, on the east side of the river, of Thomas Kempshall, on the west side, and the removal of the flouring mill lately owned by Benjamin Campbell, on the south side of the aqueduct.

By referring to the report of the Engineers, it will be seen that lines for two locations have been surveyed: the one commences 200 feet, and the other 300 feet above the present aqueduct, on the east side of the river, and both connect with the Erie Cenal at the same point en Exchange-street, on the west side of the river. The first line above the aqueduct has been adopted. On this location the curve in the Canal at the east end of the acqueduct will be much improved. An entire new work will be constructed, better in its appearance, and probably more permanent than the work contemplated on the present location The width of the water-way will be increased to 45 feet, and the new line admits of the location of a weigh-lock parallel with the Canal, and a collector's and inspector's office adjoining it on the west side of the river.

The present location of the nine locks above the junction, has not left sufficient pound reaches between them for the convenience of navigation. To lengthen and double these locks, will increase this inconvenience. To obviate this objection, the Canal Commissioners directed a survey, for the purpose of ascertaining the praticability and expense of changing the presnet line. The survey shows that a new line may be located, commencing below the junction, and connecting again with the present line a short distance above the Nine Locks. By this location, the lifts are differently arranged, and one lock is dispensed with. On this line, the work could be performed without interfering with the present line.

The surveys which have been made indicate that several important deviations may be made from the present line of the Erie Canal, to wit: a continuation of the new line, which has been mentioned, diverging from the present line below the junction, to the head of the four locks above the Cohoes Falls, and from thence, on the south side of the Mohawk River, to its intersection with the present line above the upper aqueduct; from four miles above to one mile below the Schoharie Creek; a new line passing through the village of Rome; an extension of the Geddes level to the level west of the village of Jordan, by which the Jordan summit would be avoided; a new line from the lock west of Port Byron to Montezuma, with a view of taking a feeder from the Owasco Creek, below the flouring mill of Beach & Co.; and a new line east of Rochester, in order to avoid a great bend in the Canal at Brighton.

The examinations which have been made are not sufficiently matured to enable the Canal Board to determine the question affecting the alterations; but they may result in the opinion that the public interest requires them to be made. If so, the alterations on the eastern section must be made next season, in order that the new locks may be put under contract. It will be seen that if these alterations are made, a new Canal, on the enlarged plan, must be constructed simultaneously with the locks.

In connexion with the changes which are indispensable to the enlargement of the Erie Canal, according to the proposed plan, the Canal Board are deeply impressed with the importance of making such other improvements essential to its usefulness, as shall be commensurate with the means and interest of the State, and the character of the most important artificial communication in the world.

The Canal Board, however, duly appreciate the propriety of making no deviations from the present line, that are not clearly sanctioned by considerations of public utility. Investments and various improvements have no doubt been made on many parts of the present line, under the expectation of its continuance; and although this circumstance should not be permitted to operate against the interest of the public, it is entitled to a respectful consideration.

Dated, Albany, January 23d, 1836.

S. Van Rensselaer,
Wm. C. Bouck,
Jonas Earll, Junior,
John Bowman,
John Tracy,
A. C. Flagg,
John A. Dix,
A. Keyser,
William Campbell.

From the London Mechanics' Magazine.

EVIDENCE OF DR. LARDNER

On the Great Western Railway Bill.

3d of August, 1835.

(Continued from page 59.)

[The witness is referred to two sections on the table.]

Were these prepared by you?—Yes. I was asked whether the summit level of the line had any necessary connexion with the power necessary to work it, and I drew these specimens to show that there might be two lines, one of which has a very high summit, and the other a very low one, and yet which require the same total power to work them.

Just produce them, and explain them?—If you suppose this section, No. 1, to represent two roads, one of them consisting of one continuous slope rising 1 in 300, and then one descending slope of 1 in 300, and then another, with the same termini, consisting of six short ascending slopes of 1 in 300 interrupted by six descending slopes of 1 in 300,—I take 1 in 300 as an example merely,—the power necessary to work these would be precisely the same.

According to the plan you now hold in your hand, though the lower line, the darker line, attains so much lower a summit level than the lighter line, the same power is required to surmount the one as the other?—Yes; the one is a succession of summits, and the other one only; and to compare these it would be necessary to bring all the ascending slopes to one end, and all the descending to the other, and on comparing you would then find them the same.

Does not it follow, then, as an inevitable conclusion, that the mere summit level of two sections does not of itself afford any thing like a conclusive estimate of the power necessary to surmount that summit level?—Certainly not.

A plan which shall show two summit levels, one twice as high as the others, may not give any thing like a fair estimate of the power required to surmount the two?—You must not judge by the summit level—very little depends upon that.

Is it not obvious that a much higher summit level may be obtained by less power than a lower summit level, if, in attaining the lower summit level, you have more objectionable inclinations?—Yes, every thing depends upon the graduation.

So that if power be lost on the lower more than the higher summit level, the mere surface would be calculated much to mislead?—It would not mislead scientific men or engineers.

But to mislead a common spectator?—Yes, people not acquainted with the subject.

In the section you have exhibited, No. 1, you say the same power would be required for the two lines?—Yes.

You have another marked 2?—Yes; in which the lower would require the greater power.

That is, the lower and darker section would require a higher power than the upper?—Yes; the slopes are more steep.

Yet they both start at the same point?—Yes; and one is a higher summit level than the other.

And the sum of the ascents upon the undulating line on the last plan are greater than the sum of the ascents on the other?—That is not necessarily a test.

Is it not the case with this section?—It may be so; I have not measured it; that is not the test.

Explain how it is that less power is required to attain the higher summit?—If you add together all the perpendicular heights that the load has to be lifted in ascending, and then subduct from it all that falls upon an acclivity which is not more steep than 1 in 250, you will then get a number of perpendicular feet which the power is to overcome; but, in addition to that, it will be necessary to take those descending slopes which are more steep than 1 in 250, and allow for them as giving back so much power as they would give back if they were only 1 in 250, and then you get the number of perpendicular feet that the power is to overcome. The loss arising from steep slopes consists in this, that any descending plane more steep than 1 in 250, will only give back as much power as it would give back if it was 1 in 250; the consequence is, there is a number of perpendicular feet lost wherever there is a steeper incline than 1 in 250.

One in 250 is the point of rest?—That is the angle of repose.

Witness handed in the following paper:—

"*Calculation of the Amount of Mechanical Power necessary to draw a Ton from London to Bath, and from Bath to London, on the Great Western and Basing Lines, the Power being expressed in the equivalent Number of Pounds raised Three Feet high.*

"GREAT WESTERN RAILWAY.

"*London to Bath.*

	Feet.
Sum of all the rises	383
Sum of all the falls, not exceeding 1 in 250	243
	140
Fall at Box-hill, estimated at 1 in 250	51·98
To be overcome by power	88·02

	Yards.
Distance from London to Bath	192,588
Friction at 9lbs. per ton in pounds raised 1 y'd.	1,733,292
Power to raise 1 ton 88·02 feet	65,722
Resistance from London to Bath in pds. raised 1 yard	1,799,014

"*Bath to London.*

	Feet.
Sum of all the rises	364·5
Sum of all the falls, not exceeding 1 in 250	337
	27·5
Effective fall of Euston-square incline	15·91
	11·59

	Yards.
Friction at 9 lbs. per ton in pounds raised 1 y'd.	1,733,292
Power to raise 1 ton 11·59 feet	8,654
Total resistance from Bath to London in pounds raised 1 yard	1,741,946

"BASING LINE—*London to Bath.*

	Feet.
Sum of all the rises	480
Sum of all the falls, not exceeding 1 in 250	181
	299
Effective fall of slope 1 in 202	141·6
To be overcome by power	157·4

	Yards.
Distance from London to Bath in yards	187,396
Friction at 9lbs. per ton in pounds raised 1 y'd.	1,686,564
Power to raise 1 ton 157·4 feet	117,525
Total resistance from London to Bath in pounds raised 1 yard	1,804,089

"*Bath to London.*

	Feet.
Sum of the rises	355
Sum of the falls	480
Total effective fall	125

	Yards.
Friction at 9 lbs. per ton in pounds raised 1 yard high	1,686,564
Effective aid derived from fall of 125 feet	93,333
Total resistance from London to Bath in pounds raised 1 yard	1,593,231

Mr. Talbot.—Is that taking all the slopes upon our line?—Yes; including Euston-square and the Box-plane.

Mr. Joy.—If it has been stated in evidence by Mr. Locke, that there are fewer accidents on the descending slope upon the Manchester and Liverpool Railway than upon other parts of the line, would not that answer—I do not mean intentionally—be fallacious in this respect, that the length of the line is about thirty-one miles, whereas the length of the incline is only about a mile and a half?—The fact that there are more accidents on that slope than on any other portion of the line of equal length, is notorious.

You cannot fairly compare that plane with the whole line?—You cannot compare that one mile and a half with the twenty-eight miles.

Mr. Joy.—Have you some other tables marked 4, 5, 6, and 7, which you have prepared?—Yes; I wished to verify the result of the calculation, as it would be satisfactory to make them prove themselves, by making a calculation of the same thing, by two different processes and formularies, so that it should be seen, that it was not only arithmetically right, but right upon principle; and I have proceeded to obtain the total mechanical power necessary to work the lines by both methods; the results coincide so nearly as to perfectly verify each other.

[The witness delivered in the tables referred to.]

Are these tables illustrative of the speed?—These tables include the speed which the road would be traversed with, subject to two different conditions: one, that the maximum speed is limited to thirty miles, and the other to forty miles an hour: they also state the length of line in yards, and the mechanical power necessary to overcome every slope.

On each line?—Yes, expressed in pounds weight raised a yard high; they also express the resistance in pounds per ton every slope, from one end to the other.

Backwards and forwards?—Yes.

What are the termini?—Euston-square and Bath.

Not Bristol in either case?—No.

Mr. Joy.—Taking the speed in the first instance, as not exceeding thirty miles an hour for the maximum, what time would be consumed upon the Great Western from

London to Bath?—From London to Bath on the Great Western would take, on that supposition of thirty miles an hour, four hours fifty-five minutes twenty-three seconds; on the Basing line, four hours fifty-nine minutes and fifty-seven seconds; and from Bath to London on the Great Western it would take four hours fifty-four minutes forty-four seconds, and on the Basing line four hours forty-three minutes forty seconds; and then both ways, backwards and forwards, on the Great Western it would take nine hours fifty minutes and seven seconds, and on the Basing, both ways, nine hours forty-three minutes and thirty-seven seconds; the difference in favor the Basing line, six minutes and thirty seconds. This is on the supposition that the plane is 1 in 202.

Have you got the difference, if it was calculated at 1 in 250?—No, I have not.

With a speed not exceeding forty miles from London to Bath?—Four hours forty-four minutes and forty-four seconds on the Great Western, and on the Basing four hours forty-nine minutes and forty-seven seconds.

Bath to London?—Four hours forty minutes and twenty-one seconds.

Basing?—Four hours twenty-eight minutes and thirty-six seconds.

London to Bath and Bath to London, the Great Western?—Nine hours twenty-five minutes and five seconds; and on the Basing, nine hours eighteen minutes and twenty-three seconds; the difference in favor of the Basing, six minutes and forty-two seconds.

What rate do you assume on the level?—Twenty-five miles an hour.

Is that for the forty?—For both.

Have you got any other tables?—Yes.

Do they relate to another point of your examination?—A comparative view of the two lines with respect to their average power and their greatest resistance: the results are here brought together.

The results of the other tables are brought together?—Yes.

The witness delivers in the following papers:—

Comparative View of the Great Western and Basing Lines.

	G. Western.	Basing.
Total mechanical power necessary to work the line both ways, calculated by estimating the resistance upon each successive slope from the table of gradients, expressed in pounds weight, lifted three feet high -	3,510,965	3,397,316
Difference of total mechanical power in favor of the Basing line - - - -	......	143,649
Total mechanical power necessary to work the line both ways, calculated by allowing nine pounds per ton for friction throughout the whole distance, and then estimating the power necessary to lift the load through the sum of all the rises, and the quantity of this power restored by the sum of all the falls - -	3,540,960	3,397,320
Difference in favor of the Basing line - - - - -	......	143,640
Total length of the line in yards	192,538	187,496
Difference in favor of the Basing line - - - - -	......	5,192
Average resistance of the line, worked both ways, in pounds per ton - - - - - - - - -	9·1879	9·0645
Difference in favor of the Basing line - - - - -	......	0·1234
Maximum resistance on ascending slopes from London to Bath in pounds per ton - - - - -	35·05	17·96
Difference in favor of the Basing line - - - - -	......	17·09
Maximum resistance on ascending slopes from Bath to London in pounds per ton - - - - -	29·93	20·09
Difference in favor of the Basing line - - - - -	......	9·31
Time of transit from London to Bath and from Bath to London, thirty miles an hour being taken as the greatest allowable speed - - - - - - - - -	h. m. s. 9 50 7	h. m. s. 9 43 37
Difference in favor of the Basing line - - - - -	......	0 6 30
Time of transit from London to Bath and from Bath to London, forty miles an hour being taken as the greatest allowable speed	9 30 5	9 18 23
Difference in favor of the Basing line - - - - -	......	0 11 42
Length of an absolutely level line requiring the same quantity of mechanical power - - - -	Yards. 196,721	Yards. 188,739
Difference in favor of the Basing line - - - -	......	7,982
Effect of the gradients expressed in equivalent increase of length	4,133	1,313
Difference in favor of the Basing graduation - -	......	2,790
Comparative amount to which the power necessary to work the line both ways would be reduced if the Box-hill and Euston-square planes on the Great Western were converted into absolute levels, expressed in pounds raised one yard - -	3,466,586	3,397,318
Difference in favor of the Basing line - - - - -	......	69,268
Greatest resistance from London to Bath, exclusive of Euston-square slope, in pounds per ton	16·27	17·95
Greatest resistance from Bath to London, exclusive of the Box-hill slope, in pounds per ton -	15·53	20·06

Since the preceding calculations were made, it has been proposed to reduce the gradient of 1 in 202 on the Basing line to 1 in 250. This will alter several parts of the comparative estimate of the two lines. In the following table I have made these changes:—

Comparative View of the Great Western and Basing Lines, the Gradient of 1 in 202 being supposed to be changed to 1 in 250.

	G. Western.	Basing.
Total mechanical power necessary to work the line both ways	3,540,965	3,373,128
Difference of total mechanical power in favor of the Basing line - -	......	167,832
Total length of the line, in yards	192,588	187,396
Difference in favor of the Basing line - - - -	......	5,192
Average resistance of the line, worked both ways, in pounds per ton - - - - - - - - -	9·1879	9.0000
Difference in favor of the Basing line - - - - -	......	0·1879
Maximum resistance on ascending slopes from London to Bath, in pounds per ton - - - - -	35·05	17·96
Difference in favor of the Basing line - - - -	......	17·09
Maximum resistance on ascending slopes from Bath to London, in pounds per ton - - -	29·93	17·96
Difference in favor of the Basing line - - - -	......	11·97
Time of transit from London to Bath and from Bath to London, thirty miles an hour being taken as the greatest allowable speed - - - - - - - - -	h. m. s. 9 50 7	h. m. s. 9 43 37
Difference in favor of the Basing line - - - -	......	0 6 30
Time of transit from London to Bath and from Bath to London, forty miles an hour being taken as the greatest allowable speed - - - - - - - - -	9 30 5	9 18 23
Difference in favor of the Basing line - - - -	......	0 11 42
Length of an absolutely level line requiring the same quantity of mechanical power - -	Yards. 196,721	Yards. 187,396
Difference in favor of the Basing line - - - -	......	9,325
Effect of the gradients expressed in equivalent increase of length	4,133	—
Difference in favor of the Basing graduation - -		4,133
Comparative amount to which the power necessary to work the lines both ways would be reduced if the Box-hill and Euston-square planes on the Great Western were converted into absolute levels, expressed in pounds raised 1 yard - -	3,466,536	3,373,128
Difference in favor of the Basing line - - - -	......	93,458
Greatest resistance from London to Bath, exclusive of Euston-square slope, in pounds per ton	16·27	17·95
Greatest resistance from Bath to London, exclusive of the Box-hill slope, in pounds per ton -	15·53	17·95
Average resistance from London to Bath and from Bath to London, the Box-hill and Euston-square slopes being supposed to be reduced to levels, in pounds per ton - - - -	9	9

Have you calculated the length of a line absolutely level which would be mechanically equivalent to each of the proposed lines?—I have.

What is the difference in favor of the Basing line?—The length of a line absolutely level, requiring the same mechanical power as the Great Western Line, would be 196,721 yards; and the length of a line absolutely level, equivalent mechanically to the Basing line, would be 188,739 yards. This is on the supposition that the greatest slope on the Basing line is 1 in 202, and in that case the difference would be 7,982 yards in favor of the Basing line.

Have you calculated what is the average power of traction per ton required upon each of the two lines?—Yes, I have. The average resistance of the line worked both ways expressed in pounds per ton for the Great Western is 9.1879, and for the Basing 9.0645; that is, in more popular language, it would be 9 lbs. and 19-100ths for the Great Western, and 9 lbs. 6-100ths for the Basing; that is supposing the slope to be 1 in 202, and taking into account the Euston-square slope, and the Box-hill slope, taking into account the whole line and every thing on it.

Will you have the goodness to tell me if you have made any calculation of what force must be applied to the break in order to prevent an increase of speed down the Box-hill slope?—The resistance that the break must exercise to oppose the descent of the load down the slope I stated to be 12 lbs. per ton; then, in order to produce that, the break must be pressed upon the tire of the wheel with such a force as to give that resistance, namely, 12 lbs. per ton. Now the pressure of the break upon the wheel would require to be from five to six times the amount of the resistance required, because the proportion that the actual pressure of the break bears to the resistance, supposing it to be made of such a wood as elm, will be five or six times, so that, if we want to produce a resistance of 12 lbs. a ton, we must press the break upon the wheel with a force amounting to 60 or 70 lbs. a ton.

This is assuming the friction necessary to retard going down the Box-hill?—Yes.

Now give me the same answer with reference to the descent at Euston-square?—That is 1 in 86, I believe. The force down a plane of 1 in 86 would be 17 lbs. per ton, and 5 times 17 are from 85 to 90 lbs.; that would be the pressure necessary to counteract the whole resistance.

What means have you taken to verify the calculations you have made respecting the mechanical power and other matter to be satisfied of their accuracy?—In my calculations I have proceeded by two totally different processes and formularies. In the one case I have considered the resistance that the power has to overcome from one end of the line to the other by the friction; this is 9 lbs. per ton; the total effect of that is a matter of easy calculation. I then consider separately the effect of all the rises and all the falls. In every rise the moving power must lift the whole weight of the train through the number of perpendicular feet in the rise; in every fall less steep than 1 in 250 a quantity of power is got back equal to the number of perpendicular feet in the rise; in every fall more steep than 1 in 250 the quantity of power is got back equal to the number of perpendicular feet which would be found if the fall was only 1 in 250. Having computed these, I then combine them with the result of friction; the latter is 9 lbs. per ton. I add them or subtract them, according as gravity assists or opposes the friction, and the result is the total mechanical power acquired to transfer the load from one end to the other, and I do this in both directions, and add the results, and get the total power both the one way and the other; that is one way of calculating. Then I made the same investigation by another totally distinct method; in this case I took all the slopes from one end of the line to the other. I take the common method of expressing the resistance to the drawing power on each slope expressed in pounds weight per ton; from that resistance and the length of the slope I obtain by a simple arithmetical process the total power required to draw a load from one end to the other of the slope. Having done this for all the slopes from one end to the other of the line, I added the results together, and obtained the total mechanical power in both directions. Now, upon comparing the results of those two methods of calculation, you can see how nearly they coincide.

Do you find them nearly coincide?—From Bath to London there is no difference in the calculations: they agree to the last unit. On the Great Western, and from London to Bath, there is a difference of 5 lbs. in rather less than 2,000,000 lbs.; and on the Basing line, from Bath to London, a difference of 1 lb.

Can you at all account for that slight difference?—Yes; it arises, most probably from a few decimal places being neglected in the one case that were taken in the other.

In the calculation you made, have you or not included the slope of 1 in 86, the Euston-square slope, and 1 in 107 at Box-hill?—I have included the power absolutely expended in working the slopes, but I have not made any allowance for the waste of power which must be incurred in whatever way these slopes are worked. If it is worked by a single rope, I have not included the power necessary to pull the rope back, or to work the rope, but the bare power necessary to draw the load on the slope.

How does it happen that the Great Western line has the effect of an ascent in both directions?—That is a very common consequence of graduation. The line at the one end may be a number of perpendicular feet below the other end, and the graduation may be such that it may have the effect of an up-hill both ways, as is the case on the Great Western; that arises from the two steep inclines. In going down those steep inclines we do not get back the power that is expended in ascending, and they do not give it back for the reason I have already stated; they can only give it back at the rate of 1 in 250. Now the acclivities are both considerably greater than this, and consequently a number of perpendicular feet of fall are lost.

Mr. Talbot.—Allow me to call your attention to this question; you have stated that in the case of the tunnel there would be so much greater power required, and that power requiring a greater proportionate quantity of combustion, that the ill effects would be produced in that proportion?—Yes, on a given quantity of air.

You did not add that. To a question, what would be the proportion of increase in the consumption of fuel, you say, as thirty to nine. "In the same proportion as the increase of power?" "Yes; I may assume that the destruction of vital air and the production of noxious air is in the proportion to the mechanical power exerted?"—Yes.

And only that?—Only that.

Then the consumption of power up the Box tunnel is as thirty to nine?—Yes; there are 30 lbs. of power to 9 lbs. on a level.

What is it the other way?—What do you mean?

Descending?—Nothing at all; there is no power used in descending.

If there be no power at all that way, may I not say that, taking it both ways upon two trips in this tunnel, I have an average of fifteen to nine?—If you put it in that way.

Is that an unfair mode of viewing it?—That depends upon the object you have in view in putting it so. The fact is, you consume no fuel in going one way, and you consume it in the proportion of thirty to nine in the other.

And this tunnel being to be used both ways, it is not fair to consider the quantity of noxious air and the destruction of vital air both ways?—Yes, provided that is the way you state it.

I want to know whether you accede to that?—I stated all the conditions, and my statement alluded to the passage of an engine up the tunnel from one end to the other. The passengers who descend being free from annoyance, is no relief to the passengers ascending.

That sounds very clear and very amusing to my learned friend; but when we are upon the consumption of vital air, practically speaking, and trains working both ways, and passengers going both ways, am I not entitled to consider there is no consumption of vital air one way?—Yes.

Is it ridiculous to suppose that?—No.

Is it not an absolute fact?—Yes, it is.

Then it ought to be as fifteen to nine?—No, certainly not; not so far as regards any effect produced upon passengers.

You mean, when any effect is produced, it is as thirty to nine?—If there happened to be two trains passing at the same time in opposite directions, all the passengers coming down would receive the ill effects as the passengers going up, without any one receiving any benefit from the descent.

Do you mean to state, that with trains going both ways the consumption of vital air in the tunnel is in the proportion of thirty to nine, compared to a level?—No, not with the same number of trains, but I have alluded to a single train during its passage.

And during the ascent?—During the ascent.

Then with respect to those two trains going in different directions at the same time, the consumption of air would in this tunnel, with respect to another tunnel with the same length on a level, be as eighteen to thirty?—Yes.

In favor of the level tunnel?—Yes; but that is a thing never likely to happen.

Are you not, in your calculations of the effect of the noxious air given out, assuming that for a moment there is no draught?—Yes, I am decidedly of that opinion. I do not think that the shafts in the tunnel would be found to produce any good effect for the passing engine, though they will probably ventilate it for the next train; but the passage through will be so quick that no effective ventilation will have time to take place for the passing engine.

Should you like a tunnel a mile long without shafts?—I think that the shafts will not be found to be the best means, and my opinion is, that they must ventilate long tunnels by other means.

Have you any practical experience upon that subject?—No, and no one has any practical experience in tunnels of this great length upon slopes.

Are you sure of that?—I do not know of any; I never saw or heard of them.

A tunnel of a mile long?—Worked by locomotive on a slope; I am not aware of any.

What is the longest tunnel you have known?—I know of no tunnel a mile long worked by locomotives.

Mr. Talbot.—Should you like a tunnel of a mile long without shafts as well as one with shafts?—I have no experience upon the subject.

You are a scientific gentleman of great eminence put into the box to favor us with your opinion; I want your opinion?—My opinion I have stated already, that I apprehend shafts will not produce a material relief for the passing train; they may, and probably will, ventilate for the next train. In the transition of the train through a certain length of the tunnel, there is not time for the ventilation to take effect. If the atmosphere in the tunnel be, as it ge-

nerally will be, still, then the engine, as it draws the train through, will produce a quantity of noxious and annoying air; that air will remain immediately behind it, and the train will instantly be involved in it, and one cannot suppose that there will be time for that air to go up the chimney or shaf between the passage of the engine and the passage of the train of passengers; and my idea is, that they will be obliged to resort to artificial means to carry off the toul air.

Mr. Talbot.—Why should not the train of carriages leave it behind?—So it will, and it involves the train; it is because they do leave it behind that it involves the passengers.

Suppose it rises to the roof in a tunnel thirty feet high, how much will it be above the train of passengers?—I cannot recollect the height of the carriages, twelve or fourteen feet.

The chimney is fifteen?—The carriages are very high; they go up a considerable height of the chimney.

There would be from fifteen to twenty feet between them and the roof of the tunnel?—Yes.

Do you think that this air is to rebound almost perpendicularly upon the train of carriages?—I have no doubt of it, from the velocity with which it comes from the chimney. I may state that there is a jet of high pressure steam turned upwards in the chimney; it is blown out of the engine, and it is presented perpendicularly upwards in the chimney. All the high-pressure steam that works the engine is blown with prodigious violence up the chimney; this carries with it the noxious air, and they are driven against the roof of the tunnel with this force; they do not go up with their natural force of draught, but they are carried up and strike the roof with force of the steam, which is so considerable that they would come down upon the first carriage like a ball rebounding.

I want to ask you to explain one thing, which to me requires explanation. You told their lordships that the acclivity of the slope had nothing to do with the strength of an endless rope, because it balanced itself?—Yes.

I should be glad to know how you explain that?—If you put an endless rope over a pulley actually perpendicular, which is the extreme case and the greatest acclivity, and apply the power to it to put it in motion round the pulley, you will require a certain force to do it; and if you put the same rope upon a level it will require the same force, because the rope balances itself

If there was a pulley at the top of this room, and I put a thread over it in the one case, and a nine-inch rope in the other?—I am speaking of the same rope.

You stated that the acclivity had nothing to do with the strength, from which I infer that the same rope will do; am I wrong?—No, provided it is to draw the same load—not the same load because the acclivity makes a difference in the load, but I am speaking of the rope itself—so far as the rope itself goes it balances itself.

You mean with the same strain?—Yes.

(To be continued.)

Applications of Chemistry to the Useful Arts, being the substance of a Course of Lecture delivered in Columbia College, New-York, by James Renwick, Professor of Natura Experimental Philosophy and Chemistry.

Continued from page 155.

II.

NITRE.

History.—The nitrates of potassa, lime, and magnesia, are found in the soil in various places, and are probably frequently formed spontaneously. It is only, however, in warm climates that they are generated in the open ground in sufficient quantities to make them profitable objects of extraction. In colder climates, these salts occasionally form, in quantities worth collecting, in caverns, in cellars, and in damp buildings of masonry. The nitric acid which unites with earthy and alkaline bases to form these three salts, is formed by the absorption of its two elements, (oxygen and nitrogen,) from the atmosphere. This being suspected in France, a successful attempt was made to form artificial nitre beds, and thus a supply of this essential munition of war was obtained, when all access to the countries whence nitre had been previously obtained was prevented by the British fleets.

Rationale.—The theory of the formation of nitric acid from its elements, as they exist in the atmosphere, is not fully understood. The union does unquestionably take place by the passage of electricity; and the rain which accompanies lightning often exhibits traces of the acid; but the quantity thus produced is not sufficient to explain the large quantities of the nitrates which are found in some situations. We can only, therefore, state the circumstances which experience has shown to be necessary in order to the production of these nitrates. These are—

1. The presence in the soil of powerful alkaline or earthy bases, such as lime, magnesia, and potassa.

2. A certain degree of moisture, such as that in friable vegetable mould, after a gentle rain.

3. An elevated temperature in the air, as at the freezing point, the nitrates are not produced, and the process is not active below 70° of Fahrenheit.

4. The access of solar light, which seems to be absolutely necessary, although if it be so intense as to dry the soil, the action ceases altogether.

5. In temperate climates, animal matter disseminated through the soil must be present; and this is so essential, that, when artificial nitre beds were first formed, it was supposed that the nitric acid was altogether derived from the organic matter. But the quantity of the nitrates which are formed, is far greater than can be accounted for in this manner. It is therefore analagous to the case of ferments, where by the addition of a substance capable of entering into fermentation, that action may be induced in a great quantity of other fermentable matter, which might otherwise have remained unaltered.

Native Nitre Beds.—The salts contained in the nitric soils of Bengal, Ceylon and Egypt are, nitrate of potassa, (nitre,) nitrates of lime and magnesia, sulphates of lime and magnesia, and common salt. In Ceylon the soil is mixed with wood ashes, and lixiviated. The water in its passage dissolves not only the saline matter contained in the soil, but the potash of the wood ashes, and by it the earthy nitrates are decomposed and nitrate of potassa results. In Bengal the advantage of the use of alkaline matter does not seem to be understood, and the earthy nitrates are lost.

The leys obtained from the earth by passing water through it, until it flows off tasteless, are in these warm climates partly evaporated by exposure to the sun and air, and partly by boiling until the liquid is saturated. It is then poured into vessels where on its cooling the nitre crystalizes. The mother water contains the earthy nitrates, (if not decomposed,) with part of the sulphates and of the common salt. But the crystalized nitre is by no means pure, containing a portion of the last named salts, as well as organic matter, which are usually, taken together, as much as 25 per cent.

ARTIFICIAL NITRE BEDS.

AUTHORITY—DUMAS. Chimie appliquee aux Arts.

These have been formed in calcareous soils impregnated with animal matter, as beneath butchers' shambles, and in ancient burial grounds. But this method has gone out of use, with the necessities which gave it birth. The only operation necessary was to stir the earth frequently, so as to expose fresh surfaces to the air, and at the end of a few months, a sufficient quantity of nitrate of lime was formed to render the earth fit to lixiviate. To the liquor, containing the nitrate of lime, common potash was added, in sufficient quantity to insure the decomposition of this earthy salt. The nitrate of potassa thus formed, was obtained by concentrating the liquor by boiling, and crystalizing. It was in this manufacture, that the large quantities of potash exported from this country to the continent of Europe were principally used; and the consequent high price of this article had a most important influence upon the clearing of our forests, and bringing them into cultivation.

In Sweden, the nitrate of lime is procured, by placing in a small wooden hut, upon a floor of wood or well rammed clay, a mixture of common earth, marl, and ashes, to the depth of two or three feet. This is thoroughly moistened with the urine of cattle, and stirred up once a week.

At Longpont, in France, a nitre bed is formed in an ancient quarry in calcareous rock; in the bottom of this a bed of three or four feet in thickness is formed of alternate layers of earth and stable manure, and the washings of a stable are directed to it. At the end of two years the mass is moved into the light, and is frequently stirred for two years more, when it is fit for lixiviation.

In some places the earth is prepared for

the purpose by fencing sheep upon it. Their manure is removed every four months, and replaced by a layer of fresh earth. At the end of a year the sheep are taken off, and the earth is stirred, at intervals of two months, for two years more, taking care to keep it moist with the drainings of stables.

In Prussia, calcareous earth charged with animal matter, is formed into walls, by which the operation is rendered more rapid.

Upon the whole, these methods cannot be recommended as profitable objects of industry, but only as means which may be resorted to in cases of absolute necessity.

PURIFICATION OF NITRE.

AUTHORITY—DUMAS. *Chimie appliquee aux Arts.*

Crude nitre, or saltpetre, as it is imported from the East, contains about 25 per cent. of impurities. These are partly saline, and partly organic, the latter derived from the animal and vegetable matter which exists in the soil. In this state it is unfit for its most important uses in the arts, and therefore requires to be refined.

To refine the crude saltpetre, two successive solutions and crystalizations are usually performed. In the course of these, the organic matter is separated in consequence of its insolubility, and the greater part of the foreign salts are removed, by taking advantage of their relative degrees of solubility and manners of crystalization.

The first solution is performed by putting water into a copper boiler in the proportion of one-fifth of the weight of the saltpetre. To this the saltpetre is gradually added as the liquid is heated, and at the boiling temperature the whole of the nitre is dissolved. The insoluble matter rises to the top of this dense solution, and may be skimmed off. In order to facilitate the formation of the scum, a small quantity of glue, dissolved in water, is added to the solution; this will carry with it, to the surface, all the matter suspended in the liquid. Cold water is also thrown upon the surface of the liquid, from time to time, in order to check the ebullition and permit the formation of the scum. After the last skimming, when no more solid matter appears at the surface, the liquid is made to boil violently for a short time, after which the fire is permitted to expire gradually. The liquor ceasing to boil, the saline matters which are not soluble in the quantity of water which is present, sink to the bottom of the vessel, where they are left by the decantation of the solution, while still hot. The solution is received in copper basins, which are covered with wooden lids, in order to render the cooling more gradual; in these basins all that portion of the nitre, which is more soluble in boiling than in cold water, will finally crystalize in the form of the basin.

The *loaf* thus formed is permitted to drain, by placing it on wooden shelves pierced with holes. The mother waters which run off, are still rich in nitre, and are preserved, as well as the scum of which we have spoken.

As these *loaves* have been formed by crystalization in water holding other salts in solution, the nitre, although much improved in quality, is still far from pure. It is therefore dissolved a second time in one-third of its weight of boiling water. The solution is treated with glue and skimmed as in the former case, and permitted to crystalize in copper basins. The loaves thus formed, are set aside to drain upon an inclined plane of wood, in which gutters are formed of sheet lead. These gutters convey the drainings to a common receptacle. The place in which the inclined plane is formed, must be sheltered from the weather, but have a free access of air. Several months will elapse before the loaves are thoroughly dried.

The scum is washed with caution, in order to separate the nitre which may have adhered to it, and the washings, with the drainings of the loaves, are concentrated by boiling until the solution is saturated, when they are permitted to crystalize. The washings of the scum of the second boiling give, on their first crystalization, nitre of excellent quality; they are therefore heated by themselves. The drainings and washings of the first boiling are usually returned to the boiler during the first operation. If earthy nitrates be present they are converted into nitre, and their bases precipitated, by adding sub-carbonate of potassa, (common potash,) as long as effervescence continues, to the drainings of the loaves.

An improved process has recently been introduced, in which nitre mav be refined by a single solution and crystanzauon To the water in the boiler, twice its weign. of crude nitre is added, while cold; this quantity is increased as the liquid heats, until it amounts to five times the weight of the water. After the boiling has commenced, it is checked from time to time by the addition of cold water, in order that the insoluble matters may fall to the bottom, whence they are scraped out. The liquid is treated with glue, as before, and finally, by the addition of cold water, the quantiy of that liquid is increased to one-third of the weight of the saltpetre. When this liquid, by repeated skimmings, has become perfectly clear, the fire is permitted to expire, until no more is left than will prevent the liquid from cooling below 190° Fahr.

After the interval of a night, this liquid is removed by means of copper ladles, taking care not to disturb the sediment, which with the turbid portion of the liquor is left behind. The liquid is emptied from the ladles into a vessel of the form represented in plate 3.

PLATE III.

Fig. 1.

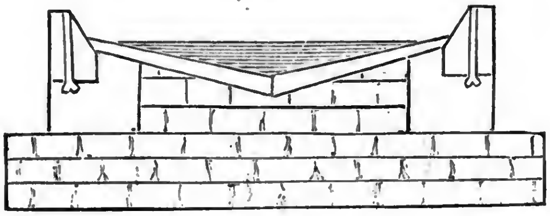


Fig. 2.

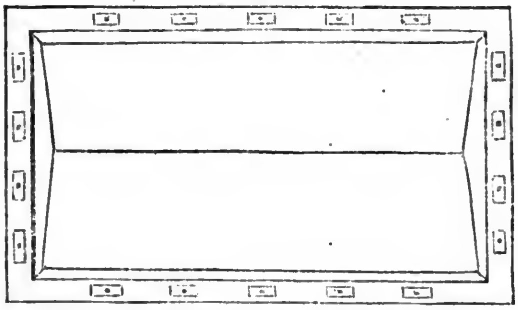


Fig. 1, section of vessel for crystalizing nitre.

Fig. 2, plan of do.

In these vessels the liquid is permitted to cool. As it cools, nitre is deposited in slender crystals, which are removed by rakes as they form, and heaped upon the inclined edges of the vessel, in which position the adhering liquid rapidly drains off. As soon as by draining, the nitre has lost its transparency, and become white, it is removed by means of copper shovels to a wooden bin. This has the figure of a truncated pyramid, with a false bottom, piercedwith holes. Beneath the false bottom a hole is bored in one of the sides of the bin, to which a spiggot is adapted, as represented in plate 4.

Fig. 1, plan of a bin for purifying nitre by washing.

Fig. 2, transverse section of do.

Fig. 3, longitudinal section.

bb, false bottom pierced with holes.

s, spiggot.

In these bins the nitre is heaped up, until the middle of the heap is about six inches higher than the edges of the bin. It is then washed alternately with a saturated solution of pure nitre, and with pure water. After the liquor of each successive washing has remained for about three hours in contact with the nitre, the hole near the bottom of the bin is opened by withdrawing the spiggot, and the liquor is allowed to drain off. The washing is completed when the liquid, tested by the hydrometer, has the exact density of a saturated solution of pure nitre at the temperature of the experiment. In operating upon 3000 pounds avoirdupoise

PLATE IV.

Fig. 1.

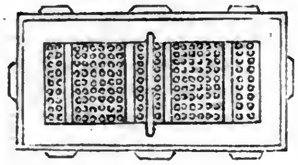


Fig. 2.

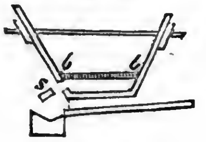
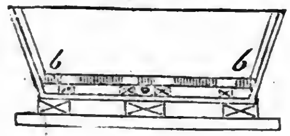


Fig. 3.



of crude saltpetre, 360 pints* of water are usually employed, in three successive washings. The first is composed of 150 pints of water, saturated with pure nitre; the second of 150 pints of pure water; and the third of 60 pints of water, saturated with nitre. The nitre having remained five or six days in the bins, is removed to a stove, in which it is dried. This stove is usually heated by the waste flame and smoke of the boiler, in which the solution of another parcel of nitre is going on. During the drying, the nitre must be frequently stirred, in order to prevent it from sticking to the sides and bottom of the stove. It is thus brought to the form of a white powder. Three thousand pounds of crude saltpetre, treated in this way, give 1750 to 1800 pounds of nitre of great purity.

The mother water of the boiling, and the liquid which drains from the first washing, are impure; the liquor of the third washing, and the latter part of the second, are sufficiently pure to be employed in the subsequent washings. The impure liquors are concentrated by boiling, treated with glue, and finally with carbonate of potassa, in order to decompose the earthy nitrates. Being then permitted to crystalize, and washed as before, they yield nitre of great purity.

MANUFACTURE OF GUNPOWDER.

AUTHORITY—DUMAS. Chimie appliquee aux Arts.

Rationale.—The nitrate of potassa, (nitre,) when rapidly heated is decomposed, giving out oxygen, nitrogen, nitrous acid, and nitric oxide, in their gaseous form. This decomposition is rendered more rapid by the presence of combustible bodies, and particularly of carbon in any of its more usual forms, which causes the gases to be evolved in such quantities as to produce detonation. By its action also, the oxygen is converted into carbonic oxide and carbonic acid. In order that the detonation may be certainly and readily produced, the carbon and nitre should be mixed with a substance which has the properties of taking fire at a low temperature, and of producing an elevated temperature by its combustion. Sulphur has these properties, and in addition, it appears that when it is heated in contact with carbon and nitre, a sulphuret of potassium is formed, which is even more inflammable than sulphur itself.

In order that the sulphur shall begin to burn, it is necessary that it be in contact with air, but the combustion may be kept up afterwards by the oxygen furnished by the decomposition of the nitre. As the sulphur is thus converted into sulphurous acid, and the heat generated is sufficient to render potassa volatile, the whole product of a mixture in proper proportions, may be gaseous, and this is the rationale of the common test of the quality of gunpowder, namely, to flash it from a shallow cup of brass placed upon a sheet of white paper, to which, if pure and in due proportion, it will communicate no stain.

Manufacture.—Gunpowder is made up of the three substances of which we have spoken: nitre, carbon in the form of charcoal, and sulphur.

In order to make good gunpowder, these articles must be of the best quality.

The nitre must be refined by either of the processes which have been described; of these the last yields it in the most convenient form.

Instead of the ordinary mode of purifying sulphur, a method invented by Michel, of Marseilles, is to be preferreed. In this,* crude sulphur is sublimed from a large iron kettle, which acts as a retort, capable of holding 15 or 1600 lbs. of sulphur, and which is charged with 1000 to 1250 lbs.—The upper part and neck of the retort are supplied by a dome and flue built of brick. The flue terminates in a brick chamber, which serves as a receiver. If flowers of sulphur are required, the chamber is large; but when masses in the form of cylinders (roll brimstone,) are needed, it is of smaller size. The first sulphur which passes over will burn in the oxygen of the air contained in the chamber. The chamber must therefore be furnished with valves, in order to let off the fumes, but which will prevent the entrance of atmospheric air. When the oxygen is exhausted, the sulphur will begin to form crystals (flowers of sulphur), on the walls and ceiling of the chamber, by which they will be heated until the vapor of the sulphur will condense in a liquid form on the floor. Hence it is withdrawn from time to time into proper moulds.

The charcoal must be made of soft wood, (willow, poplar, or alder,) and in some countries it is prepared for this purpose from the hemp plant. Soft wood is better than hard, inasmuch as the charcoal prepared from it is less charged with earthy and alkaline matter, and less liable to be inflamed by friction. The best mode of preparing the charcoal is by the distillation of the wood in iron cylinders, as we shall have occasion to describe under the proper head. The wood should not be of more than 5 or 6 years' growth, and should be stripped of its bark; for old wood contains more earthy and alkaline matter than young, and the bark more than the body of the tree. It ought to be cut when full of sap.

Long experience has brought the proportions of the three substances which enter into the composition of gunpowder, to that relation which the most accurate experiments, and the most severe consideration of the theory of their action, would have pointed out. Three principal descriptions of gunpowder are manufactured in the following proportions, although there is some variety among manufacturers in this respect.

Government Powder.

	For ordnance.	For mines	Powder for fowling pieces.
Nitre,	75	65	78
Sulphur,	12½	20	10
Charcoal,	12½	15	12

The first of these proportions insures the most rapid combustion of the gunpowder, and under favorable circumstances a complete decomposition of the nitre. The second burns with less heat, but produces more gas. In the first, if the combustion be complete, no excess of sulphur remains to act upon the metal of the fire arms, but as the powder may be damp, the third composition, although it produces less gas than either of the others, and less heat, is preferred in some cases; for, in consequence of the excess of oxygen produced by the nitre, there is less danger of the pieces becoming foul. The second composition, on the other hand, would speedily render small arms unfit for service.

In the preparation of gunpowder the charcoal and sulphur are first mixed together, by grinding them to powder. The nitre is then added, and the grinding continued until they are thoroughly incorporated in the form of a fine *meal.* The grinding was originally performed in wooden mortars, by means of wooden pestles; the latter are lifted by a water wheel, or other power, and fall by their own weight. They were originally of the form of a cylinder, but are now usually made of the shape of a pear. In some establishments the grinding is performed in cylinders, or drums, revolving around a horizontal axis. Within these are placed balls of an alloy of copper when the charcoal and sulphur are ground, and of tin when the three ingredients are to be incorporated.—In both methods the mixture is kept in a moist state, in order that it may be less inflammable.

Gunpowder in the form of meal burns slowly in consequence of there being but little air in contact with the sulphur, except at the surface of the mass. In order to give air access to the interior of a parcel, the gunpowder is formed into grains. The size of these grains varies according to the use, being largest for the charging of cannon, and smallest for small arms. In order to form meal gunpowder into grains, it is, while still moist, forced through seives, the meshes of which have a size adapted to that of the desired grains. The seives are made of leather, pierced with holes by a machine constructed for the purpose. The dust which forms is next sifted off, and returned to the moistened heap. For the military and na-

* Standard liquid measure of the State of New-York, which is to be always understood unless otherwise expressed.

* See DUMAS. Article Soufre.

val service it only remains to dry the grains. This may be done, either by exposure to the sun and air, or in a chamber heated by a stove. The granulation was formerly wholly performed by hand, but of late machinery has been invented for the purpose.

For fowling pieces it is usual to *glaze* the gunpowder. This is done by placing dry granulated powder in a barrel, revolving on a horizontal axis, and the polish of the surface is produced by the mutual friction of the grains.

Grains of a spherical figure are now manufactured. This form is preferred in service, and can be obtained at less expense, as the granulation is effected by a simpler machinery.

The machine for making round grains is a drum or hollow cylinder, about a yard in diameter, and from 12 to 16 inches in thickness. This is affixed to a horizontal axle, around which a tube is adjusted that communicates with a reservoir of water. The tube being pierced with small holes, the head of water causes that liquid to issue from them in a shower of drops. Dry meal gunpowder is introduced into this drum, and during the revolution always tends to occupy its lower part. Upon this the drops fall, and roll; each of them thus becomes the nucleus of a spherical mass, whose size will depend upon the time that the revolution is kept up. The globules are sorted, by passing them through seives, and dried. By cutting off the supply of water, the same apparatus will glaze the grains.

3. BORAX.

Borax is a combination of boracic acid with soda, in which the alkaline matter is in such excess that it retains an alkaline reaction. This salt is found native in many parts of the globe, but is principally procured from a lake in Thibet. In its raw state it is mixed with an oleaginous matter, probably of vegetable origin, and with other salts of the same acid.

In order to purify it, it is reduced to powder, thrown upon a filtering cloth, and washed with a weak solution of soda, until the liquor passes off free from color. In this process, the soda forms a soap with the oleaginous matter, which is readily dissolved.

It is next dissolved in boiling water, in such quantity that the solution may have a density of 1.17.* Twelve parts of sub-carbonate of soda for each 100 pts. of the borax are added to the solution, in order to decompose the other salts; and the liquor is filtered, in order to separate the precipitates. The liquor is again boiled, and then emptied into vessels of a conical or pyramidal form, in order that it may crystalize. These vessels are lined with sheet lead. In order to obtain the borax in separate terminated crystals, the rate of cooling in these vessels must be extremely slow.

Besides the lakes which furnish this sub-borate of soda, there are in Tuscany springs which yield boracic acid. These have recently been applied as sources of borax. At these springs, the boracic acid is now prepared by evaporation, in its crystaline form. In order to obtain borax, 600 lbs. of carbonate of soda are dissolved in 500 pints of boiling water, and 500 lbs. of crystalized boracic acid are gradually added to the solution. As the decomposition of the carbonate is attended with violent effervescence, the vessel must be at least twice as large as is necessary to contain the liquid. The solution being saturated by boiling, is crystalized as rapidly as possible, by cooling. The crystals are again dissolved in boiling water, to which 10 pts. of carbonate of soda are added, in order to decompose the earthy borates, arising from the impurities of the soda of commerce. It is then crystalized in the mode above described.

* 20° of Beaume.

4. ALUM.

History.—Alum is a double salt, composed of sulphuric acid, soda, and an alkali. It is a native product in the vicinity of volcanoes, whence it is sometimes extracted for use. It was first imported into Europe from Rocca (Edessa) in Syria, whence the name of Rock-alum frequently given to its crystals. A Genoese of the name of De Castro having noticed the mineral whence the Syrian alum is obtained, discovered the same substance in Italy, and introduced a similar manufacture at Tolfa. After the chemical nature of alum was discovered, it was found that a sulphate of alumina was often formed spontaneously, by the decomposition of iron pyrites in argillaceous rock, and that a similar decomposition might be produced, by roasting clay-slates rich in sulphuret of iron. These were therefore next employed in the manufacture of alum. Finally, since the great improvement in the manufacture of sulphuric acid, the acid and the earthy base have been combined directly.

MANUFACTURE OF ALUM FROM THE NATIVE ALUM OF TOLFA.

AUTHORITY.—DUMAS. Chimie appliquee aux Arts.

This mineral contains the proper proportions of the sulphates of alumina and potassa, united to a definite proportion of hydrate of alumina. The separation of the salts from the earthy matter cannot be effected until the water is separated from the hydrate. For this purpose the mineral is broken into fragments and calcined in a furnace, regulating the heat in such manner that the sulphates shall not be decomposed. The calcination being finished, the roasted mineral is placed on a level earthen floor, in layers, each of which is sprinkled with water. The mass gradually assumes the form of a paste, and is ready to be lixiviated at the end of a couple of months. The lixiviation gives a (cold) saturated solution of alum, mixed with a turbid sediment. The liquor is evaporated by boiling in leaden vessels, until ready to crystalize, and is then permitted to cool. The crystals which are deposited first are octoedral; the next are cubo-octoedral; and the last cubic. The cubic form is now known to be owing to an excess of alumina.

MANUFACTURE OF ALUM FROM PYRITICAL SLATES AND SCHISTS.

AUTHORITY.—DUMAS. Chimie appliquee aux Arts.

The decomposition of iron pyrites spontaneously, or by the aid of heat, yields the sulphates of the protoxide and black oxide of iron. If, however, alumina be present and the decomposition be complete, the whole of the sulphuric acid will combine with the earth and leave peroxide of iron free. This condition is fulfilled in argillaceous slates and schists containing pyrites. In some of them, the pyrites is subject to spontaneous decomposition; these only require to be exposed for about a year to the air. In other cases the decomposition may be effected by pouring water on the slate. When the pyrites does not decompose spontaneously, the mineral is roasted in heaps. In some cases schists are so rich in bitumen, that no more fuel need be applied, than is necessary to inflame the bitumen. In other cases, the heap is formed on a floor of wood, with layers of faggots between those of the mineral, or built into strata with coal.

The combustion of the heap being completed, the roasted mineral is lixiviated, or sometimes washed by directing a running stream against the heap.

Where wood is employed as the fuel, its ashes yield potasa, and when the wood is burned with coal, ammonia is produced. In either case, a portion of the sulphate of alumina will be converted into alum.

The liquor produced by lixiviation is concentrated by boiling, to a density of 1.333.* It is then permitted to rest for five or six hours, in order that the insoluble salts, and particularly those of the peroxide of iron, may settle. Being next placed in crystalizing vessels, the greater part of the alum which has been formed by the ashes of the fuel, is deposited in a crystaline form. The liquor is then repeatedly concentrated by boiling, and allowed to cool; at each successive stage of which, crystals of the sulphate of the protoxide of iron are left. Finally, the liquor becomes thick and viscid, from the presence of the deliquescent sulphate of alumina. This liquid, by the addition of sulphate of potassa, or sulphate of alumina, or of both, is converted into alum, which is precipitated in the form of powder. In order to give it the crystaline character, the powder must be dissolved in boiling water, and permitted to cool.

The persons who work aluminous slates and shales usually sell the sulphate of alumina to others, whose specific business is the manufacture of alum. In this case, the viscid liquor is evaporated to dryness, and the purchaser re-dissolves it. The dry sulphate of alumina has the consistence of grease or tallow.

MANUFACTURE OF ALUM BY THE DIRECT UNION OF ITS COMPONENTS.

AUTHORITY.—DUMAS. Chimic appliquee aux Arts.

The clays (silicates of alumina) which are best fitted for this process, are such as are as free as possible from carbonate of lime and the oxides of iron. Such clay is roasted in a furnace, until it becomes capable of being readily pulverized. By this calcination, the principal part of the water is driven off, any iron which may be present oxidated to the highest degree, and the action of the sulphuric acid on the alumina facilitated.

The clay is next pulverized with care, and passed through bolting cloths, in order to

* 36° of Beaume.

exclude the coarser parts. This fine powder is then formed into a paste with dilute sulphuric acid; and as the two manufactures are usually combined, the liquid which comes from the leaden chambers* is used without concentration. Forty-five parts ot this are mixed with 100 parts of clay. The mixture is placed in a stone basin covered by a vault, and heated by the smoke of the furnace in which another parcel of clay is undergoing the process of roasting, or by other waste heat. It remains in this basin several days, during which it is frequently stirred, and is then laid aside in a warm place, for more than a month. The mass is then repeatedly washed with water, which separates the sulphate of alumina which may have been formed. The liquor is concentrated to 1.17*, permitted to settle and decanted. The clear liquor is further concentrated to 1.21†, if the alum is to be formed by sulphate of ammonia, or to 1.35‡, if sulphate of potassa is to be employed. The subsequent concentration and crystalization are conducted as in the former cases.

The alum of commerce is rarely free from sulphate of iron. This renders it unfit for some of the arts, and particularly for dyeing silk. Alum in a sufficient state of purity for this purpose may be obtained by dissolving the alum of commerce in boiling water, in such quantity that the density of the solution may not exceed 1.26§. The solution, on cooling, deposits small crystals, which are free from the metallic sulphate. The mother water, on concentration and cyrstalization, yields common alum.

Alum is sometimes transformed into an acetate of alumina, which is better adapted to some purposes in the art of dyeing. This process may be conveniently included under this head.

PREPARATION OF ACETATE OF ALUMINA FROM ALUM.

AUTHORITY.—VITALIS. Cours de Teinture.

Three parts of purified alum, and one of acetate of lead, are dissolved in eight parts of boiling water. The solution being completed, 1-8th of a part of potash, and as much chalk, are added. The mixture is stirred at intervals, for a few hours. It is then permitted to rest, and when the precipitate has settled, the liquor is decanted. The solution still contains the alkaline sulphate which formed a part of the alum, but this does not impair its qualities. As the acetate of alumina does not crystalize, the solution is preserved in its liquid state for use.

5. SUPER-TARTRATE OF POTASSA—(CREAM OF TARTAR.)

AUTHORITY.—VITALIS. Cours de Teinture.

The *tartar* which collects on wine casks is this super-tartrate mixed with the coloring matter of the grape, and with tartrate of lime. In order to purify it, the crude tartar is reduced to powder, and dissolved in boiling water. The solution is decanted into vessels where the salt crystalizes on cooling, in a state almost colorless. To separate the residue of the coloring matter, it is again dissolved in boiling water, to which four or five per cent. of clay is added. The liquid is boiled until a thick pellicle of the salt has formed at its surface. During the boiling, the coloring matter will have combined with the alumina of the clay, and on crystalization, a colorless substance is obtained.

* See "Manufacture of Sulphuric Acid." SUPRA.
*20° of Beaume. †25° of Beaume. ‡40° of Beaume. § 30° of Beaume.

The five salts whose preparation has been described above, are the most important of those with alkaline and earthy bases which are prepared on a large scale for use in the arts. In the sequel, we shall have occasion to treat of some of their most important applications. The preparation of the metallic salts can be more appropriately considered under the head of the metals.

AGRICULTURE, &c.

A DISSERTATION ON THE MULE,

With the view of promoting an improvement in the breed; and of demonstrating the utility of employing him as a substitute for the horse, in the labors of husbandry, canals, &c. BY SAMUEL WYLLYS POMEROY.

"—OPINION is the queen of the world; it gives motion to the springs and direction to the wheels of power."—JOHN QUINCY ADAMS.

"Knowledge is power."—BACON.

(Concluded from our last.)

"As to my opinion of the value of mules, I shall always appear extravagant. I have scarce a horse on my estates for agricultural purposes, nor would I except of one as a gift, (except for road wagons,) of which I have no need, as my property lies upon navigable water. Nothing ever was so good as mules for the uses of this, our southern country; they live longer, eat less, and above all, are better suited to our slaves, than any other animal could possibly be: their strength, patient endurance of privation and hardships, slender pasturage, exposure—and in short, all those ills to which animals are subject where slaves are their masters, give to mules a decided preference in all the agricultural states of the south.

"I do not know of any being trained to the purposes of pleasure carriages. They are often ridden, and go pleasantly, with great surety of foot. I have no doubt, but that in time they will generally be used for carriages, and would particularly suit mail coaches; they are very swift, and have great durability in travelling."

The *Knight of Malta*, mentioned by Mr. Custis, was unquestionably the first Maltese Jack ever brought to the United States. The second came in the frigate Constitution, on her return, I think, from her first cruise in the Mediterranean; and, I have understood, was sold in the District of Columbia, or one of the adjoining states. Since that time a number have been introduced by officers of the *navy* from *Malta*, and the large *Spanish breed* from *Minorca* and *Majorca*. From the Mount Vernon and those stocks, some fine mules have been bred in the middle states, and probably farther south. A few valuable *Maltese* Jacks have been imported in merchant ships.

The impressions received, when on a visit to the West Indies in my youth, by observing, on the sugar plantations, the severe labour performed by mules in *cane* mills, induced me, when I commenced farming, to purchase the first well broke mule I could light on; and notwithstanding he was so small as to require a vehicle and harness constructed purposely for him, his services were found so valuable, and the economy of using those animals so evident, that I was stimulated to great exertions for procuring several others of larger size; in this I succeeded, after great difficulty, to such an extent, as to have had more labour performed by them on *farm* and *road*, for thirty years past, than any person I presume, in New England; and every day's experience has served to fortify my conviction of the superior utility of the mule over the horse, for all the purposes for which I have proposed him as a candidate. And it should be considered, that those I have used were of an ordinary breed, vastly inferior to such as may be easily produced in our country, by attention to the introduction of a suitable race of *Jacks*, and a proper system of breeding and management. The question occurs how is this to be effected? I will premise, that there exists a strong analogy between three varieties of the horse, and those of the domestic ass, considered the most valuable. We have the *Arabian*, the *hunter*, and the stout *cart-horse*. There is the heavy *Spanish Jack*, with long slouching ears, which Mr. Custis has described, that answers to the cart-horse; another Spanish breed called the *Andalusian*, with ears shorter and erect, of tolerable size, plenty of bone, active, more spirited, and answering to the hunter. Then comes the *Arabian Jack*, with ears always erect, of a delicate form, fine limbs, and full of fire and spirit. Judicious crosses from these varieties, will be requisite to produce such kind of mules as may be wanted for general purposes. From the small Jack of *African* origin, with a *list* down his back and shoulders, are bred a small race of mules, by far the most hardy of any. With attention to selection in breeding the Jacks, with, perhaps, a *dash* of some cross of the foregoing description, a stock of mules may be produced, preferable to all others, for the light lands and cotton culture of the middle and southern states.

To procure any number of *Arabian* Jacks from their native country, is hardly practicable at the present time. *Egypt* has been celebrated by Sonnini and other travellers, for superb Jacks of the Arabian breed, which probably has been often improved by those introduced by the Pilgrims from Mecca. I apprehend no great difficulty in obtaining them from that country. There is, however, no question but the *Maltese* Jacks are of the *Arabian* race, more or less degenerated. The most of those brought to this country, that I have seen, were selected on account of their *size*, and had been used to the draught. I should recommend the selection of those that are esteemed most suitable for the *saddle*, as likely to possess greater *purity of blood*. A Jack of this kind was, a number of years since, imported from Gibraltar, that had been selected by a British officer at Malta; and very much resembled the *Knight of Malta* described by Mr. Custis. I found, upon a careful examination, that he differed but little from the description I had heard and read of the true *Arabian* race; indeed I could discover some prominent points and marks, those found by Professor Pallas, to belong to the *Hemionus*, or wild mule of Mongalia. From this Jack I have bred a stock out of a large *Spanish Jennet* of the *Andalusian* breed, that correspond very minutely with Mr. Custis's description of *Compound*, bred by General Washington, and also a *mule* that now, not three years old, stands fifteen hands, and has other points of great promise.

Such have been the ravages of war and anarchy in Spain for a long time past, that

the fine race of *Jacks* that country once possessed have become almost extinct. In Majorca and probably, some part of the coast of Spain opposite, the large breed may be obtained: and there formerly was a superior race in *Andalusia*, which, it is hoped, have been preserved. Crosses on one of these breeds, by the *Arabian* or *Maltese*, I consider indispensable to furnish a race of Jacks for the production of the most desirable mules, uniting the weight and bone of one, with the spirit and vigor of the other; although their height will in a great measure depend on the mares, yet if sired by full blooded Maltese Jacks, their limbs are too slender and their pasterns too long for heavy draught; but for the *saddle*, especially from blood mares, they are admirable, and out of stout mares suitable for light carriages.

My attention has been but lately directed to breeding mules; and those intended only for my own use. The system adopted is to halter them at four months, and have the mules emasculated before six months old; which has great influence on their future conduct, and is attended with much less hazard and trouble than if delayed until they are one or two years old, as in the general practice. If they are treated *gently* and fed occasionally out of the hand, with *corn, potatoes*, &c., they soon become attached; and when they find that "every man's hand is not against them," will have no propensity to direct their heels against them, and soon forget they have the power. In winter they should be tied up in separate stalls, and often rubbed down. By such treatment there is not more danger of having a vicious mule than a vicious horse—and I am decidedly of opinion, that a high spirited mule, so managed and well broke, will not jeopardize the lives or limbs of men, women, or children by any means so much as a high spirited horse, however well he may have been trained.

The longevity of the mule has become so proverbial, that a purchaser seldom inquires his age. *Pliny* gives an account of one, from Grecian history, that was *eighty years old*; and, though past labor, followed others that were carrying materials to build the temple of *Minerva* at Athens, and seemed to wish to assist them; which so pleased the people, that they ordered he should have *free egress* to the grain market. Dr. Rees mentions *two* that were *seventy years old* in England. I saw myself in the West Indies, a mule perform his task in a *cane mill*, that his owner assured me was forty years old. I now own a *mare* mule, *twenty five years old*, that I have had in constant work twenty-one years, and can discover no diminution in her powers; she has within a year past often taken upwards of a ton weight in a wagon to Boston, a distance of more than five miles. A gentleman in my neighborhood has owned a very large mule about fourteen years that cannot be less than twenty-eight years old. He informed me a few days since, that he could not perceive the least failure in him, and would not exchange him for any farm-horse in the country. And I am just informed, from a source entitled to perfect confidence, that a highly respectable gentleman and eminent agriculturist, near *Centreville*, on the Eastern shore of *Maryland*, owns a mule that is *thirty five years old*, as capable of labor as at any former period.

The great Roman naturalist, in one of the most beautiful passages of his elaborate history of nature, observes that "*the earth is constantly teazed, more to furnish the luxuries of man than his necessities.*"* We can have no doubt but that the remark applied with great justice to the habits of the Romans in the time of Pliny; and I am much mistaken if ample proofs cannot be adduced that it will lose none of its force or *truth*, at this present period, in all northern climates, or any section of the United States, where the horse is employed for *agriculture* as well as for pleasure. Far be it from me, however, to disparage this noble animal, on the contrary, I feel a strong attachment for him; and at the same time a full conviction, that the substitution of the *mule* for the purposes before stated, as extensively as may be consistent with the requisite production of each species will have the effect of restoring the horse to the station from which he has been degraded, and place him, as in former ages, upon a more dignified footing—an object of *acknowledged* luxury; and thereby introduce a more correct system of breeding and management, in which our countrymen are so generally deficient, consequently more perfect animals, and such an advance in the price of them, that will afford the farmer what he is now a stranger to: such remuneration as will make his *brood mares* a profitable species of stock. And it is obvious, that the system will be followed by an improvement in the breed of *mules*, in the same ratio as the miserable race of *scrub* mares, which are now consuming the profits of agriculture, shall become extinct.

It does not appear that the horse was employed by the *ancients* for any purpose of husbandry. The *ox* and *ass* drew the *plough* and the *wain*, and performed all kinds of drudgery until after the *feudal system* was established in Europe; when the numerous *retainers* of the *feudal lords*, who held their lands by the TENURE of performing *knight's service*, found themselves under the necessity of making the horses they were obliged to keep, contribute towards their support in the cultivation. From this time, I believe, we may date, and to this cause may be attributed the introduction of the *horse* for the purposes of agriculture. Since that period, the history of Europe is little else than the annals of *war* and its preparations; and no material for that *scourge*, except the deluded *human victims* seems more necessary than the horse; accordingly we find, that throughout the whole country, from the *Rhine* or the *Seine*, to beyond the *Danube* and *Vistula*, which has been the principal *arena*, the system of agriculture has embraced, extensively, the breeding of horses of different grades and forms adapted to the several uses in war. Indeed whole provinces were appropriated almost exclusively to the rearing those animals for disposal to the different combatants; and it must be obvious that their general use in husbandry, at the same time, would follow as a necessary consequence. It cannot be expected, therefore, but that the *Dutch* and *Germans* who have emigrated to our country, should bring with them such strong predilections for the horse, which have continued with most of their descendants, especially in those sections where communities of that respectable and industrious portion of our population have been located.—In *Great Britain*, to the causes which have produced the effects described on the continent, may be added the insular position of the United Kingdoms, vulnerable from numberless and distant points, the horse has been considered, in connection with the unconquerable spirit of the nation, as one of the most efficient means of repelling invasion. A circumstance that would of itself be sufficient to account for the *overweaning* attachment to this animal. But identified, as his services have been for a long period, with the convenience, sports, and recreations of all ranks and classes, and the science of *breeding* and *training*, forming a characteristic feature, it could not excite surprise, if the approach of that terrible spectre, *famine*, should produce little or no effect in the reduction of the number. And, although some of the most distinguished characters in the nation, eminent for their practical knowledge in rural economy, have been for half a century advocating the substitution of the ox for the purposes of agriculture, and demonstrating the feasibility, economy, and vast saving of food, yet it is said the number of laboring oxen have lately diminished, and horses increased. FIVE MILLIONS of the latter are now supposed to subsist in the United Kingdom, and two-thirds employed in husbandry—consuming, at a moderate estimate, the product of *twenty millions* of highly cultivated acres! And what is the consequence? *Consumption* follows so closely upon *supply*, that at every season of *harvest, let the preceding one be never so abundant*, fast sailing vessels are found in the various ports with their anchors *atrip*, to convey intelligence of the *result* to all parts of the world where a surplus of bread corn is grown—exciting such an interest in our own country, that the *farmer* on the shores of *Erie* and *Ontario*, and on the banks of the Ohio, may be seen reading *bulletins* of *British weather*—the *rain* and *sunshine* of every day in *August* and the *two* following months—often within thirty days after the time of their publication in London or Liverpool. Can it be supposed that in a country, where an attachment to the horse borders so nearly upon *infatuation*, that the question of the utility of the *mule* as a substitute, would be seriously agitated, or engage scarce a momentary invegstiation?

In no country is the mule better adapted to all the purposes of husbandry, for which the horse is used, than in every section of our own. And it would be highly desirable to be able to exhibit a calculation of the actual saving, *in dollars and cents*, by his employment; but, unfortunately, no correct data can be had. And as I consider such calculations, unless founded upon experimental facts, *and those multiplied*, to be as "tinkling cymbals," I shall merely submit a *desultory* between the *mule* and the *horse*, derived from such facts as my own experience, and information from authentic sources, will justify the assumption of.

From what has been stated respecting the longevity of the mule, I think it may be fairly assumed that he does not deteriorate more rapidly after *twenty* years of age than the horse after *ten*, allowing the same extent of work and similar treatment of each. The contrast in the mule's freedom from malady or disease, compared with the horse, is no less striking. Arthur Young, during his tour in Ireland, was informed that a gentleman had lost several fine mules by feeding them on wheat straw cut. And I have been informed that a *mule dealer* in the western part of New-York, attributed the loss of a number of young mules,

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* "It is earth, that, like a kind mother, receives us at our birth, and sustains us when born. It is this alone of all the elements around us, that is never found an enemy to man. The body of waters deluge him with rains, oppress him with hail, and drown him with inundations; the air rushes on in storms, prepares the tempest, or lights up the volcano; but the earth, gentle and indulgent, ever subservient to the wants of man, spreads his walks with flowers, and his table with plenty, returns with interest every good committed to her care; and though she produces the poison, she still supplies the antidote; though CONSTANTLY TEAZED MORE TO FURNISH THE LUXURIES OF MAN THAN HIS NECESSITIES, yet, even to the last, she continues her kind indulgence, and when life is over, she piously hides his remains in her bosom."—[Pliny's Natural History, Book ii., Ch. 63.]

in a severe winter, when his hay was exhausted, to feeding them exclusively on cut straw and Indian corn meal. In no other instance have I ever heard or known of a mule being attacked with any disorder or complaint except two or three cases of inflammation of the *intestines*, caused by gross neglect in permitting them to remain exposed to cold and wet, when in a high state of perspiration after severe labor, and drinking to excess of cold water. From his light frame and more cautious movements, the mule is less subject to casualties than the horse. Indeed it is not improbable, but a farmer may work the same team of mules above *twenty years*, and never be presented with a *farrier's* bill, or find it necessary to exercise the art himself.

Sir John Sinclair, in his "Reports on the Agriculture of Scotland," remarks, that "if the whole period of a horse's labor be fifteen years, the first six may be equal in value to that of the remaining nine; therefore a horse of ten years old, after working six years, may be worth half his original value." He estimates the annual decline of a horse to be equal to 50 per cent. on his price every six years, and supposes one out of twenty-five that are regularly employed in agriculture, to die every year: constituting a charge of four per cent. per annum for insurance against diseases and accidents. He considers five acres of land, of medium quality, necessary for the maintenance of each horse, and the annual expense, including harness, shoeing, farriery, insurance and decline in value, allowing him to cost $200, to exceed that sum about *five per cent.*, which is the only differenc between the estimate of this illustrious and accurate agriculturist, and that of a respectable committee of the *Farmers' Society of Barnwell District*, South Carolina, who, in a report published in the Charleston Courier, of 23d of February last, state, that "the annual expense of keeping a horse is equal to his value!" The same committee also state, that "at four years old, a horse will seldom sell for more than the expense of rearing him." That "the superiority of the *mule* over the horse, had long been appreciated by some of their most judicious planters; that two mules could be raised at less expense than one horse; that a mule is fit for service at an earlier age, if of sufficient size—will perform as much labor, and if attended to when first put to work, his gait and habits may be formed to suit the taste of the owner." This report may be considered a most valuable document, emanating, as it does. from enlightened *practical* farmers and planters, in a section of our country where we may suppose a horse can be maintained *cheaper* than in *Maryland*, or any State farther north.

I am convinced that the small breed of mules will consume less in proportion to the labor they are capable of performing. than the large race, but I shall confine the comparison to the latter—those that stand from fourteen and a half to be rising of fifteen hands, and equal to any labor that a horse is usually put to. From repeated experiments, in the course of two winters, I found that *three mules* of this description. that were constantly at work, consumed about the same quantity of *hay* and only one fourth the *provender* that was given to *two* middling sized *coach horses*, moderately worked. And from many years attentive observation, I am led to believe that a *large sized* mule will not require more than from *three-fifths* to *two-thirds* the food, to keep him in good order, that will be necessary or a horse performing the same extent of labor. Although a mule will work and endure on such mean and hard fare, that a horse would soon give out upon, he has an equal relish for that which is good, and it is strict economy to indulge him, for no animal will pay better for *extra keep* by *extra work*. But if by hard fare, or hard work, he is reduced to a *skeleton*, two or three weeks rest and good keeping will put him in flesh and high condition for labor. I have witnessed several such examples with subjects twenty years old; so much cannot be said of a *horse* at half that age. The expense of shoeing a mule, the year round, does not amount to more than *one-third* that of a horse, his hoofs being harder, more horny, and so slow in their growth, the shoes require no removal, and hold on till worn out; and the wear from the lightness of the animal, is much less.

In answer to the charge generally prevalent against the mule, that he is "*vicious, stubborn* and *slow*," I can assert, that out of about twenty that have been employed on my estate at different periods during the course of *thirty years*, and those picked up chiefly on account of their *size* and *spirit*, wherever they could be found, *one* only had any vicious propensities, and those might have been subdued by proper management when young. I have always found them *truer pullers* and *quicker travellers*, with a load, than horses. Their vision and hearing is much more accurate. I have used them in my *family carriage*, in a *gig*, and under the *saddle*, and have never known one to start or run from any object or noise; a fault in the horse that continually causes the maiming and death of numbers of human beings. The mule is more steady in his draught, and less likely to waste his strength, than the horse; hence more suitable to work with *oxen*; and as he walks faster, will habituate them to a quicker gait. But for none of the purposes of agriculture does his superiority appear more conspicuous than ploughing among crops; his feet being smaller, and follow each other so much more in a line, that he seldom treads down the ridges or crops. The facility of instructing him to obey *implicitly* the voice of his driver or the ploughman, is astonishing. The best ploughed tillage land I ever saw, I have had performed by two mules *tandem*, without lines or driver.

There is one plausible objection often urged against the mule, that "on *deep soils* and *deep roads*, his feet being so much smaller than those of the horse, sink farther in;" but it should be considered that he can extricate them with as much greater facility.

Few can be ignorant of the capacity of the mule to endure labor in a temperature of *heat* that would be destructive to the horse, who have any knowledge of the preference for him *merely on that account*, in the West Indies, and in the Southern States.

It is full time to bring our comparison to a close; which I shall do by assuming the position, that the *farmer* who substitutes *mules* for *horses*, will have this portion of his animal labor performed with the expense of *one spire of grass* instead of *two*; which may be equal, so far, to making "two spires grow where one grew before." For although a large sized mule will consume somewhat more than half the food necessary for a horse, as has been observed, yet if we take into the account the saving in expense of *shoeing*, *farriery*, and *insurance* against *diseases* and *accidents*, we may safely affirm that a clear saving of *one half* can be fully substantiated. But in addition to this, the *mule* farmer may calculate, with tolerable certainty, upon the continuation of his *capital* for *thirty years*; whereas the *horse* farmer, at the expiration of *fifteen years*, must look to his *crops*, to his *acres*, or a *Bank* for the renewal of his—or, perhaps, what is worse, he must commence *horse jockey* at an early period.

The intense interest with which the public mind is at present occupied on the subject of canals now in operation and progress, encourages me to offer the *mule* as an important *auxiliary* in the economy of their management; as, I trust, it will not be denied, that on the *cheapness* of transportation, on them depends their *utility* as well as *profit* to the stockholders. The mule seems so peculiarly adapted for the labor on canals, that compared with the horse, he may be considered almost equal to a *locomotive power engine*. Among the advantages we have enumerated respecting his use in husbandry, the most of which are applicable to canal labor, that of the much greater security from *diseases* and *casualties*, which must necessarily require a great number of supernumerary *horses*, to prevent interruption in the line of passage, is not the least important; nor is the very trifling expense at which the mule can be supported during the winter months, as he will bear being taken off his *feed* till the boats are about to be launched in the spring, and in a few days can be made fit for efficient duty—while a *horse* will require at least *half* feed *if he does nothing*, or must be *fed high* for some time before he can resume the labor that will be demanded of him. The same advantage may be derived by his employment on *railways*.

In a communication, published in the *Utica Observer*, the 16th of May, inst., by Henry Seymour, Esq., one of the *canal commissioners* of New-York, it is stated that a *packet-boat* on the Erie Canal, requires a team of *three* horses to tow sixteen miles —going eighty miles in the twenty-four hours, including stoppages and detention of locks; the *relays* demanding fifteen horses for each *nautical* day. If it takes five days for a boat to be towed from Lake Erie to the Hudson, *seventy five* horses will be required. I am not certain but it may be done in a little less time, but as there must always be supernumeraries kept, we shall be within bounds to estimate that number. In the same communication, the expense of each horse is estimated at *fifty cents* per day, I presume for subsistence *only*, without reference to *interest* or deterioration of *capital*, for the object of the estimate seems merely to show a *comparison* between the *packet boats* and *freight boats*, on a question of *profit and loss*; as it is remarked, that "many *contingent* expenses might be added to both." Taking this *data*, it will cost *thirty-five dollars* per day for the *horse* subsistence of a single packet boat. The *freight boats* require but *two*, and allowing for the time occupied in taking in and discharging their cargoes, with the other necessary detentions, averaging *forty miles* per day—which being double the time of the packet boats, although they may not require the same number of relays, the expense cannot materially differ. From these premises we may conclude, that for every boat navigating the *great Erie Canal*, there must be expended *three hundred and fifty dollars* for the subsistence of the *horses*, each time they tow her from the Lake to the Hudson and back. Now, if this can be done effectually by *mules* for one half this sum, and with an extension of *capital free of interest*, *fifteen years longer* than that vested in horses, the aggregate of this im-

mense saving will appear by ascertaining the number of boats at the present time on the canal. But this is out of my power; and I should, perhaps, lead the reader *nearer the verge of incredulity*, were I to offer my own prediction what that number *will* be thirty years hence, the ordinary period of a mule's labor, and which will then be some years less than a single century since the PRIME MOVER and GUARDIAN of this *stupendous undertaking*, the present Governor of New-York, first saw the light of heaven.

I cannot resist an impulse to exhibit the *mule* in one other point of view. For the movement of *machinery*, the employment of this animal, when judiciously selected, has met with a most decided preference, in comparison with the horse, independent of the *economy* in using him. And if we consider the rapid, and probably progressive increase of *labor-saving* machines, in every department where they can be made subservient to the requirements of society, it is evident that there will be a corresponding demand for *animal* power, as well as for that *more potent*, derived from the element; and although the *latter* may *vastly* predominate, yet should the horse be employed, and his increase for other purposes continue, as it now does, in the *ratio* of population, the number, at no very distant period, may become as alarming in our own, as it is at present in our *mother country*. And notwithstanding we may feel secure, from the extent of our territory and extreme diversity of *soil* and *climate*, but, above all, from being in possession of *Indian corn*—the GOLDEN FLEECE found by our "*pilgrim fathers*," when they first landed on these shores: yet such peculiar advantages may not insure us against the visitations of one of the most distressing calamities that a feeling community can possibly be subjected to.

Brighton, Mass, May 27, 1825

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, MARCH 26, 1836. [VOLUME V.—No. 12.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MARCH 26, 1836.

☞ A gentleman of experience in Civil Engineering, is about visiting Europe for the purpose of examining the Railroads, Canals, and other works of internal improvement, and will remain there most of the ensuing year. It has occurred to us, that some of the numerous Railroad Companies, now preparing to commence operations, may find it for their interest to engage him to furnish information in relation to late improvements, and perhaps, to make contracts for iron, &c., for both of which duties he is every way competent.

Further information will be given on application to the Editor of this Journal.

AN ENGINEER who has had charge of several important works in the United States, and is now engaged upon one of a large class in a neighboring Province, is desirous of being employed during the ensuing six or eight months by some company, to make the prelimirary surveys of a Railroad or Canal.

He can give the best of references.

Applications in relation to his employment may be made to the Editor of this Journal.

We ask attention to the article in this number from the Journal of the Franklin Institute, in relation to Avery's Rotary Engine—both to the strictures of *Fair Play?* and to the remarks of the Editor of the Journal in reply.

For the satisfaction of those who take an interest in the engine, we will endeavor soon to say something in relation to the one in use in this city.

A project is on foot at New-Orleans, for the construction of a Ship Canal of eight miles in length, to lead from the Mississippi to the ocean. It is to commence about three miles below Fort Jackson, passing through the prairie on the left bank of the river. The cost is estimated at $300,000 to $500,000.

We ask the attention of those who are, or desire to be, engaged in putting down the superstructure of Railroads, to the following notice to contractors from the Chief Engineer of the GEORGIA RAILROAD.

GEORGIA RAILROAD & BANKING COMPANY.

NOTICE TO CONTRACTORS.

SEALED Proposals will be received at this office, between the 1st and 3d of June next, for laying the superstructure on 50 miles of the Georgia Railroad—all materials to be furnished by the Company.

The first ten miles to be commenced by the 10th of September, and completed by the 15th January next—the remainder of the line MUST BE finished on or before the 1st of May, 1837.

Plans and Specifications of the work, may be seen, and all other information obtained on application at the office, one week previous to the letting.

J. EDGAR THOMSON, Chief Eng'r.
Engineer's Office, Augusta, Geo. April, 2d, 1836. 12—4t.

We would call the attention of those of our readers, who engage in the construction of Railroads, to the following notice of Mr. Petrie, Engineer of the Jackson and Brandon Railroad Company in Mississippi.

TO CONTRACTORS.

Sealed proposals for the graduation, bridging and superstructure of the JACKSON and BRANDON RAILROAD: for the erection of a BRIDGE over Pearl river, and the remaining incidental work necessary to the completion of said road, will be received at the Railroad Office in Jackson, until the 10th of May next.

Plans and specifications will be exhibited at the office, and the necessary explanations given, by the Assistant Engineer upon the line, one week previous to the letting.

It is expected that testimonials of characters, &c. will accompany the propositions of those who are not personally known to the Agent, and the Company reserve the right of rejecting any bids not deemed to their advantage.

W. PETRIE, Chief Eng. & Agent.
J. & B. R. R. & B. Co.
Jackson, Mi. March 15, 1836. 12—3t.

A TRIP TO BOSTON.—We were of the party which participated in the pleasure of an excursion, in the new and splendid steamboat Massachusetts, to Providence on Saturday the 2d April. The following account of the boat and her performance, from the New-York American, is all that need be said in relation to her; but of *us more* is required; we must refer also to those more recent and more useful works of art, RAILROADS.

"THE STEAMBOAT MASSACHUSETTS returned yesterday from her first trip, as one of the regular packets of the Boston and Providence Railroad line, having performed to the satisfaction of her owners, and to the admiration of numerous passengers, among whom the writer was one.

"We left here an Saturday at a little after 5 o'clock, and ran the distance to Providence in a little more than 13½ hours—with less perceptible motion, less vibration, and a greater sense of the solidity and security of the noble vessel, than usually attach to fast boats.

"The Massachusetts is of about 700 tons burthen: her cabin, which is one lofty saloon of some 200 feet or more in length, is fitted with three tiers of berths, and can

thus accommodate 118 passengers: the finishing is in good and simple taste, where every thing appears to have been done for comfort and use, and little for mere show: the bedding is excellent, and made for the boat,—the blankets and counterpanes being woven expressly for her, and having the name at length on each: the table service, of pure white, is marked on every piece with armorial bearings of the State of Massachusetts; and the order and regularity of the service of the table are exemplary.

"The upper deck presents an unobstructed walk of 200 feet; which, though rather uninviting in this cold and unseasonable weather, will make a delightful summer *promenade*, while below, and on a level with the ladies' cabin, the space may be inclosed, as from the severity of the cold it was on Wednesday night, and made a vast apartment.

"Of her speed sufficient is said, in noting the fact that her first trip was performed in considerably less than 14 hours; which, for a distance estimated at 200 miles, is fast enough.

"Returning, the steamboat *President*, not second before certainly to any boat on the sound, started from Providence six or seven minutes ahead of the *Massachusetts*, and a contest for superiority ensued—a generous emulation, truly, for there was no undue excitement, no impropriety, nor any *unsafe* exertion made on boare the Massachusetts, certainly; nor, we may say, we are sure, with every presumption of truth, on board the *President*. The *Massachusetts* bore away the palm, overtaking the President first abreast of Newport—and subsequently (the President having first, by some minutes, got away from the dock,) in the Sound, and arrived here several miles in advance of her competitor, in something less than fourteen hours from Providence. Of her commander, Capt. *Comstock*, it is hardly necessary to say more, than that to no hands could be more worthily confided so fine a vessel and so responsible a command; he may be likened to the engines of his boat, working silently but very effectively.

"The *Rhode Island*, another boat of the same class, and belonging to the same Company, was launched in safety yesterday, and will take place in the line in June. A third, to be called the *Narragansett*, of equal force and dimensions, is building, and when completed, the three will present to passengers a combination of power, speed, comfort and sefety, not equalled, probably, on any waters.

"These boats connect with the Railroad line, so that on their arrival a train for Boston proceeds immediately, bringing, in fact, the cities of New-York and Boston within easy and unfatigued travel of from 15 to 18 hours."

We arrived at Providence a few minutes before 7 A. M., where we found a locomotive, with a long train of cars, in readiness to take us to Boston. Taking our seats, and putting the train in motion required but a few moments, when the engine moved off in beautiful style, crossing the line of Rhode Island into Massachusetts, passed through a considerable cutting, and ascended an inclination of about — feet per mile.

We soon found that the past almost unparalleled severe winter had, in some measure, affected the Road. The cross ties, or sleepers had in many instances, sunk below their level, which caused more or less jolting as the train passed over them. This will, however, be remedied as soon as the frost is entirely out and the ground settled.

The location of this Road does credit to the Engineer—and it is for that which an Engineer is *first* and *mainly* responsible; after that, unless he has ample means at his command, his responsibility consists in *properly* appropriating that which he has.

This Road must become a great thoroughfare, and it must and certainly will be made permanent.

The general features of the Road are very favrable. It is 42 miles in length; more than one half of it is in a straight line; there is no grade exceeding $37\frac{1}{2}$ feet per mile; and no curve with a less radius than 5000 feet. It is graded for two tracks—the first entire and a part of the second, is laid with the ⊥ rail weighing 56 lbs. to the yard—resting upon cross sleepers, which ought to, but do not, rest upon longitudinal sills beneath the surface of the earth—or upon a foundation of solid materials. The rails are fastened to the sleepers, by spikes with the head turned one way, forming a hook, which holds to the under lip of the rail.

The engines used are of English Manufacture, and weigh about eight and a half tons, and travel at from 10 to 30 miles per hour. A part of the country through which the Road passes is uninteresting, but that in the vicinity of Boston is beautiful.

The Canton viaduct is a stupendous work. It is creditable alike to him who projected and those who executed it. There are few equal to it in the country. It is 50 feet high and 450 feet in length, of solid masonry, and contains about 15,000 perches of solid masonry.

On our arrival in Boston we took quarters at the TREMONT; and it is no disparagement to any other house in our country, to say that its superior cannot be found in the Union. If any one doubts it let him go and spend a month or a week there, and satisfy himself.

On Monday we proceeded to Lowell—a distance of 25 miles—time of *travelling* ONE HOUR, by the Boston and Lowell Railroad. This is a work of uncommon firmness. The rail mostly used in the construction of the Road is what is usually termed the "*fish-belly*" rail, (see Vol. 1, No. 4, fig. 9, of the Railroad Journal,) in lengths of about 15 feet, but it is not approved of.

The second track will be laid, we were informed, with the ⊥ rail.

The stockholders of this Road are gentlemen of wealth, and most of them deeply interested in the town of Lowell, and therefore deemed it to be for their interest to make the work in the most permanent manner, that they might rely at all times upon it as a means of communication between the two *cities* of Boston and Lowell—they have succeeded—and may, in all time to come, and at all seasons of the year, with proper care, travel and transport over it at the rate of 26 miles per hour.

This Road has no grade exceeding 15 feet in the mile, and no curve with a less radius than 3,000 feet. The superstructure, if so it may be termed, consists of continuous stone walls with their foundation three feet and over below the surface, with cross ties or sleepers of stone, about $3\frac{1}{2}$ from centre to centre, upon which are placed cast-iron chairs of about 17 lbs. weight—in which rests the fish-belly, edge rail, weighing 45 lbs. to the yard; but it is not liked—being found liable to break.

The engines used on this Road are of about $8\frac{1}{2}$ tons weight, and are manufactured at the Manufacturing Company's splendid machine shop at Lowell, an establishment which is creditable to our country, and at which we are informed the entire machinery for a cotton factory of 5000 spindles may be supplied in four months—and in addition to which they are now nearly prepared to complete a locomotive engine every two weeks, is required.

We spent our time very pleasantly from 10 to 3 o'clock, in visiting the various factories, and in conversation with gentlemen connected with them, and were in Boston a few minutes after 4 P. M.—thus having travelled 52 miles and devoted five hours to useful observation and inquiry between 9 A. M. and 4 P. M.; a performance, the prediction of which, only ten years ago, would almost have caused the issuing of a writ of lunacy against him who dared be so bold.

For a more full and highly interesting account of Lowell, we refer our readers to the communication of our worthy correspondent, the Rev. Henry Colman, will appear in our next number.

Of the Boston and Worcester Railroad, which we intended to, but for other engagements did not, visit, we speak from the report of a practical engineer, Mr. James Seymour, who accompanied us over both the Boston and Providence, and the Boston and Lowell Roads.

The Boston and Worcester Railroad is 44 miles in length—its steepest grade is 35 feet per mile, and its shortest curve has a radius of 1140 feet; there is, however, a very small portion of the curved line with a less radius than 1600 or 1700 feet. The Road is graded for a double track, a single one only is laid. The superstructure consists of the edge or ⊥ rail, of 50 lbs. to the yard, placed in cast-iron chairs, upon wood cross ties or sleepers, which are covered with earth—thereby keeping them always moist, and of course less liable to decay.

This Road, like the Boston and Providence, has been considerably affected by the frost, during the past winter—they will, however, both be speedily put in first rate order for use, and must of course become great thoroughfares for travel and transportation. The Boston and Providence, at least for a time, for the *direct* communication with New-York, and the Boston and Worcester for that across the country and up the Valley of the Connecticut.

This last mentioned Road must, at no distant day, become one of the most profitable in the county. It will be the termination of no less than four important Roads, viz. the Norwich and Worcester; the Worcester, Hartford and New-Haven; the Western, or Worcester and Albany, with a branch to Hudson; and the Connecticut Valley Railroads—either of which, independent of the others, with its local business, would warrant the construction of a Road from Worcester to Boston.

A visit to, and examination of, these Railroads, will deeply impress upon the mind of the most casual observer the fact that *Bostonians* are resolved to omit no effort to open, upon the most improved plan, such avenues of communication as will insure to her, at all times, her full share of business. If any one doubts it, let him contemplate for a moment her pasition. A good harbor and the wide ocean on one side, with a Railroad to Providence, which will be extended to, or connected with one to Stonington—both connected with a first rate steamboat navigation; another to Worcester, which will be, in a few years, connected with a Road to Norwich, another to Hartford and New-Haven, a third to Albany and Hudson, and a fourth to and up the beautiful Valley of the Connecticut, at least to Canada line, and probably to Montreal—and a third to Lowell—which is by no means its termination, as it will probably be extended to Brattleborough, there intersecting one from Springfield, cennected with the Worcester, the Hartford, and the Albany Roads—as it certainly will be continued to Concord and Lebanon, N. H., and to Montpelier and Burlington, Vt.—thus opening the way to all New-England, except in an easterly direction, which is to be effected by a Road recently surveyed through Salem, in the direction of Portsmouth, N. H., and Portland, Maine—and will be, beyond all question, connected with the contemplated Road to Quebec. With such evidences of enlightened forecast and public spirit in her citizens, who dare not predict for Boston a degree of prosperity and importance hitherto little anticipated.

With such evidences of public spirit before us, in a neighboring city and State, how great and mortifying the contrast when we review the policy of those who wield the destinies of this State!

NEW MODE OF JOINING THE PLATES OR BARS USED UPON RAILROADS.

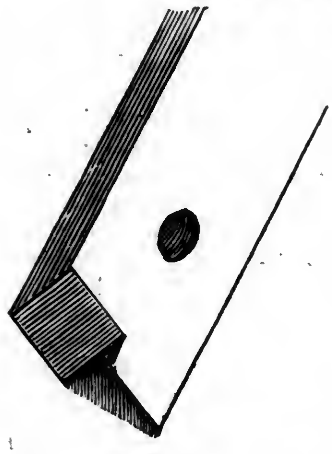
To the Editor of the Railroad Journal:

Montgomery, Alabama, March 28th, 1836.

Sir,—Enclosed I send you five dollars—my amount of subscription for the current year.

I also send you a drawing of a new mode of joining the plates or bars used upon Railroads, together with an extract from the specification of a patent, applied for by me, for the same—which, should you think it worthy a place, I should be pleased to see in the columns of your journal.

Very respectfully,
Yours, &c.
A. M. McCaine.



EXTRACT:

"The surface of the bar may be either rounded or flat—a plain plate, or flanged on the inner edge, or otherwise, as preferred, and of any required thickness, width, and length. The joint or connection, which I claim as new and original, I make with a double lap or bevel; that is to say, two bevels or laps in contrary directions, of equal or unequal width of surface on the end of each plate, in such manner that one part of the bar or plate laps *above*, or over, a part of the connecting bar or plate, while the other part falls *below*, or under a corresponding part of the same connecting bar.

"In the drawing, the bevel or lap is represented of equal widths upon the end of the plate, each bevel being made in contrary directions, at an angle of 45°, which angle may be found most advantageous in practice. And where greater solidity in the extremity of the joint is required, instead of a plane surface, or "bevel," I use a convex and corresponding concave surface—the point, or centre, from which said curved surface is described, being upon the upper edge of the plate or bar.

"The bevels or laps are of the same width and angle on the connecting plate, but inverted in position, so as to make a perfect joint both laterally and longitudinally, when applied to the preceding plate: so that all the plates having the ends thus bevelled or lapped, and laid down continuously upon the bearing surface, may be *confined down* by one spike in the centre of each bar or plate; and it is evident that the plates or bars may be permanently fixed with a fewer number of spikes than is necessary with the ordinary methods of joining.

"I also claim the application of this principle of the double lap or bevel, to a *mitre* joint and *tongue* joint, or to any other joint by which the bars thus *confine each other*, when placed in connection.

"Any one at all acquainted with the practical operation of Railroads, must at once appreciate the advantages of this expedient, by which the subscriber conceives they may be effectually secured from all difficulties arising from the working loose of the end spikes, and consequent rising of the extremities of the plates—which coming in collision with the wheels and axles of the engines and cars, give rise to serious accidents, endangering the lives of passengers, and causing frequent and expensive damages to the locomotives.

"With this joint, even should the end spikes work out, or break off, there can be no vertical or lateral separation of one bar from another—and, consequently, no injury can arise from such cause. The great and perpetual expense attending the keeping up of supervisors of the iron, on a long line of Railroad—now found absolutely necessary to prevent injuries and accidents from loose bars—would be entirely obviated. A great saving in the annual expenses of the road would be thus effected; and the trips could be performed with more celerity and regularity, and the passengers would pass over the road without that constant apprehension of danger, which the prospect of loose bars, broken spikes, and raised plates, is so well calculated to awaken."

I approve very highly of the above plan of joining rail plates, and shall adopt the same on the Montgomery Railroad.

Andr. Alfred Dexter,
Civil Engineer.

March 28, 1836.

RAILROADS IN GEORGIA.

There can be little doubt, we should think, of success to any judicious, managing man, who will engage in the business spoken of in the following communication.

For the Railroad Journal.

Mr. Editor,—I find your Journal abounds with communications on the subject of Internal Improvements, particularly Railroads. Permit me, through your columns, to say, that description of improvements has commenced in Georgia. The Central Railroad and Banking Company has lately organized, and will no doubt proceed forthwith to the work of a Road from Savannah to this city, two hundred miles in length. The Monroe Railroad Company is now progressing with their Road from this place to Forsyth, twenty-five miles, through the healthiest part of Georgia; the water is pure freestone, and the atmosphere of the purest and best; the survey is progressing under Messrs. Tomson and Griffin, from Pennsylvania, and will in a few months be completed and ready for contract. Northern contractors would do well to turn their attention this way, as the field is large and just opening, and competition almost none. Stock will be offered the 1st of November next, for a continuation of the road from Forsyth to

West Point—say 85 miles—there to unite with the road now in progress from Montgomery, Alabama—say 90 miles. The whole length of all these roads from Savannah to the latter place will be four hundred miles.

Our city is central in the State, and will receive this season eighty thousand bales of cotton—an increase over last year of twenty thousand, and a prospect of a further increase. Under all the circumstances it seems to me a most favorable location for a foundry and factory for Railroad and engine apparatus; th northern cities are full to overrunning, and here nothing of the kind doing; and the whole country fully ripe for the harvest. All the engineers in this country are from the northern climate, and will bear me out in saying, that from the middle section of the State upwards, is as pleasant and as healthy as in any part of the United States. We have here to this place steamboat navigation, one steam mill in operation, and another building. The excavation and embankment on the Monroe Railroad is almost entirely earth, but part heavy for this country. This city, in point of population and commerce, is now improving at the ratio of seventy-five per cent. per annum.

L. L. Griffin.

Macon, March 30th, 1836.

RADII OF CURVES, ACCLIVITY OF GRADES, RATES OF SPEED, ETC.

To the Editor of the Railroad Journal:

Sir,—It was not until very recently, that I discovered in your Journal of February 13th, a communication signed S. D., in relation to the report of James Seymour, respecting the radii of curves, acclivity of grades, rates of speed, &c., of the different Railroads between Washington and New-York, and the Roads in the vicinity of the latter city. I entirely agree with S. D. in saying that the natural features of the country must govern the course of the route, nor would I be understood to say that the radii of curves were no detriment to such a work as the New-York and Erie Railroad; but on the contrary, I consider these things serious obstacles in the way of Internal Improvement, and might be carried to such an extent as to work a complete failure of the purposes intended by them. If the surface should prove to be a perfect plane, as S. D. says, I confess there would be but little to contend against, and in such case the service of an engineer would hardly be required. But he admits that this is not often the case, and that the surface is more or less broken—that the topography of the country is undulating, with vallies and ridges often running contrary to the course that we would wish them. It is frequently the case that spurs run out so that engineers are obliged to cut through them, and place the earth in the vallies or low ground contiguous. This, of course, must enhance the expense, yet it is often better to do this than to curve around them, if the radius is likely to be short, and the grades light. But where the curves can be made with a large radii, and the grades are heavy, engineers should, by all means, avoid these jutting points by curving around them. This increases the distance, but this objection is overbalanced by lessening the cost, and also lessening the grades. This engineers are often compelled to do in this country, and on the route of the New-York and Erie Railroad, great pains have been taken to avoid curves of small radii, so much so that in many instances the expense has been greatly increased to effect this object. Speaking for myself, I have not located one foot of ground with a radius of less than 955 feet, and think to have one cotinnued line of over 60 miles with a curve of no less radius, although with a radius of from 400 to 600 feet, I could have wound round hills, and kept the grade near the surface, whilst, with the radius of 955 feet, the grade line must often pass so as to make the cutting much greater and the embankment much more heavy.

Equal pains have also been taken to lessen the grades by keeping well upon the side hills,—by crossing deep ravines,—and by causing excavations of ten, fifteen, twenty, and sometimes over thirty feet,—whilst, if a sharp grade were no detriment, we could follow near the streams, and would lessen the expense; but the grades in these instances, would, at times, be quite easy, and in other places very heavy. The engineers have chosen and acted upon the course of making the grades as regular as possible,—which course will stand the test of review. Knowing, or at least believing, that many will view this magnificent work (the largest and most noble of the kind in the United States,) its engineers would in all time to come, regret that it should not be completed in a workmanlike manner, or that permanent injury should result to the Company or the public, from their incapacity, especially with one so eminent in his profession as Judge Wright at the head.

As S. D. says his motive in adverting to Mr. Seymour's letter, is a desire to see the Lake Erie Railroad finished, as regards route and details, as perfect as circumstances will permit, the Company are doubtless obliged to him for his friendly feeling towards their Road, and in behalf of the Engineers I invite him to an inspection of the same as soon as they shall have so much of it completed as he may consider worthy his attention.

One of the Engineer Corps of the
New-York and Erie Railroad.

QUERIES.

We shall be obliged to any one who will answer the following queries, both to oblige the gentleman who inquires, and for our own gratification:

"I saw, perhaps two years since, a notice of a machine (in the Railroad Journal,) for making bricks by pressure, so that when they came out of the mould, they were ready to go into the kiln. If you know any thing about the practical success of the machine, please give it in the Journal. Have the bricks been found on the whole to be better than those made in the common way?"

AVERY'S ROTARY ENGINE.

We give the following communication from the pen of a friend who should have been an Engineer, rather than of that profession heretofore considered almost the only path to eminence, the Law.

To the Editor of the Railroad Journal:

Sir,—It is some time since the attention of the public has been invited, through your valuable Journal, to the Re-acting Rotary Engine of Mr. Avery, of Syracuse, but the merits of the invention do not seem to be duly appreciated, except, perhaps, by those who have an engine of his construction in actual use. I have been informed, however, that in every instance where one of this kind of engines has been put up, it has proved itself superior to the high pressure piston engine. It is quite probable that most engineers have fallen into an error in theory in calculating upon the power of Mr. Avery's engine, by misapplying one of the first principles of mechanics—"*that action and re-action are equal.*" Starting with this theorem, which is admitted to be true, one would very readily be led into an erroneous conclusion by reasoning in this manner:—"Action and re-action being equal, and the most that can be obtained by a fluid impinging upon the vanes of a wheel, is an effect equal to one third of the power applied, therefore the effect in the re-acting engine is only one third of the power of the steam used," from which must be deducted the usual discount for friction, &c. This conclusion is plausible, but erroneous, as can be shown by comparing the different circumstances under which the power is applied in the two cases. In the case of a fluid impinging by direct action upon vanes or paddles, if any motion whatever is produced, the vanes must necessarily move in the same direction with the impelling fluid, and the velocity of this motion must be deducted from that of the stream, so that the greater the velocity of the wheel the less is the impulse. In the reacting engine there is no loss from this source. The motion may be greater or less, and not affect the impelling pressure, because the power moves with the revolving arms, and whatever may be their velocity the enclosed steam and those arms are relatively at rest, and the pressure upon the side opposite the orifice is precisely the same when in the most rapid motion as when standing still.

It is upon this principle that the rocket ascends with astonishing velocity, the re-acting pressure not being in the least diminished by the ascending motion,

If I am correct in the *rationale* of the re-acting engine, we need not be surprised that it should perform at least as much with the same fuel as the common high pressure engine, which at best falls far short of the actual initial power of the steam employed.

HIERO.

REMARKS AND INQUIRIES RESPECTING MR. AVERY'S PANENT STEAM ENGINE.

To the Editor of the Journal of the Franklin Institute.

Sir,—You have doubtless seen, in a late number of the New-York Mechanics' Magazine, (the one for September, I think,) an engraved drawing of "Avery's Rotary Steam Engine," accompanied by a description. It is generally believed that this engine has been *secured* to Mr. Avery by patent. I have always supposed the main object of the patent law to be, the *protection* of *original inventors* in the enjoyment of whatever pecuniary advantages they may fairly derive from their useful inventions.

That Mr. Avery's engine, or one constructed upon the same principle of action, though perhaps somewhat different in detail, will be found in some situations a convenient and economical machine, I do not doubt. Indeed, I know some persons who would like to make use of such engines, but who are, some of them, unable, and all unwilling, to pay Mr. Avery for the privilege of doing that which they feel themselves equally at liberty to do with himself. My reasons for doubting the validity of his patent, may be found, *first*, by referring to the September number of the New-York Mechanics' Magazine for 1833, in which is given a drawing and description of the beautiful contrivance of Hiero, the first account of which is said to have been published in the year 1571.

The principle upon which Mr. Avery's engine acts, will, I think, be seen at a glance, to be the same as that of Hiero's *Secondly*, in a work by Oliver Evans, entitled the "Young Steam Engineer's Guide," published by Carey & Lea, page 93, the biographer of Mr. Watt, speaking of his first attempt to produce a direct circular motion by steam, says, "he (that is, Mr. Watt) then tried Parent's or Dr. Barker's Mill,* inclosing the arms in a metal drum which was immersed in cold water; the steam rushed rapidly along the pipe which was the axis, and it was hoped that a great re-action would have been exerted at the ends of the arms, but it was almost nothing, the reason seems to be that the greatest part of the steam was condensed in the cold arms. It was then tried in a drum kept boiling hot, but the impulse was now very small in comparison with the expense of steam." Upon this experiment Mr. Evans remarked as follows: "It is evident, from this account, that Mr. Watt has used *weak steam*, and placed dependance on the use of a condenser; had he in his experiment with Doctor Barker's Mill, lessened the apertures by which the steam issued, so as to confine the steam until the power in the boiler was equal to 100 lbs. to the inch, he would have been astonished to see it revolve about 1000 times a minute, supposing the rotary tube to have been three feet in length; I have tried the same experiment, but without the least hope of success, on any other principle than by confining the steam to increase its elasticity to a great degree. My rotary tube was three feet long, the elastic power of the steam about 56 lbs. to the inch; it revolved with a velocity of about 700 to 1000 times a minute. The aperature by which the steam issued about $\frac{2}{10}$ of an inch in diameter; it exerted more than the power of two men, and would answer to turn lathes, grindstones, &c., when fuel is cheap. I have specified and explained it in the Patent Office." Unfortunately, there is no date to this work of Mr. Evans, but I presume it can be readily ascertained in Philadelphia, when it was published, and probably when the specifications were entered at the Patent Office. But that it was done long before Mr. Avery's engine was thought of, I think there can be little room for doubt, as it appears from another part of the same work of Mr. Evans, page 96, that he *matured* his experiments upon the application of steam to a wheel, in the year 1784, which, as he states, he described in the Patent Office.

Under these circumstances, I cannot see what possible claim *Mr. Avery* can have to a patent for this invention; as to the drum which incloses the arms as represented in the drawing of his engine before referred to, I understand it is claimed as having been first applied to it, by a Mr. Clark, of some western town in this State.

By giving the foregoing an *early* insertion in your Magazine, you will, sir, *essentially* oblige several of the friends and readers as well as promote the cause of justice. Should you be willing to express your own opinion as to the merits of this question, it would be deemed particularly valuable.

FAIR PLAY.

Remarks on the foregoing communication, by the Editor.

It so happens that "Fair Play," and others, who desire information on the subject of Foster and Avery's Re-acting Steam Engine, (commonly called Avery's) will, in the present number, have a full opportunity of seeing what constitutes the claim of these gentlemen to a patent for an improvement in this machine. They were fully informed respecting what had been attempted with engines similar in construction to their own, previously to their obtaining a patent; and it will be seen that they have confined their claim to improvement within very narrow limits, and so far as we are informed, their claim is a valid one. It may be said that their improvement is trifling; that, however, is their own concern, as those who do not need it are at full liberty to use the machine in any of the various forms which had been previously given to it, or to devise others which are new, without buying from them what may be deemed unimportant.

We are not sufficiently well informed respecting the comparative results obtained from Avery's and the reciprocating, or Avery's and other rotary engines, to make up our minds respecting its real value; between four and five years, however, have elapsed since this engine was patented, and it has been at work at Syracuse, and various other places, during the whole of that time, so that those who have seen it, and who possess a competent knowledge of the subject, have had time enough to investigate it. Before the patent was obtained, we expressed to Mr. Avery, our general want of confidence in the real value of such engines, and our doubts respecting the importance of the improvements claimed; and we did not suppose that the career of the one in question would extend to two years; a length of life, greater than has usually fallen to the lot of rotary engines; it still lives, however, maugre our anticipations, and all the reports which we have received relating to it, tend to show that it has not yet exhibited the first symptoms of decline. Although we still adhere to the opinion, that upon a full comparison, the economy of a good reciprocating, will be greater than that of any rotary engine that has been, *or will hereafter be*, made, we most cheerfully confess that we have a much better opinion of Mr. Avery's, than we at first entertained; and, as to our wishes, they are that, by the operation of this, and a hundred other contrivances, which we have esteemed of like value, we may be put entirely in the wrong; let the fact be well established, and we would be the first to make it public. Without putting in an undue claim to the *suaviter in modo*; we have sometimes thought that the tendency of our animadversions upon patented inventions was to place us in the situation of "The best good-natured man, with the worst ill-natured muse;" it must be recollected, however, that we stand between the claimants of exclusive privileges and the public.

With respect to the amount of novelty necessary to security, as a foundation for a patent, we think that the fair test of this is the utility of the improvement; if it renders that valuable which was of little comparative worth, it is enough, although it be no more than the addition of a screw, or of a peg. The views which we have adopted upon this subject, may be found at large in Vol. 8, p. 411 of this Journal. The article is a borrowed one, and well worth perusal. "The main object of the patent law is the *protection of original inventors* in the enjoyment of whatever pecuniary advantages they may fairly derive from their useful inventions," and in attaining this end, it is not possible to test them by comparative weights, or to measure them by any established scale; absolute quantity, however small, is all that can be required.

DECISION OF THE CIRCUIT COURT OF THE UNITED STATES, FOR THE EASTERN DISTRICT OF NEW-YORK, IN A PATENT CASE INVOLVING SOME IMPORTANT PRINCIPLES. TO WHICH IS APPENDED SOME REMARKS BY THE EDITOR.

UNITED STATES CIRCUIT COURT.

BEFORE JUDGE THOMPSON.

Henry Stanley vs. Henry Hewitt.

This was an action founded upon a patent granted to the plaintiff, Henry Stanley, by the United States, the 17th December, 1832, upon a specification and application made to the patent office the 11th of October, 1832, for an improved rotary cooking stove. The plaintiff, by several witnesses, proved the originality of the invention in him, its importance and usefulness, and that the defendant had, from patterns taken from the plaintiff's stove, made and caused to be made, and sold a large number of stoves, and was still pursuing the business. The defendant, to show that the plaintiff's patent was void, called Elisha Town and his son, and others, to prove that in 1823 and 1824, he invented, and procured to be cast, a rotary stove, and that the plaintiff's stove revolved like it—also a Mr. Gould, to prove that the plaintiff took the collars and flues in the cap of his stove from said Gould's stove, and also other witnesses to show that the plaintiff, as well as others,

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* Descriptions of Barker's Mill may be found by your readers, in Ferguson's Lectures, Nicholson's Operative Mechanic, and almost every reputable work on Mechanics now in use.

had used the collars and flues long before the plaintiff's improved cooking stove was invented; and also, that the defendant attempted to show that the plaintiff had sold his stoves, and given his invention to the public before he applied for his patent.

The plaintiff, in reply, called numerous witnesses to show that Town's stove, whatever it was, was useless, and had been abandoned as such; and that the plaintiff had no knowledge of it when he made his invention and improvement, and that his stove, in all the important improvements by him claimed, was wholly unlike Town's stove, and that collars and flues were not claimed by him as his invention, independently of his rotary plate in which they were attached, and that when they were put upon the Gould stove, it was done at the plaintiff's suggestion. And that all the stoves delivered out before the application for the patent, were delivered to be used on trial, and with a view to test the utility of its improvements. The trial was a very labored one, and occupied five or six days; but finally resulted in a question of law, growing out of the wording of the specification; which appeared to have been drawn up by the plaintiff without proper legal advice.

On the part of the plaintiff, it was insisted that the claim, in his summary, was for a combination of certain improvements he had made in the cooking stove, connected together and attached to the top or cap of his stove, put in motion; and that it was the combination which he claimed, and not the parts forming the combination separately, and that his specification would bear that construction.

On the part of the defendant, it was insisted that the plaintiff had so worded his specification, that it would not bear that construction, and that it really claimed the different parts comprising the top or cap of the stove separately, and independently of any combination, and that his specification was otherwise defective.

Judge Thompson, in the progress of the cause, gave his opinion that putting the stoves out on trial, and for the purpose of experiment and improvement, was not such a public use of them as would be considered as a dedication to the public—that the plaintiff was justified and had a right to test the utility of his invention, and see what improvements might be made before he applied for his patent, and that this was an article which would be tested by being put into several families, where it might be differently used by different housekeepers.

In charging the jury, Judge Thompson, after stating the case and the difficulties arising from the obscurity of the language employed in the summary of the specification, remarked that in all cases, where consequences of great importance to the parties were involved, the jury must expect that the views of each would be presented with great earnestness and zeal. Nor is it surprising (said he) that in such controversies, matters not materially connected with the merits of the issue, should be brought before the Court and Jury during the progress of the trial.

These remarks are applicable to the case now under consideration. It evidently involves matters of importance to the parties concerned, and has been accompanied by circumstances having no material bearing upon the questions in issue. *We*, however, are to examine the controversy, and determine it, by the law and the evidence, without reference to extrinsic matters, having no bearing upon its merits. And in this view of the subject, it is of no consequence whether the plaintiff, Mr. Stanley, has, or has not, accumulated a fortune, as the fruits of his invention. If, by his own talents, industry, and perseverance, he has produced a machine, useful in itself, and approved of by the public, he is entitled to the protection of the law, so far as he has rights to be preserved and guarded. And if, on the other hand, he has interposed claims which cannot be the subject of legal sanction, he must abide by the consequences of his fault, or misfortune.

I state to you, gentlemen, in the outset, that this is not a case free from difficulties. But I have the consolation of knowing that my decision of the matter *need* not be final, and that any mistakes committed *here*, may be reviewed and corrected by another tribunal, where I, too, shall have an opportunity of considering the subject with more care.

In my view of the case, much evidence has been introduced upon both sides, which is entirely irrelevant. The plaintiff's rights, whatever they are, depend upon his patent, and if he has any by his patent, and has not abandoned them to the public, he is entitled to protection. I confess to you, that my own prepossessions lean towards useful improvements, and I would construe the patent act with a liberal spirit, and expanded views. It is a beneficial law, having its foundations in public policy. Its object is, to encourage the enterprise of ingenious men, that the results of their labors, being brought into view, may be first enjoyed by the inventors for a limited period, and then dedicated to the public benefit forever afterwards. Nevertheless, I do not mean to say that all patents are to be protected *at all events*, but those only are to be sustained which have the sanction of law. It is a well known fact that patents are granted at the Patent Office, not after an examination into their merits, but upon *ex parte* statements, and hence their real claims may be afterwards investigated with proper strictness in a court of law.

There are some general rules always to be observed while considering this subject. In the first place, to entitle a patentee to maintain an action for a supposed violation of his rights, his invention must be both useful and new; not that its usefulness is to be scanned with a critical eye, to ascertain a given amount of benefit to be derived from it, but the invention must be useful, as contradistinguished from that which is frivolous, or wholly worthless. If not frivolous, or entirely useless, the requirements of the law in this particular are complied with.

With regard to the invention before us, it is clearly useful; this is proved by the testimony of witnesses on all sides. It is proved, also, by the great extent of the plaintiff's sales, by the favor of the public, which has been liberally bestowed upon it, and by the palpable imitations of the plaintiff's models in the case under consideration.

If the plaintiff has legal rights here, there can be no doubt that they have been violated by the defendant. There is no substantial difference between the stove made by the defendant, and that invented by the plaintiff; the one is a copy of the other. And as to the extent of the violations, there is as little doubt. If you believe the testimony of Mr. Randal, the defendant sold a hundred stoves before the commencement of this suit, if his own declarations are to be credited, for he told the witness, in express terms, not only that a hundred stoves like these *had been sold* in Vermont, but that they had been sold *by him*. If this witness, therefore, is worthy of credit, (and he stands entirely unimpeached in every respect,) there can be no doubt that the plaintiff's right have been violated by the defendant, if, in fact, it shall appear that he has any which the law can protect.

But the great question is, whether he has any such rights, and the solution of that question is to be found in the patent itself.

And here I may remark, that much has been proved and said in relation to the inventions of Town and Gould. The evidence upon these points is only important in one point of view, and in that it will be here considered. It shows that the materials, or component parts, of Stanley's stove are not in themselves *new*; and if the plaintiff claims a combination of things, he has evidently taken old materials to form his machine with, whatever it may be.

In relation to this part of the case, I would observe, that the particular words used in the specification and summary of this patent are of no importance. The office of words is to convey ideas, and our province is to determine what the party intended to express by the language employed. Did the patentee intend to claim the discovery of a *principle*, in the abstract or philosophical sense of that term? or did he intend to describe a contrivance, or machine, new and dseful in reference to the purpose for which it was produced? He claims in his summary, "*the* revolving top plate," as a constituent part of his invention, and the first inquiry is, whether, before the use of Stanley's stove, a contrivance had been used by which the utensils to be heated had been brought over the fire, by means of a top revolving upon its centre. If the patentee claims this revolving *motion* as his own discovery, in its application to a cooking stove, he evidently includes in his patent that which is not his own discovery; for Town's stove had a revolving top, or drum, intended to accomplish the same object, by means somewhat similar.

It is very possible that Town could not maintain a patent for that invention, because he long ago gave it up, and abandoned it to the public. He did not, however, abandon it to the *plaintiff*, and all other persons might use it as well as he. If Town's discovery was abandoned, the only claim to it which Stanley can maintain, is the use of the thing as a part of his combination; and here we must determine what Town's invention was.

It is evident that he invented a revolving drum or top of a stove, to convey vessels to and from the fire by a rotary motion, and concentrate the heat around them when placed there. This contrivance he gave up, or abandoned, because it was useless, that is, useless in its then combination, though not in the abstract—for the principle or contrivance, as to the revolution, remains. As a cooking machine, the stove of Town was good for nothing; but its revolving motion might be made useful when brought in connexion with other constituents properly adapted to the objects in view.

The same remarks are applicable to the raised cones, or collars, and the flues. Each of these was old, and each had before been used either by itself or in other combinations. Stanley himself had used the collars in his own stove, as far back as the year 1828. So had Wilson—and this part of the machine is confessedly old. So with regard to the flues. If Stanley was the inventor of these, he had abandoned them to the public long before the date of his patent, and he cannot, therefore, now claim them

as the subject of a patent. But the question is, whether Stanley *does* claim these materials or constituents as his invention?—for if he does his patent is void. He would then claim as his own the discoveries of others, or endeavor to maintain that which he had, by use, dedicated to the public.

If, on the other hand, the patentee claims a *combination* here, and nothing more, then I have no hestiation in saying that his rights are secured. If he goes for the elements or constituents of his machine, his patent is void, but if he merely claims a new combination of old materials, his rights may be protected. The patent itself is somewhat obscurely drawn, but the invention is useful and meritorious, and I am disposed to give it all the protection which the law will allow. A liberal construction should be given to these instruments, nor should a severe criticism be bestowed upon language used, for the most part by the inventors themselves, who are, in many cases, altogether unskilled in the use of technical terms. We are always to ask ourselves on these occasions, what was the intention of the writers, and if that be discovered, the particular words used are altogether unimportant.

With these views, and under these considerations, I proceed now to give you my notions as to what this patent contains. It concludes with a summary in the following words:—"the *principle* for which I claim the invention, and for which I ask letters patent," is "the revolving top plate or fixture into or on which are placed the principal utensils used in cooking," &c.

By the patent law, the party is required to describe that which he makes, that the public may understand *the thing*, and be able to construct the like after the patent shall have expired; and hence there is a necessity for a proper observance of this requirement of the act. In this case, the plaintiff claims the specific thing set forth in the summary, and we must turn to the specification in order to understand what that thing is. The term used in the summary is "principle," but a reasonable interpretation must be given to it, or no sensible exposition of the parties' meaning can be obtained. He evidently did not intend to claim the discovery of an abstract thing, or entity, but some tangible mechanical contrivance, described in the specification. By "*principle*," he evidently intended a contrivance or thing described; and as there is no magic in words, we may fairly give this interpretation to the term used.

The plaintiff then patents *this* "revolving top plate," with its collars and flues, but instead of describing his invention as it really is, a *combination*, he describes the constituent parts. His improvement consists of a combination, and he should so have described it, and I have no doubt that a specification may be drawn which will secure all his rights. If the plaintiff had properly described his invention as it actually exists, his patent would have been good, for then the combination would have appeared.

RAILROAD AND CANAL INTELLIGENCE.

BOSTON AND PROVIDENCE RAILROAD AND STEAMBOATS.

We find from the eastern papers that since the commencement of the travel this spring, every arrangement calculated to give satisfaction to the public has been made. The regulations upon this road are such as to obtain credit from all parties. In connexion with this road are to be found several of the finest and most comfortable sails upon our waters.

NEW-YORK.

Tunnel under the Hudson River.—The bill to incorporate the Albany Tunnel Company, has passed both branches of the Legislature, and become a law; the amendments of the House having been finally, and very satisfactorily disposed of yesterday.

The bill provides that the Tunnel, for a distance of 300 feet from and east of the pier, shall be twelve feet below the lowest low water mark, as defined by the United States survey; and that the crown of the arch shall be eighteen inches below the bed of the river. It will of course pass, by a gradual elevation, from the place of the greatest depth, to the shore at either termination. The clear inner width of the Tunnel will be about 24 feet, and the height 12 feet. The site is of course not yet decided upon; but the general impression seems to be that its entrance into Market-street will be through Maiden-lane, which, having been recently widened, is admirably adapted to the purpose.

The directors named in the bill are Joel B. Nott, Stephen Van Rensselaer, jr., James Stevenson, James Vanderpoel and John Townsend.

Facts and estimates, we have reason to believe, will soon be presented to the public, showing its entire practicability, at an expense that will warrant the undertaking, upon a scale commensurate with the magnitude and importance of the object.

This is one of the greatest and most valuable charters ever granted by the Legislature of this State. It is also one of the most liberal. It is in perpetuity, and without a reservation of the power to modify or repeal. Very liberal time is granted also in relation to the period of completion. Upon the whole, the passage of this bill may be regarded as a measure of the highest importance to the company.

It is due to the representatives of the city of Troy, to say that their course in relation to the progress of the bill, has been characterized by great liberality; and that, notwithstanding the supposed rivalry existing between the two cities in some respects, they promptly and honorably facilitated its passage.—[Argus.]

NEW-JERSEY.

A Railroad is about to be constructed between Burlington and Mount Holly. The charter authorises $70,000 stock; the estimated cost is $35,000 for the seven miles of road.

The ground is said to be very favorable, no inequalities of consequence occuring on the line.

The money received by the stage owners on this line for passengers only amounted to $3,100 for the last year. This alone will pay more than 6 per cent., without taking into account the transportation of goods.

PENNSYLVANIA.

A number of the laborers on the Susquehanna Railroad having struck for higher wages, and evinced a disposition to interfere with those who continued at work, it was found necessary to despatch a company of the fine Volunteer Militia of this city to quell the disturbance. Three of the ringleaders were arrested, brought to the city and put in confinement to answer for the offence. No further difficulty is apprehended.

VIRGINIA.

Richmond, March 29.

Travelling facilities are now complete from this city in every direction. The Railway cars set out daily for the Rivanna river, on the Fredericksburg route, and the steamboat Thomas Jefferson leaves here every Sunday, Wednesday, and Friday, for Norfolk, connecting with the bay boats, for Baltimore and Washington. The brightening weather and the spring business will soon give an impulse to locomotion.

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Expedition between Richmond and New-York.—We understand that the President and Directors of the Richmond, Fredericksburg and Potomac Railroad Company, are making arrangements which will enable travellers leaving New-York in the morning, to be in Richmond the next day to dinner; and on the other hand, will enable them to leave Richmond after breakfast and be in New-York the next evening.

It is anticipated that a line leaving New-York in the morning, will come to Philadelphia, and then reach Baltimore about eight in the evening; that after the arrival of the line at Baltimore, a train of cars will leave that city for Washington, and arrive in the latter place about eleven; that the steamboat will then leave Washington for Potomac Creek, and by means of the connection with the stages and Railroad, travellers will get to Richmond at the time above mentioned.

So travellers leaving Richmond after breakfast will get to Washington by three next morning, thence to Baltimore by six, and to New-York in the evening.

Under this arrangement a person leaving Richmond between breakfast and dinner would reach New-York as soon as the mail which should have left Richmond the previous evening, that is, if the hours for the mail should remain unchanged.—[Compiler.]

GEORGIA.

The following gentlemen have been elected Directors of the Central Railroad and Banking Company of Georgia, for the office at Macon.

J. Cowles,
J. Goddard,
R. Collins,
D. Ralston,
F. H. Welman,
Wm. Solomon,
R. A. Beall.

OHIO.

List of Acts passed at the last Session of the General Assembly.—General State Improvements by Canal or Slackwater.

To provide for the extension and completion of the Miami Canal north of Dayton; to improve the navigation of the Muskingum river; to provide for the construction of the Hocking Canal; to improve the navigation of Willis' Creek; to im-

prove the navigation of the Walhonding and Mohican waters; to provide for the completion of the Warren County Canal, and the adjustment of the claims of the company.

To Incorporate Companies.—To Construct the following Railroads.

The Chillicothe and Cincinnati Railroad; the Fort Wayne and Piqua Railroad; the Ohio, Maumi and Wabash Railroad; the Vermillion and Birmingham Railroad; the Ashtabula, Warren, and East Liverpool Railroad; the Cuyahoga and Erie Railroad; the Hanging rock and Lawrence Furnance Railroad; the Cleveland and Warren Railroad; the Toledo and Sandusky Railroad; the Ohio Railroad; the Columbus, Delaware, Marion and Upper Sandusky Railroad; the Cleveland and Pittsburgh Railroad; the Columbus, London and Springfield Railroad; the Newark and Mt. Vernon Railroad; the Mansfield and New-Haven Railroad; the Bridgport Cadiz, and Sandusky Railroad; the Cuyahoga Falls Branch Railroad; the Circleville, Washington, Wilmington and Cincinnati Railroad; the Maumee and Kalamazoo Railroad; the Wellsville and Fairport Railroad; the Melmore and Republic Railroad; the Cincinnati and Western Railroad; the Little Miami Railroad; the Muskingum and Columbus Railroad; the New-Haven and Monroeville Railroad; the Akron and Perrysburgh Railroad; the Urbana and Columbus Railroad; the Columbus and Marysville Railroad; the Stillwater and Maumee Railroad; the Conneaut and Beaver Railroad; the Cleveland, Columbus and Cincinnati Railroad.

To Construct the following Canals.

The Franklin Canal; the Sandusky Canal and Slackwater; the Chippeway Canal; the Belleville and Bolivar Canal; the Mt. Vernon Lateral Canal.

FLORIDA.

The Railroad from Bayou Columbus to this place, is now completed, or is so far done, as to enable Cars to cross from one depot to the other, and is open for the transportation of merchandise.

Heavy shipments of goods have been ordered from New-York, New-Orleans, and elsewhere to this city, by the interior merchants, and contrary to the expectations of many, it is now well ascertained, that most of the spring and summer business will be transacted here.

We also learn that the steamers Reindeer, Hiperion, and several others on the river, are to commence their trips from the depot to Columbus in a few days, and will discontinue their trips to Appalachicola entirely. This Railroad was the last one chartered by the Legislative Council, and is the first in operation in the Territory. The enterprize has proved entirely successful, and there is nothing in human power that can destroy its prosperity and future greatness. —[St. Joseph's Telegraph.]

MISSOURI.

St. Louis, March 8, 1836.

The Railroad meeting on Saturday last was composed of the most substantial class of our citizens—those who have the capital, and in whom the disposition exists, to forward the work without delay. Another project received the attention of the meeting, which is of great interest to our city, and if successfully entertained will make it one of the greatest manufacturing and commercial places in the Union. We mean the projected Railroad to the lead mines of Washington and Franklin Counties, and iron mines in the same region of country, and eventually extending it to the rich agricultural counties in what is called the Kickapoo country. A country of immense extent, with the richest mines in the world, may, by this means, be brought to our doors. We hope, that the committee appointed on this subject, will not let the matter rest, but will at once set about procuring the information necessary to enable their fellow citizens to act understandingly upon it.—[Republican.]

From the London Mechanics' Magazine.

SELECT COMMITTEE OF THE HOUSE OF COMMONS ON ARTS AND MANUFACTURES.

(Continued from page 5.)

MINUTES OF EVIDENCE.

Thomas James, Esq., examined:

The fabrics that I am best acquainted with in our house are silk manufactures; with respect to color, ever since the introduction of French goods, I think we have had a very considerable improvement in the colors, and in the patterns of the English silk manufacture, particularly in the colors—not only in the plainer, which may be called prismatic colors, but in those colors which are creations of fancy, the shades have been much more brilliant than we used to have them. The importation of French silks has almost entirely ceased in consequence of this improvement. The power of producing finer colors on the part of our manufacturers has increased,—as also there has been an increased degree of good taste in appreciating the colors. This improvement has been perceptible since the more free intercourse with France. Referring to Manchester and Macclesfield, the time the country manufacturers came to London, to attend the periodical sales of silk at the East India House, it was their custom to come to our house and other houses of our class, and obtain from us patterns of the shades of different French goods that we had bought or imported, and the imitation of these goods and patterns has led to these improvements, or at least has been co-existent with it. From the excellence and beauty of our fabric, if silk was still to advance and become dearer, the public would always repay that by an increased consumption. The difficulty of selling a bad shade of color, whenever it does occur, is increased considerably on account of the general appreciation of good colors. Until the last two or three years, the production and consumption of figured British silks was a mere trifle, but within the last year the production and consumption of British figured silks has been very considerable. The figures are smaller, and I think more beautiful in form than formerly. Combining the beauty of design with a certain degree of neatness as well in tint as in color, the silk manufactured in England has materially improved. Formerly they were most apprehensive of the figured silks from France, and the contest in them was thought hopeless, but there is now executing in Spitalfields a considerable order for figured silks for America, where, of course, they must meet the French under no circumstances of protecting duty. If, then, the beauty of English manufactured silk goods is so materially improved, from our manufacturers having the opportunity of seeing the French, there is a still greater capability of improvement, if more means of improvement were placed within their reach. I think a matter of the first importance would be to give to the parties who originate patterns a property in the patterns for such a length of time as would repay the outlay and encourage the production of patterns. The Committee is aware that such a protection is given to the printer. When a pattern is framed on printed cotton, the party is protected by the law in the exclusive right of the pattern for three months, and I would suggest that protection should also be given to patterns framed in the loom. It will be in the recollection of the Committee, that some years ago an India handkerchief was almost the distinguishing mark of a gentleman; every gentleman had one in his pocket. India-printed handkercheifs of very common patterns were sold at from 7*s.* to 10*s.* a-piece; now the great consumption of India handkerchiefs is by the importation of the unprinted cloth, and they are printed in this country with English patterns, but the cloths printed in India are now principally sold by hawkers to the lower class of consumers. In our figured patterns we borrow very largely from the French. It is very desirable that we should create an original taste here; we are still behind the French in ribbons and shawls; we borrow our figured patterns from France, in a principal degree. From the decided advantage that we have from China silk, and our application of China silk, I do not fear that we shall decidedly beat the French in figured as in plain goods. I have heard that the French government sent a mission some few years ago into the region of Cachmere, both to introduce Cachmere goods, and also to speculate on the production of Cachmere shawls.

Mr. Thomas Field Gibson, examined:

I am a silk-manufacturer in Spitalfields. The description of figured silks which we are now making in Spitalfields are of a very small and insignificant kind; they are not of the large class of patterns. That is, the general class of patterns that are now making. They are almost entirely copies or variations from French patterns; there is but a very small degree of talent employed in Spitalfields in the production of patterns. We are almost destitute of original taste in that particular department. The French patterns are generally given to the pattern-makers by the manufacturers, and they either copy precisely, or make variations, as the manufacturer's or their own taste may suggest. I am not acquainted with any drawer of patterns who is an educated artist. A good pattern-drawer may obtain from 100*l.* to 200*l.* a year; but the remuneration varies with the description of pattern. It is also mixed up with a remuneration given for reducing the design to the mould, or cutting the card, which is necessary for the weaving it in the looms. I think that

the two difficulties under which we labor at present, are, first, that we have no protection for patterns, so that if I make an outlay of from 20*l.* to 100*l.* upon a pattern, it may be pirated to-morrow by my neighbor, and I should have no compensation for it; and the second difficulty is, that we have no national taste in this department of art, that we have no originality in design in drawing of patterns, that we are compelled to make copies from French patterns in order to supply the demands of our customers. I think a school of arts open to persons connected with the manufacture of the country would be of high value and importance, coupled with the protection of patterns; but without a protection of patterns, no shool of design would be of any advantage to us. It is not to be expected that the master-manufacturers would undertake any part of the expense of such an establishment. The utmost that could be expected from them would be to give their time and attention to the arrangement and working of the system; and I believe the fact is, that in France the government, or the municipal authorities, or both together, do pay for the whole cost of the establishment. If the general taste of the nation was improved, it would be beneficial to our manufactures; and I would add, that ours is a manufacture which is capable of such extreme variety in shades of color, in the blending of shades, and in producing various forms of pattern, that there is hardly any one to which the exhibition of all works of art in which colors are concerned would be more beneficial. A protection for patterns should be for not less than twelve months. I can give a reason why a season or six months would not be a sufficient time. I was manufacturing a pattern in silk during the spring, to the order of a large house of business in London. I received orders from them to continue the manufacture of the same pattern in autumn colors; but in the last month this pattern was taken to Manchester and manufactured there. The order which I had received for the winter article was immediately countermanded, because it was produced at Manchester at a much less price. A heavy fine should be inflicted for piracy. Sometimes there are more than 100 pieces of the same pattern. It more often happens that there are less than 100; more often than not. According to the average return from the Chamber of Commerce at Lyons, the number of pieces made of fancy goods of particular patterns does not exceed 20 from the frame; what is the average production of England of the same manufacture, I have no precise knowledge of—but I should say double, at least 40. In French silks, in some cases, a very large profit is paid to manufacturers on condition that they shall produce a small number, and then destroy the design. A pattern should be protected by registering the actual pattern. With regard to printed goods, the custom is for the parties to print on the end, "engaged for three months," and after that period it may be copied by any body; that would be a sufficient protection if it was extended, as I said before, to twelve months—whatever registration took place should be a public and authentic one. The registration and location of patterns, representing the state of protection in the particular trade, would be in itself a great means of advancing and improving the manufacture. There are no superior weavers solely employed in weaving patterns, and there is a good reason why this is so; a weaver could not himself produce the pattern to the manufacturer in the same way as he does at Lyons, because in London he is not possessed of machinery by which he could do it; the machinery belongs to the master manufacturer here, but in Lyons it belongs to the weaver. I have heard that in France, after the design has been produced, the weaver introduces a considerable modification into the pattern itself.

Mr. John Howell, (of the firm of Howell and James, Regent-street,) examined:

The manner of choosing our patterns or goods is as follows: it is usual for the Lyons manufacturers to come twice a year to England, that is, in the spring for the autumn, and the autumn for the spring, and they produce perhaps 200 or 300 patterns, not paper patterns, but silk patterns or gauze patterns, or whatever it may be, and from these patterns we make our selection; and it sometimes happens that we have so good an opinion of certain patterns, that we say, "Now you must withdraw that, it must be made for us only," and for 20 or 30 pieces they will do that. Now, the English manufacturers never give us that advantage, they think it very expensive to put to work a pattern to show us the effect of it, for it looks so different on paper to what it is in reality, that we cannot decide whether we shall have it or not, and we often urge them to bring us a little piece ready, to see the effect of it; sometimes we want color, sometimes we want a little change in the disposition; but there has always been an objection to the expense incurred, and therefore we are obliged to bear the expense if we are content to order from a paper pattern; we have sometimes found it necessary to ask for a pattern-drawer or designer; not a pattern-drawer, because they are distinct businesses. I never found a good designer in England; a pattern-drawer is a different thing altogether; he is the man who puts the thing comparatively to work, as an architect designs the building of a house. Neither have I found a good pattern-drawer; the designer gives us a small pattern, and the pattern-drawer is the person who prepares the work; as an architect gives a drawing to the builder, so does the designer to the pattern-drawer. I think there are not so many persons that are capable of doing it in this country as in France; the pattern-drawer is the medium between the designer and the weaver. After the peace with France, I found the manufactures of France were superior to those of England; I mean in regard to silks of all descriptions; but I think a great deal of that arose out of having made use of better material; the natural silk of France has been considered better than any other country, but now we have an importation of that natural silk, and it is manufactured here. The importation of raw silk from France, by reason of its superior quality, has beneficially acted upon the English manufacture; I found their silks better the moment I had an opportunity to go and see them; but I have found them declining every day since; every time I go to France, I find the French silks are not so good as they used to be, in point of material and workmanship; they appear to be desirous of a large trade rather than a small good trade; the English manufacture has improved in a greater ratio, perhaps, since then. France is superior to us in design, but it is confined to very few houses; there is only one house at Lyons we can deal with largely, because their taste is always superior. I am speaking of design. We keep all our patterns; patterns fifty years old are very useful to us at this present moment. The French pay great attention to pattern shawls; they will give three or four hundred pounds for a Cachmere shawl, or India shawl, for the sake of the pattern. The shawls that were exhibited at the Exposition in France, were superior to the India shawls; the patterns are superior in the manufacture, as well as the combination of colors and design. It is all superior. I believe they have a superiority of machinery in the manufacture and execution as well. Will the Committee allow me to exhibit some pieces of paper, to elucidate the connexion between silk and other materials, the manufactures of the country? It shows how the introduction of good patterns will give a taste or style to other materials; it is intended for rooms in lieu of silks; and instead of costing two guineas and a half, a yard would only cost 2*s.* 6*d.* The inventors are De la Rue and Company, Bunhill-row.—[*Mr. Howell then produced to the Committee patterns of various colors.*]

Mr. Robert Harrison, examined:

In designs and patterns in the silk trade we are very inferior to the French; and that is the principal difficulty under which we labor at the present time. We have not been able to find persons in this country who are capable of giving proper designs; the principal difficulty arises from the circumstance of men not having been brought up in this country to design for silk; it is very different to designing for printers, from the circumstance that it is necessary a man should be conversant with the principle of weaving, before he can make a proper design for silk. If we could only get designs in this country, we should be able to find parties that could put them on ruled paper for weaving. There is nothing but what we could make, provided we had a proper designer for the purpose of drawing patterns for weaving; and I think the principal difficulty arises from the circumstance of not having any school of art in this country, where young men would be enabled to pursue their studies for the purpose of perfecting themselves in drawing for that particular branch of the manufacture. There is no want of talent in the country, because there are a great many persons engaged exclusively in the production of designs for printed cottons, challis, and bandannas; we have in the trade individuals who can draw patterns, but are not conversant with the principles of weaving, and therefore we have been

unable to put those patterns to work. We have now many patterns by us which are perfectly useless, because the drawing is not adapted to weaving. We would willingly, at the present time, engage a man at a handsome salary, conversant with the principle of weaving, as a designer, and also able to put the patterns upon paper. Foreigners are not superior to us in their colors; there is a brightness in their colors we certainly do not possess, but I think our colors are more permanent. The dying of colors has certainly improved within the last few years, and in many cases, the permanency of colors decidedly is more so than the French. It is necessary to have a perfect chemical knowledge before a man can be a good dyer. I understand the peculiar brilliancy of the French colors arises from the climate more than any thing else, and the water has something to do with it as well. It has occurred to me, if we had a school of arts established in this country, that a great many young men would be willing to make themselves conversant with the principle of weaving, for the purpose of procuring that particular study, and ultimately to become designers and drawers upon ruled paper for the silk trade. It would be a lucrative profession.

Mr. George Eld, Mayor of Coventry, examined:

In consequence of the public attention having been directed to the subject, I made some inquiry with a view to ascertain the number of persons engaged in the ribbon trade, and who had any knowledge of the art of desiging in Foleshill; with a population of 7,000, I could not find more than six persons in the whole parish who were capable of copying a pattern, and not one capable of making an original design. At Coventry there is a drawing class connected with the Mechanics' Institution of that town, but it is as yet quite in its infancy. The inhabitants of Foleshill presented a petition to Parliament, in which they prayed for assistance towards establishing a school of design as connected with the ribbon manufacture. I think the operative weavers would eagerly avail themselves of such means of improving their taste and knowledge of art, if those means could be afforded; and I may mention, as an instance of that, that I was conversing one day with a weaver in Foleshill, and stating to him my wish to see the establishment of some school of design in that neighborhood; he said it would be a good thing, and the next morning his nephew waited upon me; he said his uncle had mentioned our conversation to him, and he very much wished that something of the sort should be established. He brought with him some patterns which he had made himself, and was anxious that I should assist in setting on foot something of the sort in Foleshill; a register of patterns; or, in short, to establish a school of design. A mere drawing school would be of very little use, unless it was accompanied by lectures on the art of drawing and design as applicable to manufactures, and as showing the means of transferring the design to the article to be produced.

Are you aware, that, at present, new patterns are invented at Coventry and at Foleshill?—I think very few original patterns are invented; but not being a manufacturer myself, I cannot speak very accurately to that.

You have stated that there is a conviction on the part of the operative weavers that such establishments would be of utility to them?—Yes.

There is a willingness, therefore, on their part, to improve their taste and to acquire a greater knowledge of the arts?—Certainly.

Do you conceive there is any want of native talent, if properly encouraged?—None at all.

In fact, then, in your opinion, it is only doing justice to the natural talents of the manufacturing population to give them the means of acquiring a better knowledge of the art of design?—Certainly.

Do you think, if some encouragement were given by government, or by Parliament, for the establishment of schools of art in certain districts, that local assistance might also be obtained for the same object?—Yes, I think so, certainly.

You think there would be no unwillingness to assist, on the part of the inhabitants of those districts?—I think there would be great willingness.

Have you any public collection of pictures at Coventry or Foleshill?—No, there is none at Coventry, and Foleshill is a mere village, with very few opulent inhabitants.

Then the manufacturing artist has no external means of acquiring a taste in the art of painting?—No.

Is there any museum for patterns at Coventry?—No.

Or of machines?—No.

Is botany a study at all attended to by the manufacturing weavers?—No; there are some collections of natural history, principally of birds, at Coventry; but I have not heard that they have turned their attention to botany at all.

Have they any means of acquiring a knowledge of the effect of a combination of colors?—No.

Is chemistry a science which is at all attended to by the operative weavers?—No.

Is it not attended to by the dyers?—I do not know.

In your opinion is there a sufficient number of opulent inhabitants in Foleshill to establish institutions to promote instruction in the arts among the manufacturing population?—At Coventry, I think, very material assistance could be derived, not only from the opulent inhabitants, but from the established school of that place. There is a school called Bablake School, which is under the patronage of the corporation, in which I think drawing and design, as applicable to manufactures, might very easily be introduced. I think the funds at the disposal of government would very much assist, with the aid of the local institutions, such as Bablake School, in which, if the boys could be taught the arts connected with the occupations in which they are afterwards to be engaged, it would be very advantageous. A central school of art for the instruction of teachers would be very useful, as it would provide for a general direction of the schools. The instructors, taught in London, from the circumstances of the immensity of the population, the number of public galleries, and the habitual intercourse that exists among individuals of all nations, would certainly have superior facilities for acquiring knowledge in all branches of art.

Mr. Robert Butt, of the Bronze and Porcelain Department, at Messrs. Howell and James, examined:

I consider, that, with a few exceptions, in metallic manufactures the French are vastly superior to us in their designs. The exceptions to which I allude are more particularly to manufactures in silver, to gold, jewellery, and to castings in iron, in which I think we excel them in design. In some branches of the porcelain manufacture the French are superior to us in design, in others they are inferior. In that description of porcelain which is of the same nature as the old Dresden china, ornamented with raised flowers, we are vastly superior to them, and a considerable quantity of such porcelain is, I believe, annually exported to Paris, and is sold there, and considered by the French superior to their own; but with the exception of porcelain in which the designs are in relief, theirs are superior to ours. The French are superior to us in their designs in bronzes, and some other metallic manufactures. In the term "bronze," we include not only that which is strictly bronze, but all articles cast in similar metal, whether gilt, or-molu, or otherwise, such as human figures, figures of animals, and the ornaments of clocks, candelabra, and so on. The superiority of the English in the one case, and the superiority of the French in the other, is accounted for by the superior costliness of the articles to which I allude in England, as compared with those of France, enabling English manufacturers to give high prices to artists to model or design their patterns, particularly in silver; but with respect to articles of an inferior value, the French are superior to us in their designs, from the greater cheapness of art in that country. In the less costly articles for which art cannot be so highly paid, there is not a sufficient supply of art at a cheap rate for the purposes of the manufacturer. For instance, a silversmith who pays highly for a design, and produces a very costly article, could afford to go to a Flaxman or a Stothard, as artists who could furnish a design; but the manufacturer of articles which come within the range of the less opulent classes of consumers could not afford to employ them. Articles in bronze are of sufficient importance to require the employment of able designers, yet they are not of sufficient importance to demand the assistance of art to be paid for at the same rate as it is for manufactures in silver and such costly materials. I mean particularly to allude to the richer description of silver articles manufactured in England. But similar designs for bronze may be obtained at a much lower rate in France. The reason the iron manufactures will pay for the employment of able designers, and those in bronze will not, is because castings in iron, such as I allude to, that is, for architectural embellishment, have a very extensive sale in this country, and we

have no foreign competitors in that branch of manufacture, but for bronzes there is not an extensive sale, and we have the competition of the French to contend with. I attribute the general excellence of the French in the design of manufactures to the facilities afforded to persons of all classes in France for acquiring a knowledge of the art of design, and the corresponding difficulty to any but persons of comparative independence of obtaining similar instruction in England. The advantage which arises to the French workman from that knowledge of the art of design which the public institutions of France enable him to obtain, consists in the circumstance that he is thereby enabled frequently to make his own designs and models, and if not sifficiently instructed to do that, he is at all events enabled to finish works executed from the models of others with superior accuracy, so to give them their proper articulation and feeling, particularly in human figures and figures of animals. I may say, in continuation, that this is rarely the case with English workmen; and the advantages which the former consequently possess, are conspicuous in the beautiful figures which decorate the clocks, candelabra, vases, &c., which are imported from the continent, the grace and expression of which (however well modelled by the artist) would be entirely spoiled by an injudicious finishing of the muscles, draperies and extremities, by an ignorant workman. Independently of the workmen being instructed, the manufacturer is enabled to get models of great beauty executed at a reasonable rate, which is one of the causes of the great abundance of beautiful designs in France. I am inclined to think that the opportunities which the French have of studying the arts must give a certain tone and feeling for them throughout the country; but I do not know that any superiority in that respect exists among the middle class of France as compared with the same class in England. With respect to the upper classes, I do not think the arts can be appreciated in any country more fully than they are in England. There are very good works in silver filagree executed in this country; as good as Spanish or American, but inferior to the Indian. There is no considerable importation of silver filagree-work for sale. With respect to Germany, the natives are inferior to the French in design, as inferior as we are, or more so, with the exception of the iron works at Berlin. For putting the English manufacturer on an equal footing with the French, I would recommend the establishment of schools of design on a popular plan, which shall be entirely separate and distinct in constitution and management from any of the academies of painting and sculpture now existing in England; and in which it should be distinctly understood that the system of instruction to be pursued would not be intended to qualify the pupils for the professions of painting or sculpture, but merely to teach them the arts of designing and modelling with purity and taste, to be afterwards applied to any manufactures which they may themselves practice, or for the direction of the works of others. Such schools would operate to improve the manufacturing artist, by enabling young men to acquire a sufficient knowledge of the art of design, to qualify them for the double capacity of clerks and draftsmen or modellers in the counting-houses of manufacturers, who would thereby be enabled frequently to vary and improve the designs of their manufactures without much cost; the great expense of models and drawings by artists being one of the causes of the paucity of design in their patterns at present. I would observe here, that a parallel system obtains in the offices of architects and engineers, where young men are constantly employed in the capacity of clerks and draftsmen. Having gone through a certain probationary study, they are admitted as articled clerks until they acquire a thorough knowledge of their art, and after a certain time receive payment for their services. It would also enable apprentices in certain trades to acquire a knowledge of design, by agreement in their indentures to attend so many times per week at these schools, so that the study of the manipulation of their trades and the art of design might go hand-in-hand and bring both to perfection. I believe that this system is practised in France. The process by which a knowledge of the arts of painting and sculpture is now acquired in England is this: a young man receives tuition from a private master; he draws from the antique at the British Museum for a certain time, and when he shows that he has sufficient talent to qualify him for a student of the Royal Academy, he is admitted: but the expense of acquiring that preliminary knowledge is considerable, and the young artist must also be maintained by his relatives during the time that he is acquiring it. Open exhibitions of the finest works of all sorts in stone, paintings, bronze, and so on, would have a good effect on manufacturing artists, as giving specimens of the highest works of art. Every school ought to have its museum, the expense of the formation of which would not be great, for casts from the antique statues, busts, vases, candelabra, gems, coins, and so on, would answer the purpose very well. Such a museum ought to be open to the public under certain limitations, to prevent their interfering with the studies of the scholars. There can be no doubt that it would be of the greatest benefit to the manufactures of this country, by improving the taste of minor artists and workmen. The Acts of Parliament existing, for the security of copyright, as far as I know, on the subject of copyright in models or casts from models, afford protection to a certain extent, but the objection is, that they do not go far enough; the protection afforded by the law to models or casts in bronze and other metals extends only to such designs as represent human figures, or figures of animals, or part or parts of such figures. I may state, for example, that however beautiful the design may be, if it be merely a model of *Arabesque* scrolls or foliage of any description introduced into any work, such as clocks, candelabra, &c., there is no protection for it; it may be pirated with impunity.

The copyright in articles which the law now protects, is, in the first place, for a term of fourteen years, and for a further term of fourteen years in case the inventor be still living at the expiration of the first term, and has not sold his copyright. That is the law at present under the Acts of the 38 George III. chapter 71, and the 54 George III. chapter 56. By the last Act the protection given by the 38 George III. to models of human figures or of animals, was extended to human figures clothed in drapery or otherwise, and combinations of the human figure with parts of the figures of animals, and also to any subject being matter of invention in sculpture. It is very difficult to ascertain the true construction to be put upon the words "being matter of invention in sculpture," but my opinion is, that they would not extend to guarantee the copyright of any model or scroll work, &c., cast in metal, as in the instance of the iron gates of the royal entrance to Buckingham Palace at Hyde Park Corner, which are remarkably beautiful. Now, I apprehend that if casts or impressions were to be clandestinely taken from those gates, and another pair similar in all respects, but with the omission of the royal arms, were to be thereby made and sold, and the proprietors of the model were to bring an action for the piracy, it would be contended that there was no copyright in the design, as it would not consist of models of any part of the human figure or the figure of animals. Moreover, as it could be easily proved that the models of those gates were originally made in wax, clay, or some plastic material, and then cast by the founder in iron, it would be held that there was no sculpture in the matter, and that therefore they could not come within the meaning of the words "matter of invention in sculpture." They might be imitated, provided the King's Arms, which, of course, contains representations of animals, were omitted. This imperfection of the law applies to the proprietor of the model, whether he be the artist, or whether he has purchased it from the artist. By the copyright of a model is of course understood the exclusive privilege of making copies or casts from that model, which a manufacturer may purchase from the artist. The inventor of models which come within the Acts of Parliament as representing human figures or figures of animals, is, I think, sufficiently protected by the present law. I do not consider that the present copyright is for too long a period with a view to afford the inventor a fair protection, and at the same time with a view to the interests of the public, because articles of the nature of which I have been speaking do not sell rapidly; at first the manufacturer will sell but few, and it is only when they become known that he is repaid for his outlay. A provision ought to be made to protect the copyright of models in cases not of an exact copy, but of so near an imitation that one might sell as well as the other; for instance, a figure of Apollo, by altering the posture in the slightest degree, or putting a different drapery upon it. With regard to designs in jewellery, the observation I made as to the additional costlines; of articles of silver extend also to jewellerys

in England, our designs in jewellery are superior to the French designs. In this case, the manufacturer is frequently his own designer. I attribute the superiority of the English in designs of jewellery to the superior encouragement afforded in England to the manufacture of expensive articles in gold jewellery. In imitative jewellery, however, the French excel us, for there is greater encouragement in France for the inferior classes of ornaments than there is for the real; the propriety of the distinction that I draw between the qualities of the real and imitative jewellery of the two countries may be inferred from the circumstance, that immense quantities of gilt jewellery are annually imported from France, and but little or none in gold.

Mr. Charles Harriott Smith, Sculptor of Architectural Ornaments, examined:

My profession relates to the decoration of buildings; the exterior in stone, and the interior in marble; particularly such work as that about the exterior of the new National Gallery, on which I am now occupied; it is that particular department which I principally profess. The capitals and other ornaments, small monuments for churches, ornamentedc himney-pieces, &c. There is no difficulty in finding useful assistants, provided I can afford to give them a fair remuneration. The ordinary wages of a clever person, according to his abilities, about 2*l.* or 3*l.* per week. I design myself, but I work a great deal under the direction of architects from their designs. There are no national schools where students can obtain instruction; a few private academies. I have always found workmen who can draw, if ever so little, are more useful, and have the preference. I was going to mention a case in point, that recently occurred to me; I sent my foreman into Yorkshire with work; on his arrival, he found difficulties arose which he had not, nor had I anticipated, and by letter to me, illustrated by his sketches, he explained all that I could wish for. No one but a man conversant with drawings could have done that; similar circumstances are likely to occur to any man in business; and such men obtain, in consequence, higher wages. The workmen have gradually improved, which I attribute to good practice and emulation among themselves; also, the opportunity of seeing works of art, and the opportunity of practising upon works that are likely to improve them. The public demand for architectural ornaments increases, especially in my department. We are most deficient in the true spirit of the Gothic or old English style of carving; but what is strictly called architectural ornaments are more particularly a mechanical process, such as Corinthian and other capitals, friezes of regular proportional parts, &c.; but where trophies, draperies, and those sorts of things occur, they become more decidedly connected with the fine arts. The workmen are, of course, less skilful in that branch than the mere execution of the mechanical part, such as the capitals of Corinthian columns, because it approaches nearer to a work of fine art, and hence becomes more difficult to execute. Wages increase pretty much in the proportion in which the operative is removed from mechanical labor towards the production of art; those branches that are purely mechanical, and depend much on accuracy of measurement, such as the execution of Corinthian capitals, are done by ingenious common workmen, if I may so term them; when they are employed on work nearly approaching to fine art, which requires more study and mental comprehension, of course the men have better practice, and if they succeed, they demand higher wages, and are entitled to it. I think, that simply in consequence of the improved habits of artisans in my branch of art, it is desirable to give them further means of improvement, since their tendency is to a greater degree of refinement, and that they deserve encouragement by instruction, and opening public places of resort, where they will be made familiar with works of art. I have heard them express a wish to that effect. I have frequently heard them complain of impediments in the way of seeing works of art; and that the museums and exhibitions are not opened after their working hours, and that they have no opportunity of going to them, without not only having to pay for admission, but to lose their time, and of course it thus costs them much more than it does persons in easier circumstances. I think it would be desirable that those collections of works of art, whose influence upon the laboring population would be so beneficial, should be accessible to them at times when they could be visited without any great pecuniary sacrifice on their part. I have always considered that the best means of serving the industrious classes, is to increase their means of serving themselves. I have visited most of the museums in France, and I do not think them superior in designing. The French are more aware of the importance of employing artists to design for their manufactures than the English are. What I have observed as to the comparative merits of the same description of works in the two countries, is this: I think ornaments are as well designed in England as in any country, but the French workmen, collectively, are better educated in art than the English workmen; consequently the French artist has a greater facility of getting his designs well executed than the English artist. The French people, as a body, seem not to be so satisfied with inferior performances as the English are. Whatever deficiency of taste is displayed in our manufactures, arises not so much from want of taste in artists to design and in our workmen to execute, as it does from want of study and education in the arts among proprietors and conductors of establishments wherein classical design and execution forms an important feature. I am also of opinion, that the public, as a body, are not yet sufficiently educated in the arts to discriminate between pure classical elegance and meretricious finery. I am alluding to the public as a body in this country; and the dealers' study is not so much to improve the taste of the public, as to discover what goods will sell most readily, and produce them the largest profit. To mention instances in which our manufacturers giving employment to artists—Coade and Sealey, the artificial stone-manufacturers, formerly employed some of our most eminent sculptors; among others, the elder Bacon, and Rossi; Rundle and Bridge, the silversmiths, used to employ Flaxman, Stothard, Theed, and Baily, all of whom were eminent in the arts, to design and model for them. Wedgewood used to employ artists of eminence also. At the time they employed these artists they were doing an amazing portion of business. From what cause I do not say, but most of those establishments have changed their system of employing artists of eminence, and they have since employed inferior artists, of course at a much less expense. Whether that is the cause or not, I cannot undertake to say, but their business has certainly fallen off very much; they have now comparatively little or no business of any kind wherein the highest class of artists had been engaged, and the plan appeared to produce the most beneficial results to the proprietors. Works of art are not sufficiently protected, especially those departments of art which are more immediately connected with our manufactures; I mean that which I profess. There is a constant piracy going on, and in my own practice I may allude to it more particularly. It is impossible to protect myself sufficiently from it. Any original drawings or models, whenever I am out of the way, are liable, by workmen or others, to be pirated, and I have no remedy beyond that of discharging an otherwise valuable workman. The copyright of the sculptor, the 38 and 54 of George III., is understood in general not to include ornamental works of architecture; but if a case were to be tried, it would very likely take in all classes of sculpture; but the chance of recovering is too doubtful and expensive. I believe it never has been tried.

(To be continued.)

AGRICULTURE, &c.

From the Cultivator.

FARM BUILDINGS AND THE CONSUMPTION OF FODDER.

Among all the deficiencies which exist in the perfect management of our farms, I am sensible that none are more prominent than that of proper buildings. Not that I would advocate expensive or large buildings, but those of ample size and convenience for all the *legitimate* uses of the farm, and of such shape and construction as shall conform to strictly economical calculations.

For instance, I would not build an expensive *stone* barn on my farm, when one of wood, equally good for all ordinary purposes, can be erected for a sum not greater than two or three years interest on the cost of the stone one, because a well-underpinned wooden building, where extraordinary warmth and tightness are not required, wil endure at least fifty years, and need shingling no oftener than a stone building. So of stables, sheds, outhouses, &c. But not so of dwellings.

The desire of warmth with which human beings are sheltered, forms a prominent part of the comfort and usefulness of life, and therefore, all dwellings should be built

of the best materials, and constructed in the warmest manner, compatible with the ability of the owner. I have much doubt whether the occupant of an open, badly built house, does not pay three times the annual interest of its cost, in the extra fuel and labor consumed to keep its inmates comfortable; and among no class of people have I found so great an inattention to these very important matters, as among our moderate farmers; and when the annual losses by disease, exposure, extra labor of obtaining and preparing fuel, and of time in various ways, all arising from a cold and comfortless house, are taken into consideration, I am thoroughly satisfied that a great portion of the profits of a whole family's industry, are annually lost by the wretched houses they occupy.

The great fault committed by most farmers, in their buildings, is in the great size of their dwellings. Many who build, calculate to do it *within themselves*; or they get out their own timber, draw their own saw logs to the mill, if there be one near them; quarry and haul their own stone, &c. &c., and so manage as to hire but a portion of their mechanic work, turning in their own labor and that of their sons or hired men, if they have them, to assist in its erection. This is as it shonld be; but the difficulty is, that they often plan too largely, calculating on finishing off only a small portion of the house *at present*, and to do off the rest at some future opportunity of more leisure and convenience. But these future opportunities of leisure and convenience rarely occur, and so much more capital is often expended in the inclosing of a large dwelling than had been anticipated, or is at all useful to the family, that it remains forever unfinished, and a cold comfortless receptacle for them, when a snug, warm and delightful dwelling could be entirely finished, with every requisite comfort for a numerous family, at the cost of the unfinished shell! How painfully true is this fact in numberless instances!

This fatal error oftentimes extends itself to the outer buildings of the farm, alike prejudicial to all descriptions of stock kept upon it, and of most serious account in the year's results of its products. Fortunately, there is so little intricacy or science needed in the construction of farm buildings, that even the least skillul may erect comfortable and necessary shelters for all his domestic animals, and materials abound so plentifully in our country, that they are every where to be found. It is better, even, in my estimation, for a farmer to sell a small portion of his land, to accommodate the remainder with proper buildings, if he cannot do it otherwise, for he is actually richer in the end to do so; as for the most of them, the produce on an equal number of those acres would be annually wasted for the want of them, besides all the discomfort, misery, and suffering caused by exposure to the inclemency of the seasons. This may be unpleasant argument to those who are intent upon nothing but increasing the extent of their farms, regardless of the comforts or profits of their stock. Yet such, were they to pause in their acquisitions, and by the erection of necessary buildings on their farms, secure more effectually its products, would in a short time accumulate much more rapidly than before. I name these facts with more emphasis, because I am well assured by my observations throughout the country, that the want of necessary and proper buildings is the greatest drawback our farmers experience in the profits of their labor.

Of what avail is it that I reap fifty bushels of wheat, or an hundred bushels of corn to the acre, and lose one third of it for want of shelter, or waste in feeding? Unless I can secure my crop, my profit in growing it is of small account. If I cut fifty tons of hay, and, by exposure in stacks to the weather, only forty of it can be eaten by the cattle, and one quarter part of that even is trampled under foot, I had better have had only thirty tons of good hay in my barn, and even then my stock would have consumed five tons less by being warmly housed for the winter. This is a view of the case which I think must strike every thinking mind, and will apply itself to every kind of domestic animal on the farm. To my own mind it has been most strikingly presented by a year's experience, and I am of opinion that the difference in the consumption of food for the domestic stock of a farm, taking in all the losses incident to the forage itself by want of housing, &c., is at least *thirty* per cent., compared with the most economical method of expending it; and in some cases even *forty* or *fifty!* I am aware that this calculation will strike the reader with surprise, and by many it will not be believed; but to such I only say, try it, and he will become satisfied of its truth.

In the spring of 1834, the management of a large tract of land coming under my charge, portions of which had for years been most miserably mangled by a horde of squatters, who had cut, haggled, and worked the land after their own fashion, although abundantly productive by nature, I found it in a most miserable condition, requiring immediate care and attention. Numerous wretched log cabins were scattered over it with bark roofs; an occasional shed for cattle, with a parcel of old rails thrown over the top, and on them the remains of an old stack bottom, where their hay, stalks, or straw, had been stored, were all the buildings or conveniences to be found on the premises. Three or four of these little squads or settlements had been made on different parts of the territory, and each one comprised within its compass from one to two hundred acres of this partially cleared, girdled and dilapidated improvement. Having got rid of the squatters, and selected one of these settlements most conveniently located for immediate operations, and taken the best cabin, well situated and convenient for a dwelling, I put into it a good family, fit to manage the place, built an addition to it also of logs, put on a good shingled roof, and with a hundred or two dollars expense, made a very comfortable affair of it. With sufficient help on the place, the fences were straigntened and put into line, the old bouks, (*bocks*,) brush fences, logs, &c. &c., cleared up and tolerable crops got in. Having come into the place about the middle of April, it was too late in the season to make rapid advances, but in the course of the summer perhaps 30 acres of oats, 5 or 6 of corn, and as many of potatoes, were cultivated, and yielded a tolerable crop. A dozen acres of wheat were also sown in the fall, and perhaps 70 or 80 acres of land worked into tolerable shape for another season. Yet we had no barns nor the means of building any during that year; one wretched log stable, which stood near the house, was all that we had for shelter to any of our animals, and with that we shifted to get along. Our hay, of which we had some 60 or 70 tons cut from a distant clearing, our oats, corn, fodder, &c. &c., were all stacked out in the open air. Winter came upon us. With a few thousand feet of boards and the aid of crotches and poles, we made some sheds and mangers for our cattle, of which we had a large stock, composed of oxen and cows, and erected some racks in the yard to feed them in. By these means we got through the winter, after the fashion. Our cattle had enough to eat, and during the cold weather, looked tolerably well; but as the cold rain and snow storms of March and April came on, they grew poor in spite of all we could do. Food enough to keep in high condition double their number, if well housed, was given them, but all to little purpose. The storms wet the fodder in the stacks, the cattle trampled it into the mud under their feet, and with all the care given them, which was a great deal, I am fully satisfied that at least 25 per cent. of the food given them was entirely lost!

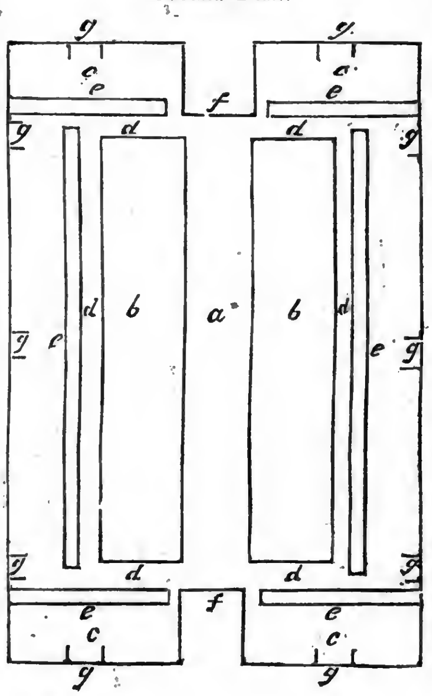
And yet this was better and more economical feeding than one half the stock of our country get on the average! It may be a bold and sweeping remark, but it is nevertheless a *true* one, and would every farmer make the experiments who thus practises, he would fully test its correctness. We had great labor to perform, and therefore submitted to the loss and inconvenience accruing to this mode of management. During the winter, we cleared up more of this *slashed* ground, inclosed it, drew off its wood and timber, and last spring had perhaps 200 acres of pasture, mowing and plough land ready for use. We were now ready to build a barn, and after the spring crops had been put in, proceeded to erect one proper for the uses of the farm. It was soon built, covered and inclosed, and by haying and harvest time was ready for use. It was placed on a central and convenient spot for the farm, which is a large one, and although this barn is 100 feet long, by 50 feet wide, and 18 feet posts, with leantos for stables on each side of it, with a floor 14 feet wide, lengthwise through the centre, more room will soon be required. It was a matter of much wonder and inquiry by my neighbors who saw the barn, of what possible use it could be, supposing it a most extravagant building, although, for the size, a very cheap one. Yet when we had cut and stored our hay, oats, and wheat, the barn was crammed full to the roof, on the floor and all. We housed every thing; all was put in, in perfect order and good condition. Ample room is there made to tie up every animal to be fed, and not a lock of hay or a spoonful of grain need be lost. The manure is all saved, and in a

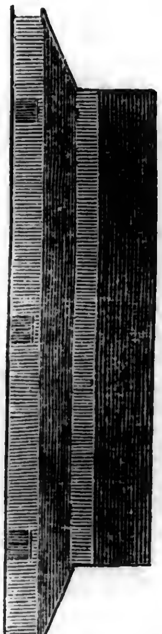
convenient situation to be carried out, and a degree of economy, comfort, and satisfaction experienced in expending the food to the stock, that amply compensates for all the extra expense. The hay and grain it contains is more than 150 tons, enabling us to feed out every bundle of straw and coarse fodder, which is in most cases altogether lost, or only used for manure: a plan of this barn is annexed.

There are so many collateral subjects connected with the barn and other outbuildings of a farm, that it is hardly possible to give an essay on this subject, without discussing the different methods and economy of feeding stock, with the preparation of the food, preservation of manures, &c. &c. But as the *principle* of feeding is the same in all kinds of neat cattle and horses, it will apply to all cases. In the first place, I hold that there is no straw, corn, fodder or grass cut on a farm, with the exception, perhaps, of the straw of peas, beans and buckwheat, but what may be consumed as *food;* therefore all reasonable pains should be taken to secure them in good order, and have them well stored and sheltered for winter food. How many thousand tons of valuable wheat straw have I annually seen in our wheat counties thrown out ftom the threshing mills, and piled up year after year to rot and taint the atmosphere with its offensiveness, when it might all be made into the best of food for cattle, by being housed and chopped with trifling labor! It appears with many farmers to be a matter of no sort of consequence *who* feeds the stock, or *how* they are fed, provided they are only fed at all; not considering that there is equal economy in expending the food as in securing it. Look at the season of haying and harvest among our farmers. What preparation for toil and incessant labor, increase of help, high wages, &c. &c. Up by day-break in the morning, and at work, and no rest till dark. It is the extraordinary season of the farmer, when every thing is sacrificed, even the Sabbath, oftentimes, to toil, and no cessation till it is all over. But when the winter comes on, this invaluable food, collected at so much cost and toil, is expended with a heedlessness and prodigality unaccountable to any rational or thinking mind. This, indeed, may seem foreign from the subject of which I am treating, but it is too nearly allied to it to be lost or overlooked.

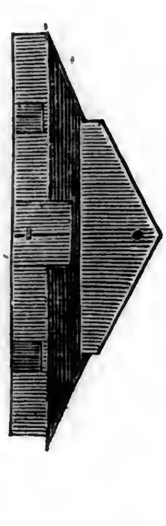
My own method of feeding is to cut *every* kind of straw, and even the coarse marsh or meadow hay, in the cutting box, and mix it with a light portion of shorts, bran or oat meal, just enough for the cattle and horses to eat it. In this way they consume every thing. Nothing is lost; for what they leave is taken from the mangers and mixed over again with the new mess. It is the exclusive business of one man to cut the food, clean the stables, and feed the cattle; and if he needs assistance, he has it. By this means he becomes acquainted with the appetite and health of each animal, a matter altogether important. If they be out of health, or need extra nursing or attention, he knows it, and provided for them. A change of food is occasionally given, and by this operation all is relished and eaten perfectly clean. We now feed about 40 yoke of oxen, 8 or 10 horses, 6 dozen cows, some sheep and young stock, all in this manner, though not all in one building, without any waste at all. Every thing is saved. Every animal is tied up in its place excepting the sheep, and each has its own portion without fear or molestation. I well know that they consume less food per head by thirty per cent. than they did during the last winter, when they were fed nearly, if not quite equal to, the ordinary method practised throughout the country. Our oxen, I am satisfied perform more labor, the cows yield more milk, and all the animals consume less food by being thus housed and attended. But to the plan of the barn. It is here given.

Ground Plan.





Upright—Side View.



Upright—End View.

Explanation.

a, barn floor, 14 feet wide.

b, *b*, bays for hay and grain, 18 feet wide and 92 feet long.

c, *c*, stables for cattle and horses, 13 feet wide in the clear.

d, *d*, passages to stables, 4 feet wide.

e, *e*, mangers for feeding, 2½ feet wide.

f, *f*, great doors, 14 feet wide.

g, *g*, stable doors, 5 feet wide, double.

Length of barn, 100 feet.
Width of do. 50 do.
Posts of do. 18 do.
Pitch of roof, 12½ feet.
Height of leanto posts, 7 feet.
Pitch of stable roof, 8 feet.
Length of side leantos, 100 feet.
do. end do. 38 do.

The barn is framed as if to stand alone, omitting the lower girt at the ends on each side of the large doors. The leantos are then framed on to the barn in the simplest manner—the passage being *round* the main body of the barn, excepting at the ends, where the passage is *in* the main barn, and the leantos there only 16 feet wide, and the manger is fitted up to the main barn. Only one passage is made to go into the short stables at the ends. Stalls are made 7½ feet wide and broad between, and each ox or cow is tied next to the partition side of the stall, which prevents their getting together, and saves much room. The doors are sufficiently wide to drive in a pair of oxen yoked, and large spikes are driven in the plates all round the stables to hang harness, yokes and chains upon.

The bottoms of the mangers are raised ten inches from the floor, and laid double. The sides of the stable are also battened with thin boards inside, which makes them perfectly tight and warm; windows with sliding shutters are made in the sides, to throw out the manure.

Girts run parallel with the main floor in the posts, across which are laid poles, nine feet above the floor, on which hay or grain can be piled up to the peak.

This barn will hold 200 tons of hay and 46 yoke of oxen, or 100 cows or horses. If only ordinary stock is kept, the *long* leantos need be only 18 feet wide, and the *short* ones 14 feet. Granaries can be partitioned off from the bays or stables, as may be convenient. If a threshing machine is used, a part of the stable can accommodate it. Its whole expense, finished complete, is about $1,500.

On this model, barns of any size may be built, and I am well satisfied that, according to the room required, it is altogether the *cheapest* in cost and simplest in construction of any plan I have seen. If a less proportion of stable room be needed, it may be omitted where convenient.

The passages around the ends of the bays and in front of the mangers, are for feeding the cattle, every thing being put in front of them. The passages are wide enough to carry hay, and when the bay is partially fed out, the hay may be thrown directly into the passages.

I would on no account store hay or other material over the cattle, under the stable roofs, although there is considerable room, as I am satisfied from experience, that there is none too much space left for ventilation.

The floors are lined with thin refuse

boards, excepting a part of the stables, it being my wish that *nothing be lost.*

This barn is placed on level ground, having no side hill convenient on which to place it. I would prefer, if possible, a sloping piece of ground, and make an ample cellar beneath it, to receive the manure, preserve roots, &c. &c. It will add to the expenses of building, but greatly to the convenience and economy of the farm.

This, it is true, is on a larger scale than is needed for an ordinary farm; yet many farms require as much and a larger quantity of barn room. If every thing be saved and housed that can be profitably expended in the feeding of stock, much more shelter is required than is supposed. If the farm be small, the size of the barns should be graduated to its wants. This plan has been closely examined by many farmers of great experience, and pronounced to be the best they have seen. The utmost possible economy of room is made for packing the hay and grain, and the stables are mere leantos, made of light frame, attached to the sides and ends of the main building. If wood covering for either of the sides or roof of boards and shingles are not to be obtained, they may be made of thatch. The bodies of the building may even be laid up of logs and covered with slabs, so that they be well chinked and comfortable. It is true that there is some waste room over the cattle in the stables, but no more than is wanted for ventilation and to pass off the respired air, which is deleterious to their health. The letting in of fresh air in cold and stormy weather, through the sides of the building, gives them colds and disease, to which they are as liable as the human family. But even if only sheds are wanted, I am satisfied that they are better to be attached to the sides of the barn in the way these stables are, than in any other, being more convenient, and allowing the stock to be fed in them with greater economy. The stables attached to this barn being for the accommodation of working cattle mostly, are wider than need be for an ordinary stock, and may be made narrower. But amongst all other plans, I have found none which combine the requisites of cheapness, economy of feeding and storage, like this. It has, withal, an appearance of snugness and comfort about it that greatly embellishes the farm.

If sheds are wanted in addition, they can be attached to the stables and run off in either direction, and accommodated with racks and mangers, as may be required. But every domestic animal on the farm should be fed at the barn, with the exception of sheep, which require, if kept in large numbers, a different and separate course of management. The custom of stacking hay or grain in the fields is at best a bad one, and if resorted to, it should be removed to the main barn as soon as the cutting season is over, or there is room in the barn to receive it. Small moveable barns are frequently built to store it in, and from them fed to cattle during the winter: but this, in the best of weather, is accompanied with waste, particularly in the manure, which is valuable even on the best of soils. It is, besides, much less labor to carry the hay either on sleds or wheels to the barn, and then feed it to the stock, than to go daily two or three times to fodder it out. So much has been said and written on the wasteful method of feeding at stacks, that at this time it is almost superfluous to mention it.

As to the other ordinary outbuildings to the farm, it is only material that they be conveniently and economically built. No farm house should, however, remain without a swill house, with a large cauldron set in brick, an ample wood house, wagon and tool house, corn-crib, &c., near by. As to the dwelling, it is a matter of fancy with many, and to those who have the ability, provided they make it comfortable and convenient, it matters little what is the shape, size or style of it. Still there is a model that I consider cheaper and more convenient than almost any other, and for those landholders and farmers who build for the accommodation of their tenants, I consider it a most excellent one to follow. I am about building one on a farm of my own for the manager to live in, sufficiently capacious to accommodate his own family and half a dozen hired men. Its whole expense will not exceed a thousand or twelve hundred dollars, and if oportunity offers, I may send you the plan in some future communication.

Most truly and respectfully yours,

L. F. ALLEN.

Buffalo, December 5, 1835.

From the Cultivator.

POLICERATE SHEEP.

MR. BUEL:—Sir,—Having in my possession a variety of sheep, which are not very common in this country, I have procured a likeness of the oldest buck, engraved by Mr. Hall, of this city, who I think has done himself great credit in the execution.

I obtained three bucks and nine ewes, in October last, from a farmer in Bethlehem, who procured the buck figured above, some five or six years since, from which he bred several bucks with four horns. The breed was originally procured, as I have been informed, from some emigrants. I esteem them more for their odd and singular appearance, than for any intrinsic value they appear to possess.

The specimen represented above, is remarkable only for his horns. The upright ones measure, from the base, twenty-two inches.

Buffon says, "One of the curious modifications produced by cultivation in the domesticated sheep, consists in the augmentation of the number of its horns; two, three, or even four supplementary appendages of this description being occasionally procured in addition to the usual number. Under these circumstances, the additional usually occupy the upper and fore part of the head, and are of a more slender shape and take a more upright direction than the others, thus approaching in character to those of the goat's while the true horns retain more or less of the spiral curve that distinguish those of the sheep. There exists a strong tendency to the hereditary propagation of its monstrosity, which is extremely frequent in the Asiatic races, but is also met with in a breed that is common in the north of Europe, and is said to have been originally derived from Iceland and Feroe Island. In the latter case it is unconnected with any other anamoly; but in the flocks of the nomad hordes of Tartary it is usually combined with the enlargement of the tail and adjacent parts, by the disposition of fat frequently to an enormous extent."

In the islands of the Archipelago, anp chiefly in the island of Candia, there is a breed of sheep of which Bellon has given the figure and description, under the name of *Strepscierus.* This sheep is of the make of our common sheep; it is, like that, clothed with wool, and only differs from it by the horns, which are larger and rise upwards, but are twisted into spirals. The distance between the horns of the ewe enlarges towards their tops; those of the ram are parallel. This animal, which is commonly called the Wallachian sheep, is frequent in Austria and Hungary, where its name is Zacke.

The more cold districts of Iceland and Russia afford a *many horned breed* of sheep, of mostly from four to seven or eight; having a coat of dark brown colored hairy wool, weighing about four pounds, and covering an inferior quality of short soft fur.

In Cyprus many of the sheep are policerate, (having more than two horns.) They all spring from the frontal bones, the crest of which is elevated in a peculiar manner, in order to form their base. The central horns are usually straight, or somewhat divaricating—occasionally they are spiral; the lateral ones assume almost every possible variety of curve. A cut representing one of the most frequent appearance of the Cyprus four horned sheep, is figured in the "*Library of Useful Knowledge—Farmer's Series.*"

CALEB N. BEMNET.

Albany, Jan., 1836.

BELL ROCK LIGHTHOUSE.—During the heavy gales of the month of October, the sea, for this early period of the season, broke uncommonly high upon the lighthouse, the foundation of which is immersed to the depth of the full rise at every tide. The light-keepers, in their monthly report (ascertained by the position of the perspective windows of the house) state, that the sea rushed up the walls to the height of from 60 to 70 feet, on the 5th and 6th; to 80 feet on the 11th and 12th; and to 70 feet on the 26th. On these occasions, the green seas collapse the lower part of the building, when sprays, as white as snow, shoot up, and in their fall, as seen from the balcony, produce effects truly sublime. To the mariner, passing at a safe distance from the rock, the lighthouse and its inmates cannot fail to suggest reflections somewhat awful. But habit has so trained the light-

keepers to this scene, that it excites no alarm, and in their monthly return, they go on with a detail of having caught a number of the birds which in storms constantly flutter about the light, and sometimes break the plate-glass windows. On the 23d, an immense flock of marrets and other sea birds occupied several hours in passing the lighthouse in their flight from the northward in the direction of the Isle of May, in the Frith of Forth. So uncommonly numerous were they, that it is supposed they must have been turned by stress of weather in their migratory flight.—[Montrose Rev.]

RAILWAY PHENOMENON.—On Monday last a gentleman of this town, who had taken his place in the hindmost carriage of one of the railway trains from Bolton to Kenyon, witnessed the following singular occurrence:—He was placed with his back to the engine, and had a clear view of the receding line of railway. The train was going down the inclined plane from Baglane to Leigh, at the apparent rate of from 30 to 40 miles per hour. A man who was standing on the side of the railway threw a stone about the size of a hen's egg in a horizontal direction, and with considerable violence, at the train. The stone was distinctly seen by the gentleman in its progress to the carriage in which he was seated, and, having attained its maximum of velocity, it appeared, like Mahomet's coffin, to be suspended in the air for a few seconds, within a foot of the gentleman's head. He seized hold of it, and he describes the sensation which he felt in doing so as somewhat similar to that which would be felt in grasping a stone, in a state of rest, suspended by a thread.—[Bolton Chronicle.]—[This is easily accounted for; both the train and the stone had attained the same velocity.—[Manchester Adv.]

NOTICE TO CONTRACTORS FOR EXCAVATION AND EMBANKMENT.

Proposals will be received at the Office of the Munroe Railroad Company, Macon, Geo., between the 19th and 21st of May next, for Excavating and Embanking the whole of the Railroad from Macon to Forsyth, a distance of 25 miles, embracing much heavy graduation.

For further information, apply to

DANIEL GRIFFIN,
Resident Engineer.
J. EDGAR THOMSON,
C. Engineer.

Macon, March 28th, 1836. 11—5t

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9-1y

ARCHIMEDES WORKS.

(100 North Moor st. N. Y.)

NEW YORK, February 12th, 1836.

The undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

SMITH & VALENTINE,

STEREOTYPE FOUNDERS,

Are prepared to execute orders in their line, at 212 Grand street, New-York.

TO BRIDGE BUILDERS.

Sealed Proposals will be received, until the 15th of April, for finding materials and building the superstructure of a bridge, over Harlem Creek and flats, on the New York and Harlem Railroad.

Said Bridge to be on the late improvement of Mr. Town, 24 feet wide in the clear, and 660 feet long between the abutments, to be supported by three piers of masonry. The bridge to be completed by the 1st of Nov. ensuing. Communications may be addressed to the undersigned, at his office, No. 9 Chambers street, where plans and specifications may be seen.

JOHN EWEN, JR.
Engineer of the New York and Harlem Railroad.
9-t15a

TO CONTRACTORS.

NOTICE is hereby given to all persons who may feel disposed to take Contracts on the Illinois and Michigan Canal, that the Board of Commissioners have determined to commence that work as early in the spring as circumstances will permit. The Engineers will commence their surveys about the 10th of March, and will have several Sections ready for contract by the first of May. It is therefore expected that definite proposals will be received from that date to the first of June. In the mean time the Board invite an early inspection of that part of the route to Chicago, and will afford any information that may be required of them.

All communications will be addressed to "The Board of Commissioners of the Illinois and Michigan Canal, at Chicago."

By order of the Board.
JOEL MANNING, Secretary.

January 20, 1836. 8-6t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined Iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails. to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

☞ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

☞ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

☞ Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM, & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroad.

No. 264 Elizabeth street, near Bleecker street, New-York.

☞ RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlæm Railroad now in operation. J25tf

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
Superintendent, at Newcastle, Delaware.

feb 20—ytf

PROPOSALS FOR THE REPUBLICATION OF THE REPORTS OF THE BALTIMORE AND OHIO RAILROAD COMPANY;

Condensed so as to include, together with other matter added thereto, all that is known at the present day of the location and the application of Motive Power and Machinery thereupon, accompanied with explanatory drawings. The whole being intended to serve as a Manual of the Railroad System, for the use of Civil Engineers, to which is prefixed a history of the Baltimore and Ohio Railroad Company.

The work, whose reports it is thus intended to republish, was the first of any extent commenced in this country for the purposes of general transportation; and its early history is but a series of experiments, costly to the Company which had it in charge, but furnishing results of the greatest value and importance to others. The character of the country through which the road passed, involved every species of excavation; and in the construction of the Railway, almost every mode was successively tried for the purpose of ascertaining the best. While portions of the road were straight, others were of the smallest admissable curvature, and the locomotive power employed had to be such, therefore, as was suitable to both cases. This led to a series of experiments in this department of the Railroad System, which has resulted in the production of Engines preferable to any in use elsewhere—equal in speed to the best imported, and far superior in efficient power. From all these circumstances, the reports of the Baltimore and Ohio Railroad, from its commencement to the present day, have been sought for by Civil Engineers for the sake of the knowledge which they contain, and the frequent demand for them has suggested to the subscriber their republication, with such additional matter as shall constitute a Manual of the Railroad System in the present state of knowledge on the subject.

The reports are now difficult to be procured, and but few complete sets are known to be in existence. While the proposed republication will therefore be of use to the profession of Civil Engineering, it will be the means also of preserving the records of a work whose importance and value are now universally appreciated. The work will be divided into five parts.

I. History of the Baltimore and Ohio Railroad Company.
II. The location of Railroads, including the principles of reconnoissances, general instrumental surveys, and location for construction.
III. The construction of Railroads, including the excavation and masonry and the construction of the Railway on the graduated surface, turnouts, weighing, &c.
IV. The motive power including engines, cars, wagons, &c.
V. Forms of contracts for every species of work which has to be performed in the construction of a Railroad.

☞ As it is not practicable to ascertain what sized volume or volumes the contemplated work will make, the price cannot be fixed, but Railroad Companies and individuals who may subscribe for it, may rest assured, that it will be made as reasonable as the nature of it will permit. Orders directed to

F. LUCAS, Jr. Publisher,
Jan., 1836. No. 138 Market street, Baltimore.

RAILWAY IRON.

95 tons of 1 inch by ½ inch,
200 do. 1¼ do. ½ do.
40 do. 1½ do. ⅜ do.
800 do. 2 do. ½ do.
800 do. 2¼ do. ⅝ do.
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys and pins.

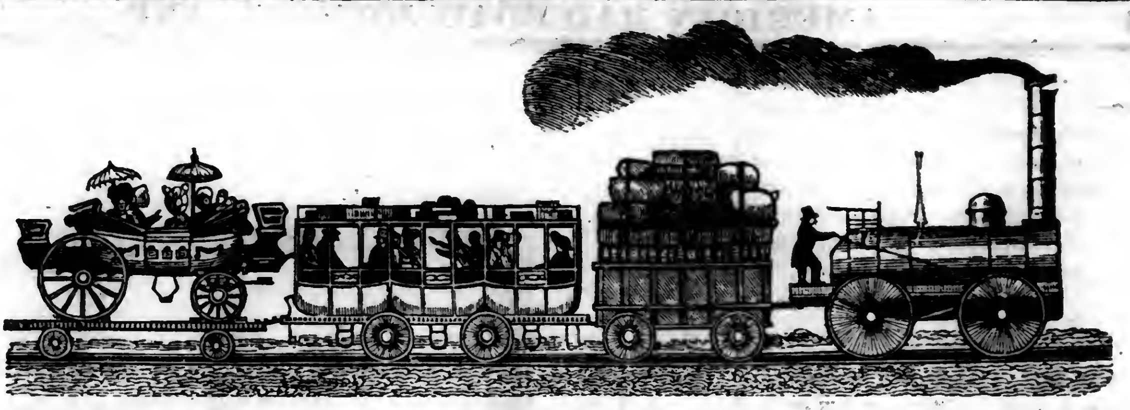
rought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½ and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them. 4—d7 1meowr



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, MARCH 26, 1836. [VOLUME V.—No. 13.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 2, 1836.

TO ENGINEERS AND RAILROAD COMPANIES.—The Proprietor of the Railroad Journal proposes to act as Agent for ENGINEERS, and RAILROAD COMPANIES, in the purchase, or procuring of *Instruments, Books, Account Books, Stationery, &c.*

In the selection of *Instruments* the aid and advice of practical Engineers will always be had. In the furnishing of Blank Books for the Company's use, they will be made to *order*, or to correspond with those in use in this city, if no special order is given, and of the best materials and workmanship. Articles of Stationery of the best quality will be furnished at fair prices—and cash or city acceptances expected on forwarding the articles.

Immediate attention will be given to orders received and the articles furnished at the earliest possible period.

D. K. MINOR.

New-York, April 16, 1836.

EDITORS and PUBLISHERS of Newspapers are respectfully requested to take notice and bear in mind that I propose to act as AGENT to procure and forward promptly, *Printing Machines, Printing Presses, Types* and *Fixtures* of every description, necessary to furnish a Printing Office complete.

Also to purchase and forward *Paper, Ink*, and other materials used in the line.

Also to COLLECT ACCOUNTS due in the CITY and STATE OF YEW-NORK and in the State of *New-Jersey, Pensylvania*, and *all* the *New-England States.*

My heavy losses by the late conflagration render it necessary that I should redouble my diligence and exertion; and it has occurred to me that an AGENCY of this kind, conducted by an experienced and careful man, will be of much service to gentlemen at a distanee who cannot conveniently visit the city to make the selections themselves. I therefore offer my services in *this line*, or to give any other orders in relation to other matters which may be desired by my friends out of the city.

My long acquaintance with the business, and with the manufacturers of the articles alluded to, and with the collection of *accounts* for Newspapers and Periodicals, will, I trust, enable me to execute orders entrusted to me, to the entire satisfaction of those who may feel disposed to patronize me in this new branch of business.

My commissions will in all cases be reasonable.

☞ No orders will be given for materials unless the payments, or paper offered, is satisfactory to the manufacturer.

D. K. MINOR.

GEORGIA RAILROAD AND BANKING COMPANY.—The Southern Banner states, that, "at a meeting of the Board of Directors of the Georgia Railroad aud Banking Company, held in Athens, on Saturday, the 26th ult., William Dearing, Esq., was chosen President, James Camak, Esq. Cashier, and Wm. R. Cunningham, Esq. Book Keeper. Hon. A. S. Clayton, and Jacob Phinizy, Esq. were also elected Directors, in place of Messrs. Camak and Cunningham, resigned. We learn that much unanimity prevailed, and the measures were adopted to hasten the construction of the Road. The Bank is expected to be in operation in a few weeks."

J. K. SMITH'S SELF-ACTING BRAKES FOR RAILROAD CARS.

The subscriber has taken out Letters Patent for the principle of applping power to brakes by the motion or impetus and collision of cars on Railroads. Desirous of bringing the subjeet before the public, he has prepared drawings for the American Railroad Journal, explanatory of three modes in which the principle can be applied.

He is aware that the apparatus must vary according to the construction of the car, and leaves further explanation, believing that those interested will be able to make a suitable arrangement.

He flatters himself that he has, by this discovery, added something to the safety of Railroad travelling, to say nothing of the saving that will be made in attendance and the destruction of cars and machinery incident on Railroads. He hopes that this improvement will claim the attention of persons engaged on Railroads, inasmuch as every possible security, by means of brakes, is attained, and that instantaneously—without the aid of any attendant. Indeed, in many cases, accidents occur so unexpectedly,

that the mischief is done before any agent can act—but by this means, action is immediate, and takes place equally on all the cars.

I feel the more confident of success, as there is nothing complicated or expensive.

Any communications addressed to the subscriber at Port Clinton, Schuyl. Co., Penn., will meet with prompt attention.

JOHN K. SMITH.

Description of the Drawings.

Fig. 1 represents a part of the frame of a tender; and

Fig. 2 the ground frame of a coach with 4 wheels, 2 axles, 8 brakes, and 2 slides, *all inverted.* For the sake of distinction, I will call the large slide [*a*] the propelling slide, and the small one [*b*] the adjusting slide. Fig. 3 shows the side view of the two slides. In order that the adjusting slide can be more easily moved, when there is a long train, it can operate over rollers supported from the large slide.

The levers of the brakes meet in the grooves of the propelling slide. Through the end of the levers a pin passes, which is secured to the adjusting slide; there being a groove in the under part of the large slide, so as to admit of a motion of the pins of (say) 4 inches, carrying with them the levers of the brakes.

The propelling slide is coupled to the tender *without any play, but* the cars *must* play along the slide (say) 4 inches.

The adjusting slide, being immediately under the other, is coupled to the slide *c* on the tender, which is to have a shifting motion by means of lever *d*.

The whole drawing represents the slides properly attached, with the cars pressing forward on the slides, and the two front wheels locked, the cross lever *d* being secured to its place by an upright *hand* lever, *not* shown in the drawing. Now give the engine motion, and *both* slides will be drawn forward 4 inches, when the checks on the large slide will come in contact with the cross pieces of the cars, which move the cars; by this motion the brakes are thrown from the front wheels, and the other brakes thrown towards the hind wheels, *but not* against them, and consequently the whole train is ready for running. Now, in order that the engine can run her train back, all that is necessary *is to* relieve the hand lever on the tender, and give motion to the lever *d*, by which the adjusting slide is operated upon—carrying with it all the brakes on the cars; by this motion the brakes will be relieved from the *foremost* wheels, *during a retrograde motion,* and will not be thrown against the hindmost wheels, inasmuch as it would require the forward motion of the large slide to effect this; suffice it to say, that when the engine is to proceed, lever *d* must be secured by the hand lever in the position it is now in (as shown in the drawing), and when a retrograde motion is necessary, relieve it and give it a forward motion, which

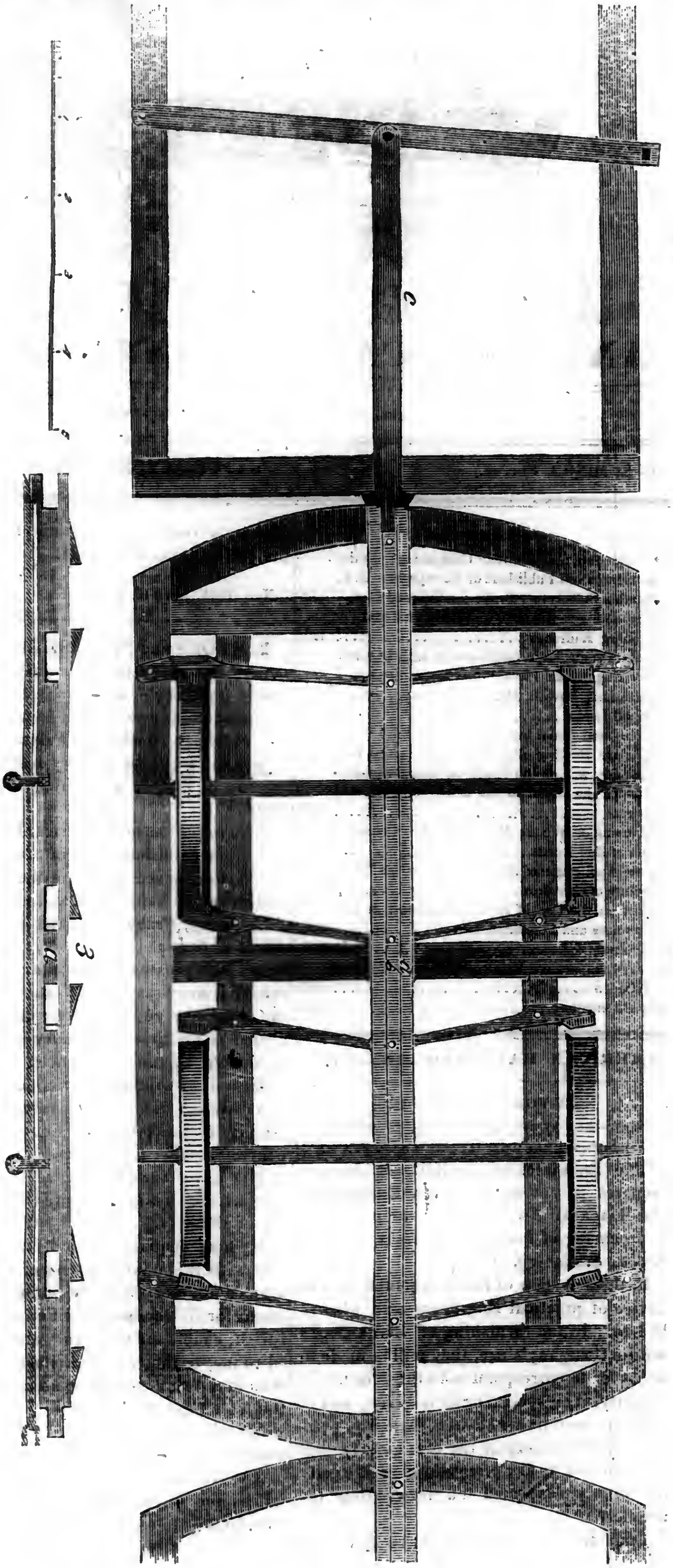


Fig. 1.

Fig. 2.

can be done by the engineer or his attendant, without the least inconvenience. I do not think it necessary to show that each car in the train would be operated on equally, and I believe it equally superfluous to enter into any explanation to show that precisely the same effects would be produced at either end of the train—*this will be the case*, and that without any alteration of the fixtures, save that of detaching the engine from one end of the train, and attaching it to the other; in like manner.

It must be borne in mind, that the cars are not attached to the tender in any other way than by the slides, except it be by a loose coupling; the cars must recede from, and approach the engines (say) 4 inches, while the propelling slide must remain firm in its place. The cars may be coupled to each other to prevent any one of them pressing forward on the brake, occasioned by any imperfection in the road or otherwise; *thus* it will appear that while the engine is exerting the least amount of power the brakes are free from the wheels. It will also be seen that when the engine is impeded, the brakes must take instantaneous effect, produced by the impetus of the cars —*and* that it is in the power of the engineer to relieve the wheels of the brakes.

In the accompanying drawing it will be seen that two wheels (the foremost) will be operated on by two brakes each, while the other two will remain free—on account of the long and short brakes, but if it should be thought best, one brake can be thrown against each wheel, by having them either all long or all short, and of *course* the pins andt he grooves in the propelling and adjusting slides must be made to suit.

Fig. 4 is a plan for a vertical brake, such as is used for the coal cars on the Little Schuylkill Railroad.

The cars are coupled with chains allowing them a play of about one foot. *a* is the brake; *b* the lever; and c the slide. In case of a stoppage, the cars run together, and drive in the slide which applies the brake to the wheels.

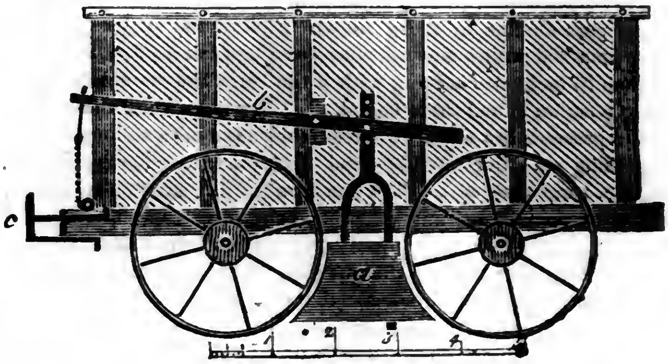
The inventor gives this as but one of the many modifications of his brake.

Fig. 5 represents a car and tender coupled loosely with a play of one foot, though this may be greater or less.

When the engine is impeded, the slide *a* on the front car will come in contact with *c* on the tender, and apply the brakes—the slides on the different cars will come in contact with each other, and so long as the press of the cars continues, the wheels will be locked. If it is necessary to free the wheels of the brakes, give motion to the lever *d* (as explained in Fig. 1). The spring of the levers will do much towards throwing the slide forward, and with the aid of a spring, or a weight operating over a pulley, the wheel will be relieved for a retrograde motion.

When the engine is changed to the opposite end of the train, the levers of the brakes

Fig. 4.



Ftg. 5.

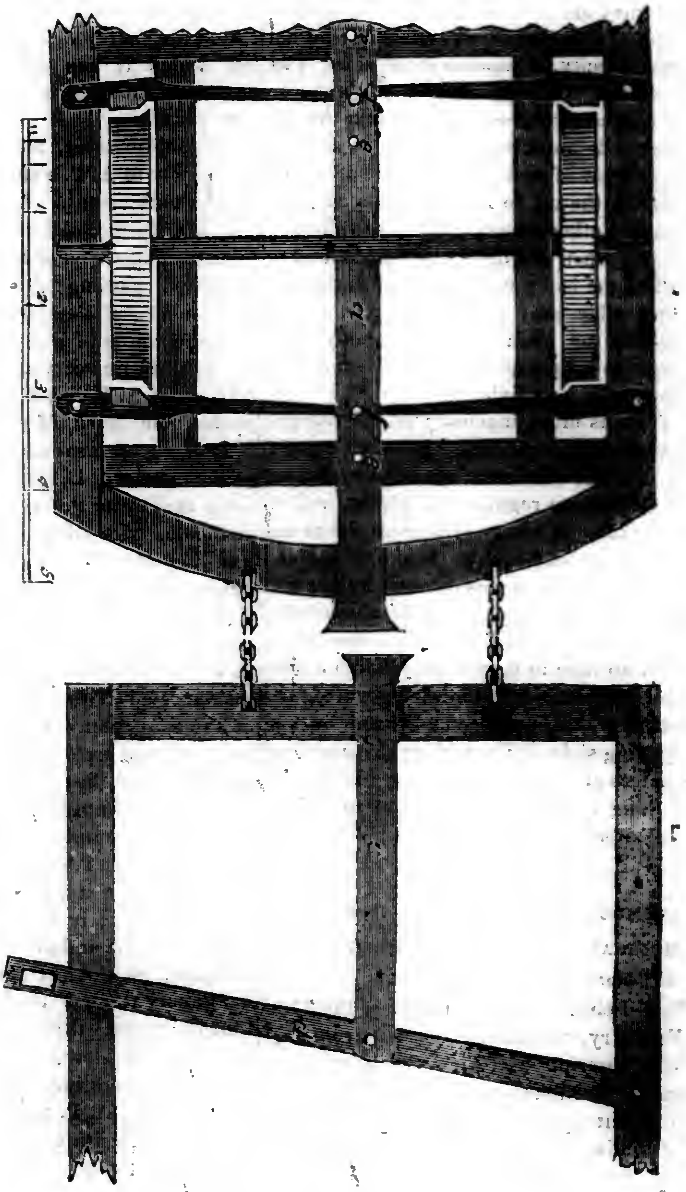
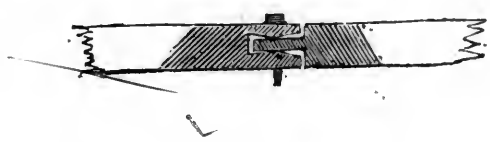


Fig. 6.



must be changed from f to e, which can best be done by a slide (not shown in this figure,) to which all the brakes must be attached by pins similar to those shown in fig. 2; which slide must move the necessary distance (6 inches), carrying with it the brakes to position e, and there bolted.

Fig. 6 represents the slides coupled—the bolts passing in horizontally—and the groove, &c. shaped so as to allow the cars to turn a curve without any pinching or strain.

The inventor, in answer to the question as to the cost of this brake, replies, "that it will be evident, from an inspection of the drawings, that there is nothing new in the brake itself, but merely in the application of the power. The brakes usually used are shown in the drawings, and in place of being attached to a rod and fastened to a hand lever, they are to be attached to a slide, to be operated by collision produced by the acquired velocity or impetus of the cars. The cost of this extra fixture certainly must be very *inconsiderable*—it is true that the adjusting slide must be added, which may be simply a bar of iron (or it may be of wood) extending the whole length of the car, and coupled to other slides, in which the pins are fastened when the tight coupling is used—or when the loose coupling is used, the adjusting slide may not extend the whole length of the main slide, being only long enough to couple all the brakes—and this slide may be very light.

[There is much ingenuity in the foregoing application of brakes. It is well known that in most accidents upon Railroads, no time is given to regulate the brakes, and in the instance of a very serious accident on the Camden and Amboy Railroad the attention of the agent was diverted by a spark on some goods, and when he discovered that the axle was broken it was too late; he had no time to regain his position at the brake. Objections to the early form of Mr. Smith's brake have been obviated by his "adjusting slide." The trifling cost certainly renders an experiment of easy execution. Any thing that promises to add to safety and comfort deserves attention.]

PORTSMOUTH AND ROANOKE AND RICHMOND AND PETERSBURG RAILROADS.

To the Editor of the Railroad Journal:

Sir,—I observe in your paper of the 27th of February, a communication purporting to be a description of the Portsmouth and Roanoke Railroad, which is in reality nothing but a *puff* of the merits of the line for travelling, that passes through Norfolk.

The writer, A. P., has been pleased to make some most invidious comparisions between this line and another, and his statements are calculated to deceive many of your readers who are not so well acquainted with the fact as we are in this neighborhood. As you have published his side of the question, it is no more than justice for you to give our side a place in your columns.

First, as to the Portsmouth and Roanoke Railroad as a road, I have nothing to say against it; for, luckily for the Company, nature had as much to do in making it as they had, and the only wonder is, that they have been so long about it. Sir, this Railroad, considering the small amount of work of any kind on it, should have been finished twelve months ago. A. P. tells you that it and the bridge over the Roanoke will be finished in the course of the summer.

Now, Sir, there is no way of disproving his statement, but if he is Virginian enough to back his assertion with a bet, I will bet him any odds that the bridge will not be finished this summer, or make him an even bet that it will not be finished by the end of next year. The bridge might easily have been finished by the end of this year, but judging from the slow way in which it has gone on for the last eighteen months, it will not be done in five years.

These, however, are small matters: we come now to A. P.'s comparison of the two routes to the south. If you, or your readers, Mr. Editor, will glance at a map of the United States, you will see that the line of Railroad passing through Washington, Richmond and Petersburg to the Roanoke, is rather more of a chord of a circle than the boasted line of your correspondent, and has, what A. P. has not thought proper to notice, the merit of passing through the seat of government and all the large towns of the interior. Besides this, it is the great *daily mail* route through the Union, and is connected with all the lines between Boston and New-Orleans. It is a line open at all seasons of the year, and passes generally through the healthiest portion of the Southern States. But how is it with the route of A. P.? It is now a tri-weekly route, totally unconnected with the mail line at the end of the Portsmouth road, as travellers well know to their sorrow when they get to Halifax, and find they have to wait until the post coaches from the end of the Petersburg Railroad are empty enough to carry them. The route from Portsmouth never can be the mail route, for it passes through no place of importance; it will always be uncertain in winter time and in the stormy months of the year, for the navigation of the Bay is dangerous at such times; and in summer time the country through which the Railroad passes is considered the sickliest in Virginia and North Carolina.

What does A. P. mean when he asks can capitalists hesitate which route to invest in. Let us compare what has been done on the two routes, and see if they hesitate.

From Baltimore to Washington, the Railroad is completed; from Richmond to Fredericksburg the Railroad is half done, stock all taken, and at a premium. From Richmond to Petersburg the stock of the Railroad will be offered for sale in the course of a month; from Petersburg to the Roanoke the Railroad has been in use more than three years, and the stock is now twenty per cent. above par. From the Roanoke to Raleigh the stock of all the road is taken, and the line half located.

How is it with the other route? The Railroad from Portsmouth to the Roanoke, should have been fished a year ago, and it is not yet done; and of the Wilmington Railroad, the books have been open for months, and not more than $400,000 have been subscribed. Can A. P. tells us how much of the stock of this Railroad was taken in Norfolk and Portsmouth?

I hear it was $10,000: compare this with the subscription of Petersburg to the Raleigh and Gaston Railroad, upwards of $350,000, and taken at a time when the stocks of one Insurance and three Manufacturing Companies were offered for sale. But A. P. writes as if Charleston was to be the boundary of the two lines. We look further than Charleston—our line will not pause until it reaches New-Orleans; and judging from the rapidity with which it is going on, it will be completed in less than ten years. It will be one of the grandest lines of travel in the whole world, passing through all the towns and cities of the Union, open throughout the whole year, and unrivalled for the expedition, care and certainty with which any amount of travel can be carried; while the line by the Portsmouth Railroad will become one of its most inconsiderable feeders. At present the line passing by the Petersburg Railroad is as perfect as it can be, and travellers coming by the mail are always certain of getting on as fast as horses can carry them; but the Portsmouth line has no connexion with the mail, and nine out of ten who travel that way will be detained, sometimes for days, waiting for seats.

The readers of your Journal, Mr. Editor, may place what confidence they please in what I state, but I beg them at the same time to consider what confidence is to be given to the statements of A. P. who in our place sets down the cost of the Richmond and Fredericksburg Railroad, (a part of our route) which is sixty miles long at $1,000,000, and immediately after it he sets down the Wilmington Railroad between 140 and 150 miles long, (a part of his route) at the same sum.

A. P. says he intends to give you, some time or other, some fact in relation to the Railroad projected from the termination of the Portsmouth road to the west by Danville, S. C. In anticipation of what he may say I will give you some facts.

A Company has been Incorporated by Virginia and North Carolina to make his road, but it is looked upon as so chimerical a scheme at present, that the sum for the survey can scarcely be made up. This road is projected to run up the Roanoke along

side of a good canal and slackwater navigation, and if ever made will be tapped either by the James River Company high up the Roanoke, or by the Petersburg Railroad fifteen miles above the termination of the Portsmouth Railroad.

In conclusion Mr. Editor, I hope you will ake it in good part of one who wishes well for the success of your paper should ask you to receive wtth some degree of caution such communication as those of A. P. While they will do very well for newspaper puffs, their partial character readers, doubtful their claims to a place in the colums of your Journal, to which all look and wish to look, whatever may be their sectional jealousies.

With high respect, PETERSBURG.

Petersburg, Va., April 3, 1836.

Albany, N. Y., April 5, 1836.

To J. E. BLOOMFIELD, ESQ.

Dear Sir,—In answer to your note of the 2nd inst., requesting me to give you the result of some experiments made by me with Locomotive Engines on planes of different degrees of elevation, I beg leave to hand you the following extract from a report recently made to the Directors of the Castleton and West Stockbridge Railroad Company, including four tables, exhibiting the load that different engines will draw at the same speed with working wheels the same diameter, and the load they will draw at different velocities, and also the load they will draw with different sized working wheels. Very Respectfully,

Your Ob't. Serv't,

WM. H. TALCOTT,

Civil Engineer.

"In order to answer the next question, viz. What will be the cost of the requisite shops, depots, carriages, wagons, and motive power, it will be necessary to determine how much load an engine will draw at one time up the different grades adopted in the estimate. The following tables, computed from experiments heretofore made on plans of different degrees of inclination, will enable us to determine this point with great accuracy.

The experiments were made on a straight road, and with the rails in full order.

The *first* column in each *table* shows the velocity in miles per hour; the *second*, the ascent in feet per mile; and the *third*, the gross load in tons which the Engine will draw at one time."

[We understand that the experiments to test make out the following tables, were made on the Hudson and Mohawk Company, they are certainly very interesting. We are much obliged to Mr. Talcott, for giving them to the public. The engines on the Hudson Railroad, are not as powerful, nor have they the improvements lately introduced, as far as we are informed, as the Engines constructed in Baltimore and Philadelphia.—ED.]

I.			II.		
ENGINE 8½ TONS. Working Wheels 4 ft. diam.			ENGINE 10 TONS. Working Wheels 4 ft. diam.		
Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.	Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.
16	0.00	97	16	0.00	116
16	10.	66	16	10.	79
16	20.	50	16	20.	60
16	30.	40	16	30.	48
16	40.	33½	16	40.	40
16	50.	29	16	50.	34½
16	60.	25½	16	60.	30½
12	0.00	116	12	0.00	139
12	10.	78½	12	10.	94½
12	20.	59½	12	20	71½
12	30.	48	12	30.	57½
12	40.	40	12	40.	48
12	50.	34½	12	50.	41
12	60.	30	12	60.	36
8	0.00	139½	8	0.00	167½
8	10.	94½	8	10.	113½
8	20.	71½	8	20.	86
8	30.	57½	8	30.	69
8	40.	48	8	40.	58
8	50.	41½	8	50.	49½
8	60.	36½	8	60.	43½

III.			IV.		
ENGINE 8½ TONS. Working Wheels 3 ft. diam.			ENGINE 10 TONS. Working Wheels 3 ft. diam.		
Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.	Velocity in Miles per Hour.	Ascent in Feet per Mile.	Gross Load in Tons.
16	0 0	108½	16	0.00	130
16	10.	73½	16	10.	88½
16	20.	59	16	20.	67
16	30.	45	16	30.	54
16	40.	37½	16	40.	45
16	50.	32½	16	50.	39
16	60.	28½	16	60.	34
12	0.00	130	12	0.00	155½
12	10.	88	12	10.	105½
12	20.	66½	12	20.	80
12	30.	53½	12	30.	64½
12	40.	45	12	40.	54
12	50.	38½	12	50.	46
12	60.	34	12	60.	40½
8	0.00	187	8	0.00	225
8	10.	127	8	10.	152½
8	20.	96	8	20.	115
8	30.	77½	8	30.	93
8	40.	64½	8	40.	77½
8	50.	55½	8	50.	67
8	60.	49	8	60.	58½

For the Railroad Journal.

LOWELL, MASSACHUSETTS.

No. I.

BY HENRY COLMAN.

A recent visit to Lowell, Mass., has affected me with much surprise, and afforded a high gratification. Agriculture and Manufactures have often been denominated, and without any poetical fiction, twin sisters; their interests are so intimately interwoven with each other; in their operations, relations and success, they are so immediately dependent on each other, that I trust it will not be deemed foreign from the proper objects of the New-York Farmer, if I give some little account of this extraordinary place. Extraordinary it may well be called, for here is a city at its maturity at the age of twelve years; here is a spot which seemed almost doomed to perpetual sterility, teeming with wealth; and in that short space the residence of a few straggling farmers, gathering, by severe toil, a scanty subsistence for themselves and their cattle, from an uncongenial and pernicious soil, is transformed into a busy and buzzing hive, with a population approximating twenty thousand, active with the impetuous spirit of industry, stimulated by rapid returns of profit, taxing to its utmost speed all the powers of mechanical genius, and labor-saving art; and with a thirst for knowledge and improvement, which seems to gather quickness from sympathy with the movements of the machinery around them, erecting halls, labaratories, libraries, and cabinets, for the cultivation of science; and thus laying a broad foundation for intellectual improvement.

The moral spectacle here presented is in itself beautiful and sublime. The machinery of one of these great mills is not an unapt picture of society. Here are wheels within wheels; bands circling within bands; threads crossing threads; numerous and almost infinitely varied operations going on at the same time; much that is seen, and much that is unseen; mighty and concealed powers working in their subterraneous abodes with a tremendous agency, and sending out their influences to places far remote from their presence; human ingenuity strained to its utmost power, and human care equally concerned in the constant superintendence of this complicated apparatus; the powers of the physical world called into efficient action, moulded, guided, and brightened under the sharpened activity of intellect; the moral every where intermingling in order to preserve harmony and secure the fidelity of the intellectual and physical powers; and all, in all its parts and operations, all resting upon an unseen agency, whose activity is every where detected, but whose power is utterly unmeasured, and the mode of whose operations the brightest philosophy has not even conceived; all resolvable into one simple and great law, the law which pervades the whole material creation; holds fast the dust of the balance, the atom floating in the sunbeam, and the mightiest orb which brightens in the firmament; all, where each part retains its place, performs its duty and supplies its contribution, moving on in a beautiful harmony; producing results largely subservient to human comfort, improvement and pleasure. On the other hand, all these results are defeated, when even the most minute and the humblest part of the machinery fail to perform their proper office; determine to go wrong, or refuse to go at all; when the wheels cease to revolve, or the filaments become broken; or the combination of physical, intellectual and moral energy, felt in a thousand hands, beaming from a thousand eyes and operating in a thousand hearts, is broken up, withdrawn, relaxed or perverted. Now, this is a striking analogy of human

society; this is a world in miniature. Laws bearing a strong resemblance to each other prevail in both. They are universal laws; they are uncontrolable and unalterable to human power or pleasure; they are ceaseless in their operation; and, like the great Being who established them, they are 'without variableness or even the shadow of change.'

Lowell is principally devoted to the manufacture of cotton; but it embraces several other important factories; very extensive woolen factories, for flannel, broadcloth, kerseymere, worsted and carpeting; extensive machine shops for the construction of various kinds of machinery, from that necessary to the furnishing of a cotton mill to railroad cars and steam engines; together with a card and whip factory, planing machine, reed machine, grist and saw mills, glass works, iron furnace and powder mills, and extensive bleacheries and print works; in all, employing a population of nearly eight thousand operatives, to say nothing of the persons subsidiary to their support and accommodation, and a capital of nearly nine millions of dollars.

The mills in general are of a large size; generally of brick, and seven or eight stories in height, well lighted, ventilated, and warmed. The machinery seemed of the most improved and perfect kind; and in general, and as far as the nature of the occupation admitted, the neatness and order of the mills which I visited, most exemplary. The hours of work, exclusive of meals, average about twelve; and, as far as I could learn, it was the determination of the overseers never to employ children under twelve or thirteen years of age; and none such were employed, except where parents, as in the block printing, where they work by the piece, chose to avail themselves of their children's aid in some of the subordinate operations. These cases were almost universally those of foreigners. They were discountenanced by the superintendents; and in my opinion, where there are schools to which such children might be sent, it ought to be made a penal offence by the statute; or in any event never more than three hours' labor in the twenty-four should be exacted from them.

The cotton fabrics made here are of various qualities; the finest averaging about 42 or 45 hanks to the pound. The printing establishments, by means of engraved copper cylinders, where sometimes four impressions are given by a single revolution of the machine, are well worth visiting; and the machinery for engraving these cylinders by the sinking of steel dies is very curious, and capable of being graduated to the thirty-six thousandth part of an inch. This is almos literally splitting a hair. The invention and delineation of the figures displayed great ingenuity and skill. The shearing of the woolen fabrics is a delicate and beautiful operation; but the singeing of the fine furze or nap of the cotton cloth by dragging the piece of cloth directly over, and in contact with, a red hot iron cylinder without burning the cloth itself, strikes an unaccustomed eye with extreme astonishment. The card and whip factories are exceedingly curious and as automatic machines approach nearer, to the actual operations of intellect and intelligence than any one, who had never seen them, could imagine to be possible. Both these machines, we understand, were of domestic invention. The rapidity of the operations in almost every department of manufacture which I visited was a remarkable circumstance. A large whip was completely braided with cord in about five minutes; and the superintendent of one of the establishments informed me that he turned out one piece of cotton cloth of thirty yards in about every minute and a half while his works were in full operation.

The standard of health among the operatives in the factories, as I learnt from the best medical sources, was considered as good. Many persons, on going into a new place, and into new and different employment from that to which they have been accustomed, generally suffer at first, and pass through a kind of acclimation; but afterwards they enjoy as good health, and in some cases the health has been improved, as before entering the mills. It is obvious, however, that some of the processes must be less favorable to health than others; as there are, doubtless, predisposing causes to disease in some, which do not exist in other temperaments or constitutions.

Of the moral character of the present manufacturing population of Lowell, I feel authorized to speak in high terms. I was permitted to look in some cases at the books, in which the names of the individuals employed are recorded; and if they are discharged, the causes of that discharge are mentioned. The instances of discharge for improprieties of conduct were comparatively very few. The regulations for enforcing decorum and order are strict; and the character of the present superintendents of these establishments, such as to afford an ample guarantee that all which can be done shall be done to secure the good conduct and virtue, and to promote the comfort of the young persons under their employ. These gentlemen, acting with such a powerful influence as they necessarily exert, it is obvious, hold a highly responsible situation. The virtue and welfare of many thousands of very susceptible beings rest upon what they do or what they fail to do: and as long as they rate the value of moral character so highly, and insist upon moral correctness, as indispensable to their patronage, and encourage sentiments of high self-respect among the operatives themselves, they certainly will do much towards securing the moral purity, and advancing the moral improvement of these interesting communities. It was delightful on Sunday morning, at the first sound of the bell, to see the multitudes of well-dressed young people crowding into the Sunday School, and into the house of God; and it was a circumstance of peculiar gratification to learn, that more than three hundred of these young persons were communicants at one of the churches in that town. The congregating of such vast numbers of young people, removed in general from the restraints of home, presents, it cannot be denied, great perils to virtue. The manufacturing districts of old countries have long been stigmatized as places of most flagrant licentiousness and immorality. The character of our population is essentially different from that of the places referred to. Our manufacturing population have in general had the advantages of careful domestic training, and a good school education. They are not manufacturers for life; but design to remain only long enough in the mills to get the means of a settlement in life. They have undoubtedly, the greater part of them in New-England, been blessed with a religious education; and they are looking forward to rise in life, and feel the high worth and indispensable importance of character every where among us. These circumstances cannot fail to operate most favorably among them; and their beneficial effects are instantly to be seen. Whether they will remain sufficient will be matter of just concern with every benevolent mind.

Much is done likewise for their intellectual improvement. Frequent and most valuable courses of scientific lectures are given,—to which access is made easy by the payment of a very small fee. A social library and reading room are established likewise, on the most liberal principles; and a chemical laboratory, and a splendid mineralogical cabinet have been procured. We have never been in a community where the spirit of inquiry seemed more active, or found more patronage and encourgement.

Add to all this, that great instrument of virtue, of comfort, and of the amelioration of the condition of the poorer and laboring classes, the savings' bank, is in full operation among them; and here, as in every case where it has been tried, has produced the most salutary effects; the deposits already amount to $200,000, and promise to be greatly extended—a great proportion of the depositors being found among the young women engaged in the establishments. The perfect security of the wages of labor, is among the most efficacious protections of human virtue; and a powerful encourager of industry, frugality, and temperance—virtues so important to individual character and comfort, and to the general welfare of society.

I shall subjoin to this a statistical account of the Lowell manufactures, showing, in extensive detail, the condition of these establishments on the 1st of January of the present year,—a document well worth examination.

H. C.

March, 1836.

STATISTICS OF LOWELL MANUFACTURES, JANUARY 1, 1836, COMPILED FROM AUTHENTIC SOURCES.

Corporations,	Locks and Canals.	Merrimack	Hamilton.	Appleton.	Lowell.	Suffolk.	Tremont.	Lawrence.	Middlesex.	Boott Cotton Mills.	Total.
Capital Stock,	600,000	1,500,000	900,000	500,000	500,000	450,000	500,000	1,200,000	500,000	1,000,000	7,650,000
Number of Mills,	1	PrintW'ks, &c., 5	PrintW'ks, &c., 3.	2	Cotton and Carpet Mill in one building.	2	2	5, another or bleachery preparing.	2, and Dye House.	4 Two going into operation, and two to be erected the ensuing season.	27, exclusive of Print Works, &c.
Spindles,		35,704	19,456	11,776	5,000 Cotton, besides Woollen.	10,752	11,520	31,000	4,620		129,828
Looms,		1,253	560	380	142 Cotton, 70 Carpet	348	404	910	38 B'cloth, 92 Casim'e.		4197
Females employed,		1,321	780	470	325	460	460	1250	350		5416
Males,	300	437	200	65	150	70	70	200	185		1377
Yards made per week,		184,000	85,000	100,000	2,500 Carp. 150 Rugs, 55,000	90,000	125,800	200,000	6300 Cas'e, 1500 Broadcloth.		849,300
Bales Cotton used in do.		120	75	95	76	86	90	180	None.		732
Pounds Cotton wro't in do.		44,000	28,000	33,000	30,000	30,000	34,000	64,000	600,000 lbs. Wool p. an. &3,000,000 Teasels.		263,000
Yards dyed and printed do.		163,000	70,000	None.	None.	None.	None.	None.			233,000
Kinds of Goods made,	Machinery, Cars and Engines for Railroads.	Prints and Sheetings, No. 22 to 40.	Prints and Drillings, No. 14 to 40.	Sheetings and Shirtings, No. 14	Carpets, Rugs, and Negro Cloth.	Drillings, No. 14.	Sheetings and Shirtings, No. 14.	Printing Cloths, Sheetings and Shirtings, No. 14 to 30, 31 to 41 in. wide.	Broadc'ths and Cassimeres.		
Tons Anthracite Coal expended p. an.		5,200	2,000	300	180	294	329	650	500		9453
Cords of Wood per annum,		1,500	1,500		500	70	60	60	1000		4690
Gallons of Oil, "		8,700	6,000	3,375	Olive 3000, Sp'm 4500.	3,940	3,692	8217	Olive 11000 Sp'm 2500.		54,824
Diameter of Water Wheels,	13	30	13	13	13	13	13	17	17 & 12	17	
Length of do. for each mill,	14	24	42	42	60	42	42	60	46 & 21	60	
Incoprated,	1792	1822	1825	1828	1828	1830	1830	1830	1830	1835	
Commenced operations,	182	1823	1825	1828	1828	1832	1832	1833—4	1830	1836	
How warmed.	Hot Air.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Hot Air Furnace.	Steam.	Wakefield Furnace & Steam.		

REMARKS.

Yards of cloth made per annum, 44,163,600
Pounds of cotton consumed, 13,676,600
Assuming half to be Upland and half New-Orleans and Alabama, the consumption in bales, averaging 361 lbs. each, is 38,000

A pound of cotton averagieg $3\frac{2}{10}$ yds.

100 pounds of cotton will produce 89 pounds of cloth.

As regards the health of persons employed, great numbers have been interrogated, and the result shows, that six of the females out of ten enjoy better health than before being employed in the mills,—of males, one half derive the same aduantage.

As regards their moral condition and character, they are not inferior to any portion of the community.

Average wages of females, clear of board, $2.00 per week.
Average wages of males, clear of board, 80 cts. per day.
Medium produce of a loom on No. 14, yarn, 38 to 49 yds. per day.
Medium produce of a loom on No. 30, 25 to 30 " " "
Average per spindle, $1\frac{1}{10}$ yard per day.
Persons employed by the Companies are paid at the close of each month.
The average amount of wages paid per month, $106,000
A very considerable portion of the wages is deposited in the Savings Bank.
Consumption of starch per annum, 510,000 lbs.
Consumption of flour for starch in the mills, print works and bleachery, per annum, 3,800 bbls.
Consumption of charcoal, per annum, 500,000 bushels.

To the above named principal establishments may be added, the extensive powder mills of Oliver M. Whipple, Esq.; the Lowell bleachery; flannel mills; card and whip factory; planeing machine; reed machine; grist and saw mills—together employing about 300 hands, and a capital of $300,000. And in the immediate vicinity, glass works, and a furnace supplying every description of castings. Also, a worsted mill, formerly the Hurd Woollen Mill, under the direction of Mr. M. H. Simpson, operates 1,200 spindles, employs 125 persons, consumes 1,000,000 lbs. of wool, and 11,250 gallons of oil per annum.

The locks and Canals machine shop, included among the 27 mills, can furnish machinery complete for a mill of 5,000 spindles in four months, and lumber and materials are always at command, with which to build or rebuild a mill in that time, if required.

From the Charleston Courier.

[The writer of the following article has made a mistake in the end of his article. The vessel raised was the Peacock, of much less tonnage than the Potomac, though a very heavy vessel for her size. She was raised by the hydraulic engine, (though this is commonly called the "screw dock.")—Ed. R. R. J.]

Railroad Locks.—We have been favoured with the permission to publish the following letter from a member of the North Carolina Legislature, to a gentleman of this city, detailing the particulars of an invention, substituting *locks* for *inclined planes*, on Railways, which is well worthy of the attention of all who are interested in these great artificial channels of modern commerce, and particularly so as connected with the noble enterprize that is to make Charleston the seaport of the far West:

Gulf of Mexico—at sea—on my way from New-York to Mobile, March 15.

Dear Sir,—I have been on this passage since the 20th of Feb., and since I came on board have become acquainted with Mr. Taylor, of Henderson, Ky., who is the Inventor and Patentee of the Railroad Lock. He has shown me a draft of the machinery, and has so fully convinced me of its practicability, that there is not (with me) the slightest remaining doubt on the subject, and I have not the slightest doubt but that it will in a short time be adopted on most of the Railways throughout the country, and that Inclined Planes will be entirely abandoned. The only objection that can be (or yet has been) made to the lock, is, that there will probably be some loss of speed. But, when all things come to be considered, I think that this objection will not be a prominent one, nor am I willing to admit that there will be any loss, but rather a gain of speed.

The arguments in favor of the lock are these—1st, that it will reduce the length of the road, because it enables you to pursue the most direct course from point to point; and 2dly, that it will be the means, in many instances, of avoiding those deep excavations which so frequently occur, and continue to be greatly detrimental to the use of the road, by continual caving of the banks, or sides, making a double track in all such cases necessary, for the purpose of conveying off the cavings; 3dly, that in overcoming ascents on all rising ground, as

in mountains there are always gentle declivities met with, which (when gained by an ascension of a lock, or two, as the case may be) can be easily graded, and at a trifling expense, comparatively speaking; whereas, by making inclined planes, those gentle ascents are lost by being merged in the general inclination; 4thly, it will enable you to dispense with the use of stationary engines, (which will be found to be no small item,) as the machinery of the locks will always be propelled by the locomotives, without requiring them to be detached from the train of cars, the whole train being elevated at the same time with the locomotive; whereas, on inclined planes, the locomotives are always detached from the train, and if there be many cars, they are brought up in detached parcels, thereby occasioning a delay of time; 5thly, the use of locks will enable you to do the business with a less number of locomotives, as the same locomotive will carry the cars through the whole road, without requiring to be detached from the cars; whereas, the locomotives in the use of inclined planes, are always stopped at the end of the plane, and must there remain until a returning train will require its use; and lastly, there is not the slightest danger to be apprehended in ascending or descending by locks, whereas there is always great danger to be apprehended in passing inclined planes. I think enough has already been said to show that locks are decidedly preferable to inclined planes, provided their practicability can be shown, (or proved,) and this can clearly be done by mathematical calculations. I have gone into the calculations, and proven it to my entire satisfaction as to power, &c. The plan of this important machinery has been derived from the *screw docks*, the ability of which to *elevate weight* to an almost incalculable extent is not to be doubted, as sufficient tests of its powers have already been given in New-York and Baltimore. The only difference between the two machines is, that the lock by its peculiar construction, is capable of being connected with and propelled by the locomotives, which being placed in the lock, with their train of cars, may be instantly attached to the machinery of the lock, and which being put in motion, elevates itself and the cars at the same time. The elevation is gained by means of screws, the same as those of the dock. The screws of the dock are propelled by the application of manual labor, whereas those of the lock are propelled by means of machinery, and that by steam.

It is confidently believed that locks may be made to ascend and descend *thirty* feet in the space of *five* minutes from the time the locomotive is attached to it.

Mr. Taylor has given me an estimate of the expense of a lock of 130 feet in length, say sufficient to elevate a locomotive and ten produce cars, the whole weight of which, together with that of the cradle on which they stand, may be considered equal to 160 tons, to be raised *thirty* feet; this he says will be readily done by an engine of ——* horse power. The expenses, agreeably to this estimate, will be $8135; but in order to make the estimate safe, he added $1865 for contingences, making a total of $10,000. Mr. Taylor has had a brass model of the machinery made, which he will exhibit at any time when called on, and I think will be fully able to dispel all doubts on the subject. Any communication addressed to Taylor & Son, Henderson, Ky., will meet with prompt attention.

*Here the figures denoting the quantity of horse power are defaced by the seal.

Knowing that a Railway from Charleston to Cincinnati is in contemplation, and anticipating a meeting of Commissioners and Engineers sometime this spring, I have been induced to make this communication, in order that the subject might undergo a timely consideration, as it may be the means of causing a survey of more direct routes, and also be a great saving of expense in the making and keeping up the road. I have not been at home since the 4th of Nov., and am quite ignorant of what is going on upon the subject of the road.

The United States Frigate Potomac, of 1600 tons burthen, was raised by the screw dock in New-York, 22 feet in the space of 40 minutes. There were 90 men at work to propel the screws. The weight of that vessel is supposed to be equal to 1000 or 1200 tons. Now, if it were necessary that such a vessel should be raised daily, or even weekly, there is no doubt, but that it would have been constructed so as to be propelled by steam. This I think is a clear and satisfactory proof of the practicability of the lock.

RAILROAD AND CANAL INTELLIGENCE.

FOREIGN.

The *Swabian Mercury* announces that Messrs. Rothschild have taken 4000 shares, of 1000 florins each, in the Iron Railroad to be established between Galicia and some other points of the Austrian States. The works of this road will be begun in the spring, and will be executed by about 30,000 soldiers.

When the Messrs. Rothschild deal so largly in Railroad stocks, it is a fair presumption that the investment is a good one.

—

A most important application of the Jacquard loom has just been made. It is now being used in raising figures on bed-quilts. The figures are in relief on the surface of the cloth, and are as firmly bound as on counterpanes made the usual way. The inspection of a 13-4ths quilt, just finished, has given great satisfaction. The effect on the prices of these articles will be astonishing. A quilt, 13-4ths, by the Jacquard loom, may be had raw for 18s.; whilst one made in the usual manner costs 30s. in wages only.—[Herald.]

Much useful information as to the surprising improvement of these looms will be found in the evidence before the Select Committee of the House of Commons.

M. Bernet, an engineer at Lyons, has invented a machine he calls a *Balayeuse*, by which, with the employment of only one horse, the mud in the streets, squares, and highways, is collected and thrown into a cart with extraordinary regularity, giving 100 strokes on a surface of about six yards square, and thus doing the work of 200 scavengers in the same space of time.

We wish some engineer in New-York would invent and put into operation a *Balayeuse*, he certainly would not come into bad odor.

Much debate is going on in the House of Commons on the subject of Railroads, particularly those in and near London.

The intention is to prevent a needless loss of capital in improvements not likely to be beneficial either to the stockholders or the public.

All well enough, but we see from the manner in which they handle Railroads, that they are much behind us, not only in regard to the experience, but as to their general views of the subject—inmany instances we think most singularly inaccurate.

From the Mechanics' Magazine.

ON THE USES OF ZINC FOR ROOFING OF BUILDINGS, CULINARY VESSELS, ETC., AND ON THE PRODUCTS FORMED BY EXPOSURE OF THE METAL TO THE ACTION OF CORRODING AGENTS. BY L. D. GALE, M. D., PROF. GEOLOGY AND MINERALOGY IN THE N. Y. UNIVERSITY, AND PROF. CHEMISTRY IN THE N. Y. COLLEGE OF PHARMACY.

Metallic zinc has been applied to various uses in the Arts in Europe, since 1740 or 1750. Though it had been known and wrought for a long time previous by the Chinese and East Indians.

The abundance and cheapness of this metal, early attracted the attention of speculators to employ it in the useful arts, and it is stated in the Philosophical Transactions for 1747, that it casts and bores quite as well as brass, and it is proposed that it should be used for various culinary vessels as a substitute for iron and other metals, that were then, and still continue in use for such purposes. The use of this metal for culinary vessels, attempted to be made, both in England and France, was of short duration, for it was soon ascertained that the various acids that are contained in a considerable proportion of our articles used as a vegetable diet, act upon the zinc, and that the compounds formed from the union of the metal with these acids, are both disgusting to the taste, and poisonous. Besides, it is found that the metal is rapidly acted upon, by contact with moist air, or alternate wetting and drying, and that when corroded, it is soluble in water, (as we shall state when speaking of the oxide of zinc,) forming a very deleterious solution, and rendering the water wholly unfit for ordinary domestic purposes.

Within a few years an attempt has been made to introduce the use of this metal for culinary vessels into the United States, and it was especially recommended as having the peculiar property of preserving the sweetness of milk for a much longer time than the materials generally used for such purposes, but unfortunately the anticipations were not verified in the trials, and the use of the metal for such purposes is now almost totally abandoned.

If milk be kept in a zinc vessel, it will, if exposed to a warm atmosphere, soon begin to undergo a change. An acid is formed, which attacks the metal vessel and dissolves a portion of it, forming a salt which is both disagreeable to the taste, and deleterious to the system. The metal cannot, therefore, ever be used for the above purpose with safety.

More recently, it has been proposed to use the metal for covering the roofs of build-

ings, as a substitute for slate, copper, and other materials, that have been for a long time in general use; and unfortunately for the public, large sums have already been expended for zinc roofs, which is worse than useless, when we take into consideration the trouble and expense of removing the material, and supplying its place with some other. One could hardly see how it is possible that the public should be so deceived in the use of an article that has been so thoroughly tried and condemned, both in France and England.

Nothing is perhaps more certain than the fact, that this metal can never be used advantageously for covering roofs. In the first place, the expansion of the metal is so great by slight changes of temperature, that the junctures are exceeding liable to get out of place from expansion and contraction, hence in the present manner of putting on the metal, the buildings are constantly liable to leak. In the second place, the metal is very brittle, so that two sheets cannot be put together by folding, but must be joined in a sort of double coil, thus:

And though this roof, when new, will shed rain tolerably well, it can never be made to resist the action of melting snow, as has been proved to the satisfaction, I trust, of a considerable number of our citizens, during the past winter. The reason of the leakage is quite evident to any one who has studied the principles of capillary attraction and the laws of fluids. Suppose, for example, that a roof covered with zinc contains a depth of six inches of snow, and that the snow melts rapidly and becomes saturated with water to the depth of three inches: this would have precisely the same effect in proving the roof as if its whole surface were actually covered with water to the same depth. The capillary attraction exerted by the water in the small spaces between the coils, together with the weight of a column of water three inches in depth upon the same, is sufficient to allow water enough to pass through any roof thus covered to inundate the building.

It will be seen that the above objections apply equally to all metal roofs put together in the same manner. If we would keep our buildings dry, the snow must not be allowed to accumulate on them, or the metal used to cover the roofs must be made water tight by soldering. The past winter has tested, in the severest manner, roofing materials; heavy snows, followed by heavy rains and rapid thaws, have continually alternated during the whole season, and the damage done to buildings, furniture, and goods, will be felt for a long time.

The brittleness of zinc renders it highly objectionable. This property is increased in a tenfold proportion, by diminishing its temperature. At the freezing point of water it is almost as brittle as glass; and hence if any heavy body fall upon the coils which project above the roof, they are very liable to be broken, and when broken it is exceedingly difficult to repair them.

The third objection to the use of zinc for roofing is, that it is dissolved in the water which runs over the roof, and thus renders it unfit for all domestic purposes. This fact seems to be one that has not yet attracted the attention of the public. Having unfortunately resided under a zinc roof, and shared largely in its deleterious effects, I have been led to examine the qualities communicated to the water by means of the zinc.

There are two distinct compounds formed by exposing to the action of the air this metal. If the metal be heated to whiteness in the open air, it takes fire and burns with intense brilliancy, forming an exceedingly light, white substance, which is a compound of the metal with a portion of the oxygen of the air. It is therefore an oxide of zinc, and generally denominated the flowers of zinc. This is the only compound of zinc and oxygen described in most of the books; it is a white powder so light as readily to float in the atmosphere, and is perfectly insoluble in water.

If zinc be exposed to moist atmosphere, it becomes covered with a gray coating, which is described as a mixture of the white oxide and the metal; but as the gray compound is soluble in water, and neither of the others possess the same property, the opinion advanced in the books can hardly be correct. Berzelius, who first described the gray compound, considers it as a sub-oxide, though he does not mention the fact that it is soluble in water. This last property is one that renders the metal highly objectionable as a roofing, for the sub-oxide formed by the action of alternate wet and dry weather, is dissolved off by the rains, and carried into the cisterns, deteriorating the water, and rendering it almost entirely unfit for all domestic purposes. It thus acquires a styplic, coppery taste, and if taken into the stomach, produces nausea and vomiting. It decomposes soap, and produces that property in water called hardness, which renders it unfit for washing.

If the water which has dissolved the sub-oxide of zinc be freely exposed to the air, oxygen will be absorbed, and the sub-oxide will be gradually converted into the white oxide or flowers of zinc, which being insoluble in water, falls to the bottom as fast as formed in the state of a white powder, and thus the water at length becomes nearly pure again. This effect is quite perceptible after a dry season, when the water constantly becomes better, until it is again deteriorated by a fresh fall of rain, which dissolves more of the metal. Now, since rain water is so valuable an article in all large towns and cities, any agent that would deteriorate it must be got rid of, even if it be at a considerable expense. Besides, rain water, after being filtered through sand and charcoal, is now coming into use for drinking, and substituted for the spring water, which has been formerly universally used for this and for all culinary purposes. It is, therefore, quite certain, that the use of zinc as a roofing for dwelling houses, at least, must be entirely abandoned, or otherwise, the use of rain water which runs from it must be partially or entirely discontinued.

From the London Mechanics' Magazine.

Why cannot our artists attempt something of this kind?

EMBOSSING ON WOOD.

Sir,—I have been shown some very beautiful specimens of embossing upon veneer, principally floral and arabesque designs, upon rosewood, maple, mahogany, elm, and other hard woods. The relief is almost *alto*, and has quite the appearance of carving. I understand the invention is patented, but that the inventor, M. Caccia, an Italian, has been prevented from bringing it into extensive operation from the primarily expensive nature of the machinery, and the jealousy of cabinet-makers, who declare that it would supersede carving and inlaying, and so spoil their business. The process may be so varied that the relief will be brought out in different colors; it is also applicable to the embossing of cloths, kerseymeres, waist-coat pieces, paper-hangings, and things of a like nature.

This is the first instance, as far as I know, in which designs have been impressed upon wood—embossing is common enough upon card, paper, calico, and such fabrics; and unless there be some improvement in the process, I do not know that the patent will hold good. Making the parts in relief come up of different colors, I believe to be new; and upon this possibly the patent rests.

Embossed hard fancy woods might be very extensively and very beautifully applied to the ornamenting of cabinets, work-boxes, &c., and to the panels of doors and wainscoting. Herewith I send you some specimens, that in the effect produced, you may judge for yourself.

I am, &c.

P. B. T.

November, 1835.

From the London Mechanic's Magazine.

REMARKS ON THE CONSTRUCTION OF BOG-ROADS.

Sir,—There are some instances where vehicles are obliged to run in the same track or rut, either owing to the sloping sides of a road, its inequality, or to facilitate the journey of the horses on account of its being boggy.

In the first case, they run on the crown of the road, consequently in the same rut; and as the traffic increases, the rut becomes greater. The inequalities of a road are a great evil; and when the road is boggy as well, the sides are still more avoided, as the water in running over the sloping sides is absorbed in the yielding substance, and renders passage over them impossible. Ruts cease to exist if the roads are worn equally in every part; therefore, if the roads are perfectly level, or nearly flat, every vehicle will take a separate track. The first thing to be considered in the construction of bog-roads, after the ground is well drain-

ed, is the making the surface perfectly level; and after that has been effected, if concrete, similar to what is used in securing the foundations of buildings, and mixed with broken stone, were thrown in, and exposed for a considerable time, it would be superior to any other method previously adopted. When hardened sufficiently for constant use and friction, time alone would soon prove whether it would not be more serviceable and efficacious than either the method of "laying branches of trees on the level of the strata," or "firm heathy sods." When such roads are situated near any place from whence lime may be obtained, or gravel could be had in abundance, additional facilities would be offered for effecting this method, which, as it becomes by exposure as firm as a rock, would certainly be found beneficial. The additional expense attending the construction of such a road, if the work is properly performed, would also be compensated by the permanent and substantial road which would be the result. Yours, &c.

FREDERICK LUSH.

Charles-square, Hoxton, Nov. 20, 1835.

[Some useful hints as to the improvement of our common roads, in similar situations, may be drawn from the foregoing article.—ED. M. M.]

The following article gives the best general description we have seen of the "Application of the Hot Blast." It is well worth reading.

From the London Mechanic's Magazine.

ON THE APPLICATION OF THE HOT BLAST IN THE MANUFACTURE OF CAST-IRON. BY THOMAS CLARKE, M. D., PROFESSOR OF CHEMISTRY IN MARISCHALL COLLEGE, ABERDEEN.

(Read before the Royal Society of Edinburgh, March, 1835.)

Among persons interesting themselves in the progress of British manufactures, it can scarce fail to be known, that Mr. Neilson of Glasgow, manager of the Gas-Works in that city, has taken out a patent for an important improvement in the working of such furnaces as, in the language of the patent, "are supplied with air by means of bellows, or other blowing apparatus." In Scotland Mr. Neilson's invention has been extensively applied to the making of cast-iron, insomuch that there is only one Scotch iron-work where the invention is not in use, and in that work apparatus is under construction to put the invention into operation. Apart from the obvious importance of any considerable improvement in the manufacture of so valuable a product as cast-iron, the invention of Mr. Neilson would merit attention, were it only for the singular extent of the improvement effected, compared with the apparent simplicity—I had almost said inadequacy—of the means employed. Having, therefore, by the liberality of Mr. Dunlop, proprietor of the Clyde Iron Works, where Mr. Neilson's invention was first put into operation, obtained full and free access to all information regarding the results of trials of the inventions in those works, on the large scale of manufacture, I cannot help thinking that an authentic notice of these results, together with an attempt to explain the cause of them, will prove acceptable to the Royal Society of Edinburgh. And that these results, as well as the cause of them, may be set forth with clearness, I shall advert

1st. To the process of making iron, as formerly practised.

2d. To Mr. Neilson's alteration on that process.

3d. To the effect of that alteration.

4th. To the cause of that effect.

I. In proceeding to advert to the process of making cast-iron, as formerly practised, it cannot here be necessary to enter into much detail in explanation of a process, long practised and extensively known, as this has been; nor, indeed, shall I enter into detail, farther than, to the general scientific reader, may be proper to elucidate Mr. Neilson's invention.

In making cast-iron, then, the materials made use of were three—

The ore,
The fuel,
The flux.

The ore was clay iron-stone, that is to say, carbonate of iron, mixed, in variable proportions, with carbonates of lime, and of magnesia, as well as with aluminous and siliceous matter.

The fuel made use of at Clyde Iron Works, and in Scotland generally, was coke, derived from splint coal. During its conversion into coke, this coal underwent a loss of 55 parts in the 100, leaving 45 of coke. The advantage of this previous conversion consisted in the higher temperature produced by the combustion of the coke, in consequence of none of the resulting heat disappearing in the latent form, in the vapors arising from the coal, during its conversion into coke.

The flux was common lime-stone, which was employed to act upon the aluminous and siliceous impurities of the ore, so as to produce a mixture more easy to melt than any of the materials of which it was made up, just as an alloy of tin and lead serves as a solder, the resulting alloy being more easy to melt than either the lead or the tin apart.

These three materials—the ore, the fuel, and the flux—were put into the furnace, near the top, in a state of mixture. The only other material supplied was air, which was driven into the furnace by pipes from blowing apparatus, and it entered the furnace by nozzles, sometimes on two opposite sides of the furnace, sometimes on three, and sometimes, but rarely, on four. The air supplied in this manner, entered near the bottom of the furnace, at about 40 feet from the top, where the solid materials were put in. The furnace, in shape, consisted, at the middle part, of the frustrums of two cones, having a horizontal base common to both, and the other and smaller ends of each prolonged into cylinders, which constituted the top and bottom of the furnace, as may be well enough conceived from the sectional sketch on the margin.

The whole of the materials put into the furnace, resolved themselves into gaseous products, and into liquid products. The gaseous products, escaping invisible at the top, included all the carbonaceous matter of the coke, probably in the form of carbonic acid, except only the small portion of carbon retained by the cast-iron. The liquid products were collected in the cylindrical reservoir, constituting the bottom of the furnace, and there divided themselves into two portions, the lower and heavier being the melted cast-iron, and the upper and lighter being the melted slag, resulting from the action of the fixed portion of the flux upon the fixed impurities of the fuel and of the ore.

II. Thus much being understood in regard to the process of making cast-iron, as formerly practised, we are now prepared for the statement of Mr. Neilson's improvement.

This improvement consists essentially in heating the air in its passage from the blowing apparatus to the furnace. The heating has hitherto been effected by making the air pass through cast-iron vessels, kept at a red heat. In the specification of the patent, Mr. Neilson states, that no particular form of heating apparatus is essential to obtaining the beneficial effect of his invention; and, out of many forms that have been tried, experience does not seem to have yet decided which is best. At Clyde Iron Works, the most beneficial of the results that I shall have occasion to state, were obtained by the obvious expedient of keeping red-hot the cast-iron cylindrical pipes, conveying the air from the blowing apparatus to the furnace.

III. Such being the simple nature of Mr. Neilson's invention, I now proceed to state the effect of its application.

During the first six months of the year 1829, when all the cast-iron in Clyde Iron Works was made by means of the cold blast, a single ton of cast-iron required for fuel to reduce it, 8 tons 1¼ cwt. of coal, converted into coke. During the first six months of the following year, while the air was heated to near 300° Fahr., one ton of cast-iron required 5 tons 3¼ cwt. of coal, converted into coke.

The saving amounts to 2 tons 18 cwt. on the making of one ton of cast-iron; but from that saving comes to be deducted the coals used in heating the air, which were nearly 8 cwt. The nett saving thus was 2½ tons of coal on a single ton of cast-iron. But during that year, 1830, the air was heated no higher than 300° Fahr. The great success, however, of those trials, encouraged Mr. Dunlop, and other iron-masters, to try the effect of a still higher temperature. Nor were their expectations disappointed. The saving of coal was greatly increased, insomuch, that about the beginning of 1831, Mr. Dixon, proprietor of Calder Iron Works, felt himself encouraged to attempt the substitution of raw coal for the coke before in use. Proceeding on the ascertained advantages of the hot blast, the attempt was entirely successful; and, since

that period, the use of raw coal has extended so far as to be adopted in the majority of the Scotch iron works. The temperature of the air under blast had now been raised so as to melt lead, and sometimes zinc, and therefore was above 600° Fahr., instead of being only 300°, as in the year 1830.

The furnace had now become so much elevated in temperature, as to require, around the nozzle of the blow-pipes, a precaution borrowed from the finery-furnaces, wherein cast-iron is converted into malleable, but seldom or never employed where cast-iron is made by means of the cold blast. What is called the *tweer*, is the opening in the furnace to admit the nozzle of the blow-pipe. This opening is of a round funnel shape, tapering inwards, and it used always to have a cast-iron lining, to protect the other building materials, and to afford them support. This cast-iron lining was just a tapering tube, nearly of the shape of the blow-pipe, but large enough to admit it freely. Now, under the changes I have been describing, the temperature of the furnace became so hot near the nozzles, as to risk the melting of the cast-iron lining, which, being essential to the *tweer*, is itself commonly called by that name. To prevent such an accident, an old invention, called the *water-tweer*, was made available. The peculiarity of this tweer consists in the cast-iron lining already described being cast hollow instead of solid, so as to contain water within, and water is kept there continually changing as it heats, by means of one pipe to admit the water cold, and another to let the water escape when heated.*

During the first six months of the year 1833, when all these changes had been fully brought into operatien, one ton of cast-iron was made by means of 2 tons 5¼ cwt. of coal, which had not previously to be converted into coke. Adding to this 8 cwt. of coal for heating, we have 2 tons 13¼ cwt. of coal required to make a ton of iron; whereas, in 1829, when the cold blast was in operation, 8 tons 1¼ cwt. of coal had to be used. This being almost exactly three times as much, we have, from the change of the cold blast to the hot, combined with the use of coal instead of coke, *three times as much iron made from any given weight of splint coal.*

During the three successive periods that have been specified, the same blowing apparatus was in use; and not the least remarkable effect of Mr. Neilson's invention, has been the increased efficacy of a given quantity of air in the production of iron. The furnaces at Clyde Iron Works, which were at first three, have been increased to four, and, the blast machinery being still the same, the following were the successive weekly products of iron during the periods already named, and the successive weekly consumpt of fuel put into the furnace, apart from what was used in heating the blast:—

	Tons.		Tons.		Tons.	
In 1829, from 3 furnaces,	111	Iron from	403	Coke, from	888	Coal.
In 1830, from 3 furnaces,	162	Iron from	376	Coke, from	836	Coal.
In 1833, from 4 furnaces,	245	Iron		from	554	Coal.

Comparing the product of 1829 with the product of 1833, it will be observed that the blast, in consequence of being heated, has reduced more than double the quantity of iron. The fuel consumed in these two periods we cannot compare, since, in the former coke was burned, and in the latter coal. But on comparing the consumpt of coke in the years 1829 and 1830, we find that although the product of iron in the latter period was increased, yet the consumpt of coke was rather diminished. Hence the increased efficacy of the blast appears to be not greater than was to be expected, from the diminished fuel that had become necessary to smelt a given quantity of iron.

On the whole, then, the application of the hot blast has caused the same fuel to reduce three times as much iron as before, and the same blast twice as much as before.

The proportion of the flux required to reduce a given weight of the ore, has also been diminished. The amount of this diminution, and other particulars, interesting to practical persons, will appear on reference to a tabular statement supplied by Mr. Dunlop, and printed as an appendix to this paper. Not further to dwell on such details, I proceed to the last division of this paper, which is,—

IV. To attempt an explanation of the foregoing extraordinary results.

Subsidiary to this attempt, it is necessary to discriminate between the quantity of fuel consumed, and the temperature produced. For instance, we may conceive a stove to be kept at the temperature of 500° Fahr., and lead to be put into such a stove for the purpose of being melted. Then, since the melting point of lead is more than 100° higher, it is evident that whatever fuel might be consumed in keeping that stove at the temperature of 500°, the fuel is all consumed to no purpose, so far as regards the melting of lead, in consequence of deficiency in the temperature. In the manufacture of cast-iron likewise, experience has taught us, that a certain temperature is required in order to work the furnace favorably, and all the fuel consumed, so as to produce any lower degree of temperature, is fuel consumed in vain. And how the hot blast serves to increase the temperature of a blast furnace, will appear on adverting to the relative weights of the solid and of the gaseous materials made use of in the reduction of iron.

As nearly as may be, a furnace, as wrought at Clyde Iron Works in 1833, had two tons of solid materials an hour put in at the top, and this supply of two tons an hour was continued for 23 hours a-day, one half hour every morning, and another every evening, being consumed in letting off the iron made. But the gaseous material—the hot air—what might be the weight of it? This can easily be ascertained thus; I find, by comparing the quantities of air consumed at Clyde Iron Works, and at Calder Iron Works, that one furnace requires of hot air from 2,500 to 3,000 cubical feet in a minute. I shall here assume 2,867 cubical feet to be the quantity; a number that I adopt for the sake of simplicity. inasmuch as, calculated at an avoirdupois ounce and a quarter, which is the weight of a cubical foot air at 50° Fahr., these correspond precisely with 2 cwt. of air a minute, or *six tons an hour.* Two tons of solid material an hour, put in at the top of the furnace, can scarce hurtfully affect the temperature of the furnace, at least in the hottest part of it, which must be far down, and where the iron, besides being reduced to the state of metal, is melted, and the slag too produced. When the fuel put in at the top is coal, I have no doubt that, before it comes to this far-down part of the furnace—the place of its useful activity—the coal has been entirely coked; so that, in regard to the fuel, the new process differs from the old much more in appearance than in essence and reality. But if two tons of solid material an hour, put in at the top, are not likely to affect the temperature of the hottest part of the furnace, can we say the same of six tons of air an hour, forced in at the bottom near that hottest part? The air supplied is intended, no doubt, and answers to support the combustion; but this beneficial effect is, in the case of the cold blast, incidentally counteracted by the cooling power of six tons of air an hour, or 2 cwt. a minute, which, when forced in at the ordinary temperature of the air, cannot be conceived otherwise than as a prodigious refrigeratory passing through the hottest part of the furnace, and repressing its temperature. The expedient of previously heating the blast obviously removes this refrigeratory, leaving the air to act in promoting combustion, without robbing the combustion of any portion of the heat it produces.

Such, I conceive, is the palpable, the adequate, and very simple explanation of the extraordinary advantages derived in the manufacture of cast-iron, from heating the air in its passage from the blowing apparatus to the furnace.

Marischall College, Aberdeen,
Jan. 10, 1835.

APPENDIX.

The blowing-engine has a steam-cylinder of 40 inches diameter, and a blowing-cylinder of 8 feet deep and 80 inches diameter, and goes 18 strokes a minute. The whole power of the engine was exerted in blowing the three furnaces, as well as in blowing the four, and in both cases there were two tweers of 3 inches diameter to each furnace. The pressure of the blast was 2½ lb. to the square inch. The fourth furnace was put into operation after the water-tweers were introduced, and the open spaces round the blow-pipes were closed up by luting. The engine then went less than 18 strokes a minute, in consequence of the too great resistance of the materials contained in the three furnaces to the blast in its passage upwards.

* An incidental advantage attended the adoption of the water-tweers, inasmuch as these made it practicable to lute up the space between the blow-pipe nozzle and the tweers, and thus prevent the loss of some air that formerly escaped by that space, and kept up a bellowing hiss, which, happily, is now no longer heard.

Materials constituting a Charge.

	cwt.	qrs.	lbs.
1829—Coke,	5	0	0
Roasted Ironstone,	3	1	14
Limestone,	0	3	16
1830—Coke,	5	0	0
Roasted Ironstone,	5	0	0
Limestone,	1	1	16
1833—Coal,	5	0	0
Roasted Ironstone,	5	0	0
Limestone,	1	0	0

Table showing the Weight of Cast-Iron produced, and the Average Weight of Coals made use of, in producing a ton of Cast-Iron, at Clyde Iron Works, during the years 1829, 1830, *and* 1833, *the Blowing-engine being the same.*

COKE AND COLD AIR.							COKE AND HEATED AIR.							COAL AND HEATED AIR						
1829	Weekly product of Cast-Iron by three Furnaces.			Average of Coals used to 1 Ton of Cast-Iron.			1830	Weekly product of Cast-Iron by three Furnaces.			Average of Coals used to 1 Ton of Cast-Iron.			1833	Weekly product of Cast-Iron by four Furnaces.			Average of Coals used to 1 Ton of Cast-Iron.		
	T.	C.	Q.	T.	C.	Q.		T.	C.	Q.	T.	C.	Q.		T.	C.	Q.	T.	C.	Q.
Jan. 7	137	18	2	8	12	1	Jan. 6	176	10	2	5	2	2	Jan. 9	375	8	0	2	12	3
14	148	2	0	6	9	2	13	181	12	2	5	0	2	16	267	18	0	2	4	0
21	148	8	2	6	11	3	20	172	5	2	5	0	2	23	270	7	2	2	3	1
28	138	9	2	7	0	2	27	178	7	0	4	19	0	30	250	9	0	2	4	0
Feb. 4	125	13	0	7	12	1	Feb. 3	164	8	0	5	4	0	Feb. 6	265	3	2	2	1	0
11	136	19	0	7	13	1	10	172	12	0	5	4	0	13	202	10	0	2	4	3
18	130	16	2	7	11	3	17	163	9	0	5	9	0	20	257	1	0	2	4	3
25	105	12	2	7	10	0	24	170	1	0	5	3	0	27	264	0	0	2	5	1
Mar. 4	101	8	1	7	17	2	M r. 3	151	19	0	5	10	3	Mar. 6	234	13	0	2	5	2
11	111	2	0	8	2	2	10	151	16	0	5	9	2	13	238	7	2	2	7	1
18	114	10	2	7	6	2	17	151	18	2	5	9	3	20	205	13	0	2	10	2
25	110	94	0	8	8	1	24	163	17	0	5	5	1	27	217	14	0	2	2	3
Apr. 1	111	4	0	8	7	2	31	163	8	2	5	11	0	Apr. 3	220	7	0	2	14	2
8	107	7	0	8	3	0	Apr. 7	147	10	0	5	7	0	10	230	9	2	2	0	3
15	91	12	2	8	15	0	14	154	9	2	5	2	0	17	304	7	0	1	17	3
22	85	13	0	9	13	0	21	163	4	0	4	19	0	24	248	12	2	2	3	0
29	91	14	2	9	6	2	28	148	12	2	5	4	0	May 1	245	7	2	2	6	0
May 6	92	7	2	8	8	2	May 5	162	10	2	5	2	2	8	200	17	0	2	8	0
13	94	6	0	9	2	1	12	149	13	0	5	3	2	15	246	4	2	2	5	3
July 8	88	4	2	8	16	3	19	162	4	0	5	5	0	22	219	1	2	2	6	0
15	91	13	0	8	5	0	26	165	7	2	4	18	3	29	231	2	0	2	8	0
22	97	12	0	8	2	1	June 2	169	4	0	5	2	2	June 5	235	16	0	2	6	2
29	104	15	2	7	10	2	9	157	17	0	5	1	0	12	232	10	0	2	7	1
Aug. 5	106	17	2	7	7	2	16	164	0	0	4	17	3	19	271	1	2	2	1	0
12	93	1	0	8	6	0	23	149	3	0	4	18	0	26	262	3	2	2	3	0
19	113	7	0	8	18	2	30	162	16	2	4	16	3	½ w. 30	22	16	0	2	5	1
	2878	18	0	209	19	0		4215	6	0	134	6	2		6370	3	0	58	18	3
Average	110	14	2	8	1	1		162	2	2	5	3	1		245	0	0	2	5	1

The correspondent by whom we have been obligingly favored with the preceding paper, makes himself the following remarks on the subject of which it treats. — ED. M. M.

"The best application of the hot blast that *I* have yet seen, is at the Wilsonton Iron Works, near Lanark and Whitburn. At these works the heated air is never at a *lower* temperature than the melting point of lead (612°.) This is readily *tested* by inserting a small bar of lead into an opening in the pipe for the purpose, a little way before it enters the furnace; the lead is *instantly* melted. When in good working order, zinc is fused (700°) in the same way. The air is heated in passing through a series of iron pipes of *small* diameter, fixed upright in a brick oven, and kept at a red heat; the heated air entering the furnace by *four tweers*. 'The Condie pipes,'—so called from Mr. John Condie, the manager of the Wilsonton Iron Works, and late of the Calder—last much longer than the ill-arranged heating apparatus (with pipes of large diameter) at the Clyde Iron Works, and effeet a much greater saving in fuel.

"The *raw coal* when used as the fuel, has the disadvantage of soon filling the furnace, and is also found to produce an inferior quality of iron, to that made by use of coke. It is, therefore, not unlikely to be soon, generally, given up."

From the Journal of the Franklin Institute.

REPORT ON THE USE OF THE HOT AIR BLAST IN IRON FURNACES AND FOUNDRIES. BY A. GUEYVEAU, ENGINEER AND PROFESSOR IN THE ROYAL SCHOOL OF MINES.

(Translated for this Journal, by Professor A. D. Bache.)

(Continued from page 199.)

The following details confirm the abstract of results just given.

1*st. Furnaces using coke or coal.*

The results as to economy by using the hot air blast are stated, in the Scottish works, as nearly 3 to 2. At Vienna, the same quantity of coke which was used for 1.075 of ore and flux in the charge, is now used for 1.51. At La Voulte, where the air is heated only to 320° in the manufacture of iron for forging, 1 part of coke is now used to 2.1 parts of ore and flux. At the furnace of Terre-Noire, 1 lb. of coke is used to 1.82 of the mixed ore and flux.

At Torteron, where a mixture of coke (1-3) and charcoal (2-3) is used as fuel, 1 lb. of the fuel is used to 2.83 lbs. of the mixed charge, with the hot air blast. While at the furnace of Guerche, where they use the same ore, flux and fuel, but with the cold air blast, 1 lb. of the fuel is used for 2.98 lbs. of the mixed ore and flux.

At Ancy-le-Franc, where charcoal is used, in the proportion of 2-3 oak charcoal and 1-3 of white wood, 2.1 lbs. of the ore and flux require 1 lb. of fuel with hot air, and 2.5 lbs. require the same fuel with heated air. At Wasseralfingen, the increase of the mineral charge, when hot air is used, is 1.43 to 1, and at Riouperoux, 1.42 to 1.

When iron for forging only is made, and fuel is scarce, it is thought that the hot air blast will be of but little advantage; the company who use the patent for this blast have stipulated for the Creusot furnace, not to pay for the construction of the heating apparatus, in case no real advantage is derived from its use.

In those furnaces which use the hot air blast, and where the mineral part of the charge has been increased, the charges pass less rapidly than formerly, and there are, of course, fewer charges in a given time, but so much more ore passes in the same time that the run of iron is much increased This increase is greater when the iron is made of the quality for forging than when made for casting. At Vienna, where iron of the second mentioned quality is manufactured, the daily yield has increased in the ratio of 1.22 to 1, while at Janon, where that of the first named quality is used, the ratio is 1.6 to 1. At La Voulte, they produce in twenty-four hours 8 or 9 tons of iron for forging, and it is stated that with an increase of the blast, the yield could be increased to 11 or 12 tons without injuring the quality of the iron.

The greatest advantage from the hot air blast is undoubtedly to be found in the diminution in the enormous quantity of fuel (coal) used in some of the English works. The results obtained in the works of the south of France are the following. At Vienne, where they chiefly make iron for casting, they tried the Clyde form of heating apparatus, but abandoned it for that of Calder, by which they heat the air above the melting point of lead. The economy of coke has been in the ratio of 1.37 to 2.50. And the daily yield has increased from 4½ to 5 or 6 tons of iron. The daily product of the two furnaces at Janon, where Taylor's heating apparatus is used, is 8 or 9 tons of iron for forging, by the consumption per ton of 1.20 to 1.40 of coke. This does not include the fuel required to heat the iron. Each of the three furnaces of La Voulte turn out 9 tons of iron for forging, while, with the cold blast, they made but 7½ to 8 tons of the best quality, under the most favorable circumstances. The consumption of coke is now 1.25 to 1.30 tons for each ton of iron, besides about 600 lbs. per ton, which is required to heat the blast; the former consumption was 2.10 to 2.30 tons of fuel for one of iron. The experiments made in France with crude coal and the hot air blast, have not been conclusive in regard to its advantages, compared with the cold blast.

At the new Torteron furnace, where charcoal (2-3) and coke (1-3) are used, the consumption of fuel is about the same for the two kinds of blast. With the hot air blast, however, they make excellent pig iron for castings without any difficulty.

2. *On the use of raw coal in smelting furnaces.*

The substitution of raw coal for coke is doubtless the source of the very great eco-

nomy observed in the Scotch works, where the heated air blast has been introduced. It was generally believed in this country, as late as 1833, that the hot air blast was indispensable to the use of the fat varieties of coal, without cokeing. It was known that certain dry bituminous coals might be used as fuel, even without admixture with coke, and without heating the blast, as is still practised in Wales.

In some of the English furnaces, on account of the cakeing of the coal, or of its containing a considerable proportion of sulphur, coke is still used with the hot air blast. In one of the Welsh works, they partly coke the coal, and with good effect; a hint which may, perhaps, be improved upon here.

The following observations on the use of coal, of different qualities, with the common blast, have been collected.

A carbonate of iron was advantageously smelted at Vizille,* with a mixture of coke, and of very compact anthracite, with the cold air blast. The high price of the coke rendered the manufacture unprofitable. It has been found, at Creusot, that raw coal could be mixed with the coke used, in the proportion of fifty per cent. of the whole fuel, without injury to the quality of the iron, and without diminution in its quantity. At Decazeville, M. Coste found that all the neighboring coals could be used with the cold air blast, and the furnaces there, as well as at Firmy, have since used no other fuel, except when it was necessary to work up the fine coal. The same weight of raw coal is now used as was formerly of coke. The pig iron has not deteriorated in quality, and the daily yield is the same as before, namely, about five tons.† In all these cases, there is an advantage resulting from the less quantity of earthy matters in the charges, than when coke is used; it has been found at Decazeville, that they require but half the quantity of flux used with coke, when raw coal is substituted for it.

A fact of an opposite kind was presented at Alais, where an attempt to mix raw coal with coke was unsuccessful, the yield of the furnace being sensibly diminished when the coal was but one sixth of the charge. The coal appears, nevertheless, to be well adapted to this purpose.

At several of the furnaces, such as Terre Noire, &c., coke made from the fine coal is cheaper than the coarse coal, and no advantage can be realised by the use of raw coal.

In regard to the different kinds of coal, it has been observed that those which cake too much, or which fly to pieces, are both ill adapted to use in the smelting furnace. As to other varieties, they may be used either with or without admixture of coke.

others may work well with cold air. Some

The question as to whether the hot air blast is, or is not, necessary, seems to be undecided, observations being contradictory. It is possible that some kinds of coal may render the use of the hot air blast advantageous, or even absolutely require it, while may require the hot air blast to drive off the bitumen before they reach the boshes, while others may not need such aid.*

3. *Smelting furnaces where charcoal is used as a fuel.*

These furnaces requiring a less draught, and being lower than those for coke, are peculiarly well adapted for placing the heating apparatus at the trunnel head. At Wasseralfingen, the pipes are nearly vertical, and pass from the lower part of the furnace to the platform, and back again to the tuyeres; at Ancy-le-Franc they are nearly horizontal, and directly above the trunnel head. An apparatus formed of curved pipes, passing in an arched form over the trunnel head, has been proposed by Mr. Taylor, but appears not to be as durable as that just referred to.

The experience of several years has proved that the heat of the combustible matters which take fire on issuing from the trunnel head, and of the other gaseous matters, will raise the temperature of the blast to 570° Fah. To this method of heating, several objections have been made; first, tnat in a well constructed furnace, the air issuing at the trunnel head should not be at as high a temperature as that required for the blast. This objection is not founded on observation, for, besides the heated gases which escape, and which do not burn, there are combustible ones escaping which take fire at the trunnel head, and give out heat by their combustion. It is a well known fact, that, in many works in France and Germany, the heat which would, otherwise, be lost, is applied to various useful purposes. A second objection is, that this mode of heating is dependent upon the proper working of the furnace, and may fail at the very time that heat is required to remove an obstruction in the furnace, from the effect of the very obstruction which is to be removed. This difficulty is easily obviated by burning a few faggots in the flues containing the air pipes, when extra heat is required.

In fact, this apparatus has proved generally satisfactory, requiring neither additional fuel, nor attendance. The exterior of the tubes should be cleaned about every fortnight, to remove dust, and other matters, which would impede the communication of heat. The cleansing of the long horizontal pipes, such as are used at Torteron, is an inconvenient matter.

It may be well to repeat, here, the results obtained by the hot air blast at Wasseralfingen. At a cost only of the construction and repairs of the heating apparatus, the daily yield of the furnace was increased thirty-nine per cent.; the quality of the iron, for casting, was not deteriorated; and the consumption of fuel was diminished from 1 to .61. The temperature of the air was from 390° to 400° Fah.

At Ancy-le-Franc, the consumption of charcoal per ton of iron was diminished twenty per cent., while the iron was improved for castings. The air was heated to 570°. The want of power of the blowing machine prevented a due supply of heated air, and the daily yield of the furnace was decreased.

I have been informed that there are several works in Franche-Comte, where they heat the air blast from the trunnel head. They have a greater daily yield, and consume less fuel than formerly, but state that the working of the furnace is not so regular as before. This, probably, depends upon some defect in their construction, since it certainly is not a usual accompaniment of the hot air blast.

At Hayange, (Moselle,) a furnace twenty-six feet in height, and using charcoal, was supplied with the hot air blast. By means of an apparatus like that used at Wasseralfingen, the air was raised to 612° Fahr., and even above this point. The area of the blast pipe was doubled, and the pressure slightly diminished. The charge of ore was increased from 430 lbs. for 22½ cubic feet of charcoal, to 680 lbs. The same number of charges were made per day, and the gain resulted only from the increase of ore in each charge. The heating apparatus has required no repairs since its establishment a year ago. In another furnace, at the same place, the heating apparatus having given way, the cold air blast was resumed at an additional expense of twelve per cent. of charcoal, per ton of iron.

It is stated in a German journal,* that by heating the air from a hydraulic blowing machine, by an apparatus at the trunnel head of a furnace, a saving of twenty-five per cent. of fuel had resulted. The air was heated to 480° Fah.

At Plons, in Switzerland, they have used the hot air blast to advantage, the fuel being a mixture of wood and charcoal. Each charge consists of 81 lbs. of charcoal, nearly half being from hard, and the rest from resinous wood, and 198 lbs. of pine wood, which would have yielded 48 lbs. of light charcoal; of 220 lbs. of ore containing 51 per cent. of iron, and 60 lbs. of an argillaceous flux. From 18 charges they obtain, in twelve hours, 20,196 lbs. of pig iron. The economy is reckoned at about 33 per cent.

These results are more satisfactory than those furnished by charcoal, alone, and cold air, or even than those afforded by charcoal and the hot air blast. So successful are they considered, that a saw mill has been established to cut the wood to the required size,

(To be continued.)

Fossil Tree.—In the quarry from which stones are at present being taken for the new church erecting at the Milton of Balgonie, was lately discovered a large fossil tree. It is lying nearly horizontal, and is as yet attached by about two thirds of its circumference to the sandstone. It is about fifteen inches in diameter, and about seven feet of it are at present visible. As it tapers slowly to the outer end, the portion still undiscovered is probably considerable. It is wholly composed of white sandstone similar to that in which it is imbedded. This quarry is remarkably rich in vegetable impressions. Casts or marks of palm trees are to be found in great beauty and abundance.—[Sunderland Herald.]

* For an account of these important experiments, see this Journal, vol. xv., p. 346.

† In 1835, it is stated that the same furnaces run six tons per twenty-four hours.

* It is stated that, at Frederickshutte, in Silesia, a successful attempt has been made to smelt with raw coal as a fuel, and with the cold air blast. The coal does not cake readily.—[Erdman's Chem. Journ.]

* Erdman's Journal, vol. xviii., p. 340, 1833.

AGRICULTURE, &c.

From Hovey's Horticultural Magazine.

RESULTS OF THE CULTURE FO SOME OF THE NEW VARIETIES OF STRAWBERRIES, RECENTLY INTRODUCED INTO THIS COUNTRY; WITH THE METHOD ADOPTED.—BY THE HON. E. VOSE.

A good many persons having attempted the cultivation of the new large growing kinds of strawberries, with very various success, I will, agreeably to your request, state the results of my own experiments with some of them, and of which you have, I believe, seen specimens of the fruit, which have at different times been exhibited at the Horticultural Shows.

The Downton, or *Knight's Seedling*.—This variety, almost every one knows, was produced from seed, by the venerable Mr. Knight, President of the London Horticultural Society; and first introduced to notice in this country, I believe, by S. G. Perkins, Esq.

The soil upon which my strawberry plat is situated, is constituted of a light mellow loam, resting upon a sandy sub-soil; somewhat sheltered from the north-west. In the latter part of August, suitable preparation having been made, old rotten manure, to the depth of three inches, was turned in to the full depth of the spade; and the beds lined out, so as to leave the rows *twenty* inches asunder, and the plants *fourteen* inches from each other in the rows, placed in the quincuncial order. Before the severe frosts set in, they were covered slightly with leaves, and a little old manure thrown on top to prevent their being blown away. Scarcely a plant suffered through the winter, and the first year, the stools consisting of single plants, the quantity of fruit was small; many of the berries were, however, quite large, and of the coxcomb shape. The next season the stools had become well established; and in April the leaves and manure, with which they had been covered, were pointed in, and the beds dressed. When coming into bloom, and before the fruit had set, the spaces between the rows, and between the stools, were wholly covered with newly mowed grass, cut from the banks and the turf edges round the walks. This was used as a substitute for, and in preference to straw; it is more easily arranged about the stools; and it is readily obtained, as it is required about the period, when you wish to crop the banks the first time. "Grass cut from lawns," is recently recommended in Loudon's Magazine for the same purpose; although it is not many years since, that Sir Joseph Banks advised a return to the old practice of the use of straw, (from which this fruit has derived its name,) as preferable to the many contrivances of trenches between the rows, boards laid lengthwise, and tiles, which had been substituted for the same object.

As it is possible that every person who may be about planting a strawberry bed, may not be aware of the uses of the grass, I will allude to them. In the first place, it protects the plants against drought, by shading their roots from the sun's rays, and also by resisting the escape of the moisture, which would otherwise evaporate into the atmosphere. Of all the large sorts, the *scapes*, or stems, are too feeble to support the fruit, when ripe, in an upright position, consequently all that which grows on the outside of the stools falls into the soil, and is, of course, spoiled; heavy showers, too, beat up the soil over much of the fruit, and make it *gritty*. When the beds are dressed in the spring, it is desirable not to disturb them till the crop is gathered, and the grass serves to keep the weeds down. It is said also to prevent the attack of slugs, as they cannot pass over it.

This was properly the first bearing year, and nothing could look finer than the vines when in fruit; the crop was abundant; many of the berries were of the coxcomb form, and some of them assuming circular and fanciful shapes, with the *calyx* nearly invisible in the centre.

After the fruit season had passed, the grass was removed, and the vines were permitted to extend themselves, and such of the runners as had not been used, were dug in before covering in the autumn, so as to keep the stools entirely distinct.

The next year, the stools having increased in size, the quantity of fruit was greater in proportion; the berries, however, were much more generally conical in shape. The third season, which was the last, the product was fully equal to the previous one.

The flavor of this variety being equal to the smaller sorts, and the flesh finer and more delicate than any of larger ones, it is, on all accounts, entitled to a preference over any of the new varieties which I have cultivated.

It is important, however, with the Downton, in making a bed, that the runners be all taken from fruitful plants, bearing, as it does, its *staminate* and *pistillate* flowers on different roots; there is danger of obtaining some that are called *males*, which are entirely useless, and exhaust the soil to no purpose; and, as they are not weakened by the production of fruit, the runners extend themselves much more rapidly than the others. It is not long since, that, in England, it was thought necessary, in planting, to apportion *one* sterile to about *ten* fruitful plants; but this opinion is exploded, and now all but the fruitful ones are carefully avoided; nor is it necessary to wait for the flower to determine them; the difference is perceptible in the foliage, that of the sterile being much more rank and coarse.

Wilmot's Superb. This variety, which has excited so much admiration in Europe, treated in the same mode as the Downton, (I have, in fact, employed the same method with all the large sorts which I have attempted to cultivate,) was abandoned, after the second year; the product being so small as not to warrant farther trial.

Keen's Seedling. This has succeeded well; it is a good bearer, and of fine flavor; not quite equal to the *Downton* in either point; but its large, dark rich berries are altogether a beautiful fruit, and it well deserves cultivation.

The last season, an individual at East Cambridge produced an abundant crop, and larger fruit than I have ever before seen of this variety; whilst other persons, experienced cultivators too, have given up this, as well as the *Downton*, after a trial, for want of success. In the cases of failure, there seems, to have been one radical error; that is, the plants have been placed upon strong, rich garden soils, and often somewhat moist: whether such soils are too adhesive to permit the fibres sufficiently to extend themselves, or the nutriment which the plant absorbs, be unfit to form the basis of fruit, is a matter of mere theory, which is of no importance, so long as the facts which the results exhibit are before us, and which have been, as far as my own observations have extended to such situations, a profusion of foliage, but little or no fruit.

Methven Castle, or *Methven Scarlet*.—This strawberry, more hardy than any of the large kinds, is very prolific; but the fruit is somewhat spongy in the centre, and it has not the fine flavor of some other sorts; still the magnificent appearance of its enormously large globular berries, renders it a desirable object of cultivation to a certain extent. The question has often been agitated, as to the comparative merits of these new large varieties, with some of the older and smaller ones. With all the *smaller* fruits, size and appearance certainly weigh a great deal in the estimate of their value; and almost every cultivator would be desirous of growing a proportion of the fine large sorts; and, with proper management, they would unquestionably well repay him; still it is not to be denied that they require to be treated with a *good deal more care and attention* than the small ones to expect success. Of the latter kinds, I have made trial of several varieties, among which the

Early Virginia, or *Early Scarlet*, is a valuable one: it is of fine flavor, produces a fair crop, and, as it serves to lengthen out the season of this delicious fruit, it is well worthy of cultivation. It comes into bearing ten days earlier than any other variety.

Wood Strawberry. This old variety has excellent properties: if well cultivated, a greater crop may be obtained from the same space than of any other kind: the period of its ripening is of long duration: it may be cultivated with as little labor, and it will produce well for three successive years, on beds running into mats. With this, as with all other fruits, the red is of higher flavor than the white.

Alpine. This old variety may be managed very similarly to the *Wood*: it has been sometimes recommended to cultivate it by seed, as a preferable mode to using the runners, but it is believed without much reason. I once attempted it with the *White Alpine without runners*; the seed, thought to be very choice, was received from the Horticultural Society of Paris. The plants were brought forward in a frame, and at a proper period they were transplanted; the stools enlarge themselves by offsets, and, like all this variety, it continued bearing till into autumn. Its extremely long and slender fruit had nothing peculiar in its flavor, nor did it seem to be worthy of cultivation, farther than as a matter of variety.

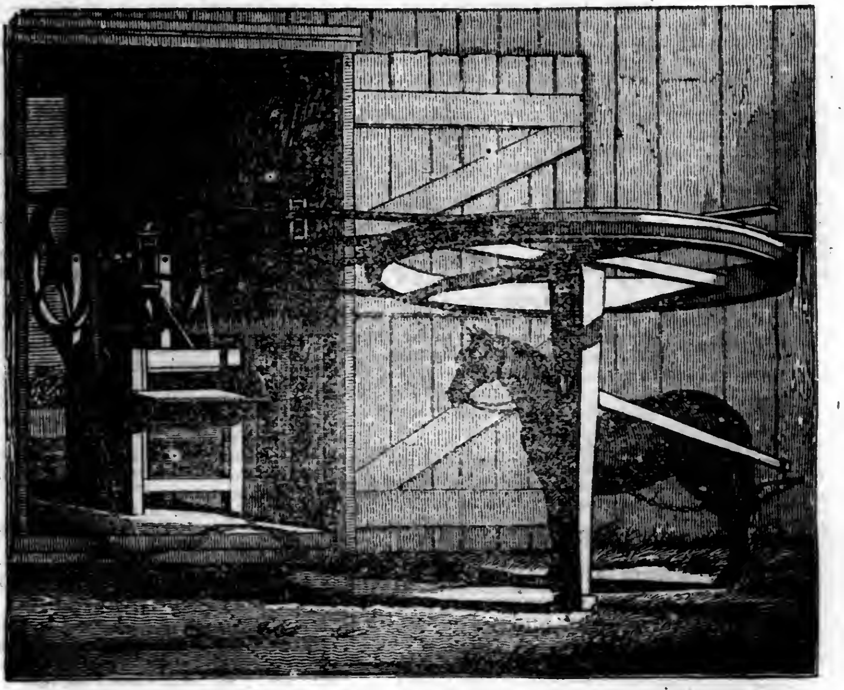
It is desirable, in a private garden, to make a new bed annually, which will enable the cultivator to turn in an old one at the same time, and still keep up a succession; as the strawberry is a great exhauster of the soil, the ground occupied by the old bed should be appropriated to some other crop.

Some distinguished cultivators have recommended burning the vines; in the spring they put on a covering of dry straw, an inch in thickness, and set on fire different portions of the same bed at three different periods. It is said to lengthen out the succession of the crop, and that the product is much larger. I have had no experience in this practice. The results of the exertions which have been made in this vicinity within a few years to improve the cultivation of this fruit, are very apparent, as seen in the increased quantities which the market of the metropolis affords, as well as in the introduction from England of those large and splendid varieties, which, till very recently, were unknown, even in that country; and when it is recollected that the English catalogues now contain over *one hundred* distinct varieties, and that they are constantly increasing, and that such are the facilities with which new and valuable fruits are now obtained from abroad, it may reasonably be expected that the number of choice varieties will not only be augmented, but that the period is not distant, when a fruit, which is as universally a favorite as it is simple and harmless in the use, will be produced in quantities more commensurate with the wants of the community.

E. VOSE.

Dorchester, Feb. 15, 1836.

THRESHING MACHINE AND HORSE POWER.

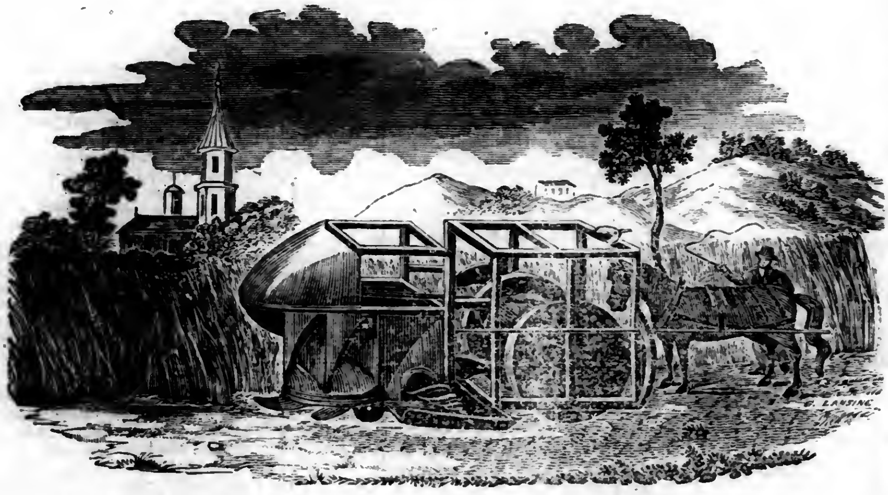


From the New-York Farmer.

The above engraving represents a threshing machine and horse power, invented by Mr. John Shaw, of Augusta, in the county of Kennebeck, and State of Maine, which, taking them on all accounts, are, perhaps, to be preferred to any other invention of the kind. They certainly appear to be less liable to disorder; the horse power embracing no complicated gearing, but doing the whole business with a strap and wheel; and the threshing part of the establishment is at least as simple and operative as any we have seen: and, what is a farther recommendation, we believe they cost less than any other in use.

A threshing machine, with a horse power to propel it, are a pretty heavy item of expense to the farmer, and those we have seen in operation are so liable to get disordered and become useless, and so absolutely unnecessary to the farmer's convenience, that we would advise any one who is about to purchase, to call and examine the above.—The whole concern is so simple, and so well represented by the above cut, that we deem any farther description unnecessary, especially as no one will probably attempt to construct without looking at the machines themselves. This apparatus may be seen and examined by calling on Mr. Barney, in Albany, who, we believe, is proprietor of the patent right for that vicinity.

MOWING AND GRAIN CUTTING MACHINE.



From the New-York Farmer.

A model of a machine for the above purpose was exhibited last fall, at the Fair of the Mechanics' Institute in this city, by the inventor, Capt. Alexander Wilson, of Rhinebec, from which model the above engraving was taken. It was pronounced by many, who, we have reason to suppose, were competent judges, to be superior to any other plan which has hitherto been exhibited, and Capt. W., who is himself a practical farmer, has tested it by sufficient experiments to give him perfect confidence in its success. He is now having the machines built for actual use, at the machine shop of Mr. Fuller, in Waterford, under the direction of Mr. Fairman, whose mechanical talents are not surpassed, to say the least, by those of any other man in this State. There is now building one calculated to cut twelve acres of grass or grain per day, and to be operated and managed by one horse and boy, without any other assistance. The grass will be spread by the machine, and the grain left in swarths for raking and binding.

There are many farmers who have a few acres of meadow so formed by nature as, perhaps, to render this machine forever useless on them; and there are others who cannot afford the time and labor to remove a few stones, and render their meadows smooth. Both these classes will probably condemn, or at least ridicule the use of a mowing machine. But there is a large number, and the proportion is rapidly increasing, who possess large tracts of both grass and grain land, who will decide very differently, and it is fortunate that this class of gentlemen possess not only the disposition but the means to encourage such an improvement. But though a large proportion of the lands east of the Alleghany, where this machine will be highly useful, still the maximum of its usefulness will be on the western prairies, where, with a strong team of two or more horses, it will prove the most efficient pioneer that ever smoothed the surface of a new country. We cannot but hope that an invention of so much promise will receive from the public a fair and candid trial, and the reward it merits.

ON THE COMPARATIVE VALUE OF IRISH AND VIRGINIAN TOBACCO. BY EDMUND DAVY, F. R. S., M. R. I. A., &C., PROFESSOR OF CHEMISTRY TO THE ROYAL DUBLIN SOCIETY.

In the year 1829–30, the cultivation of tobacco in Ireland excited much attention among agriculturists, and several hundred acres of it were raised in different counties; in consequence, the attention of the Royal Dublin Society was directed to the subject, and the author was requested by a select committee of that body to institute experiments on tobacco, with a view to determine some questions of a practical nature, as whether its root contained nicotin, and in what quantity, and to ascertain the comparative value of Irish and Virginian tobacco.

The author's experiments were made on average samples of Virginian and Irish tobacco; for the former he was indebted to the kindness of Mr. Simon Foot, and for the latter to Messrs. Wild, Cuthbert, Cathwell, and Brodigan. From a number of experiments, the author was led to conclude, that the dried roots of Irish tobacco contain from four to five parts of nicotin in 100 parts; and that one pound of good Virginian tobacco is equivalent in value to about twenty-four pounds of good Irish tobacco.

After the author had finished his experiments, it was gratifying to him to be informed that some manufacturers estimate one pound of Virginian tobacco equivalent in value to about two pounds of Irish. Hence there seems to be a pretty near coincidence between their results and those derived from a chemical examination.—[Proceedings of the British Association: Lond. and Edinb. Phil. Mag., vol. vii., p. 391.] A. T.

PROSPECTUS OF VOL. II. OF THE CHICAGO AMERICAN, TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public. The reasons that induced him about a year since to establish his weekly paper, operate with renewed and increasing force in favor of his present design. He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of his future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at \$4 per annum, if paid at the time of subscribing; \$5 if paid at the expiration of six months, or \$6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a \$5 bill will receive the paper fifteen months.

*** All sums to the amount of \$10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, No. 132 Nassau street, by

D. K. MINOR.

CHICAGO LOTS.

Notice is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section Number Fifteen, in the Township Number Thirty-Nine, North of Range Fourteen, East of the third principal Meridian, adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

These who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING, Treasurer to said Board.

Chicago, March 17, 1836. 13-8t

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroad.

No. 264 Elizabeth street, near Bleecker street, New-York.

☞ RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlem Railroad now in operation. J25tf

GEORGIA RAILROAD & BANKING COMPANY. NOTICE TO CONTRACTORS.

SEALED Proposals will be received at this office, between the 1st and 3d of June next, for laying the superstructure on 50 miles of the Georgia Railroad—all materials to be furnished by the Company.

The first ten miles to be commenced by the 10th of September, and completed by the 15th January next—the remainder of the line MUST BE finished on or before the 1st of May, 1837.

Plans and Specifications of the work, may be seen, and all other information obtained on application at the office, one week previous to the letting.

J. EDGAR THOMSON, Chief Eng'r.

Engineer's Office, Augusta, Geo. April, 2d, 1836. 12—4t.

TO CONTRACTORS.

Sealed proposals for the graduation, bridging and superstructure of the JACKSON and BRANDON RAILROAD: for the erection of a BRIDGE over Pearl river, and the remaining incidental work necessary to the completion of said road, will be received at the Railroad Office in Jackson, until the 10th of May next.

Plans and specifications will be exhibited at the office, and the necessary explanations given, by the Assistant Engineer upon the line, one week previous to the letting.

It is expected that testimonials of characters, &c. will accompany the propositions of those who are not personally known to the Agent, and the Company reserve the right of rejecting any bids not deemed to their advantage.

W. PETRIE, Chief Eng. & Agent. J. & B. R. R. & B. Co.

Jackson, Mi. March 15, 1836. 12—3t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9-1y

NOTICE TO CONTRACTORS FOR EXCAVATION AND EMBANKMENT.

Proposals will be received at the Office of the Munroe Railroad Company, Macon, Geo., between the 19th and 21st of May next, for Excavating and Embanking the whole of the Railroad from Macon to Forsyth, a distance of 25 miles, embracing much heavy graduation.

For further information, apply to

DANIEL GRIFFIN, Resident Engineer.

J. EDGAR THOMSON, C. Engineer.

Macon, March 28th, 1836. 11—5t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

☞ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

☞ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

☞ Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM, & GROSVENOR.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG, Superintendent, at Newcastle, Delaware.

feb 20—ytf

TO CONTRACTORS.

NOTICE is hereby given to all persons who may feel disposed to take Contracts on the Illinois and Michigan Canal, that the Board of Commissioners have determined to commence that work as early in the spring as circumstances will permit. The Engineers will commence their surveys about the 10th of March, and will have several Sections ready for contract by the first of May. It is therefore expected that definite proposals will be received from that date to the first of June. In the mean time the Board invite an early inspection of that part of the route to Chicago, and will afford any information that may be required of them.

All communications will be addressed to "The Board of Commissioners of the Illinois and Michigan Canal, at Chicago."

By order of the Board.

JOEL MANNING, Secretary.

January 20, 1836. 8-6t

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap Shovels			
150	do	do	do plain	do
150	do	do	do	cast steel Shovels & Spades
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined Iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO. No. 2 Liberty street, New-York.

BACKUS, AMES & CO. No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

ARCHIMEDES WORKS.

(100 North Moor st. N. Y.)

NEW YORK, February 12th, 1836.

The undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO. 4—ytf

RAILWAY IRON.

95 tons of 1 inch by ½ inch,
200 do. 1¼ do. ½ do.
40 do. 1½ do. ⅜ do.
800 do. 2 do. ½ do.
800 do. 2¼ do. ½ do.
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys and pins.

rought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½ and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON, 9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them. 4—d7 1meowr

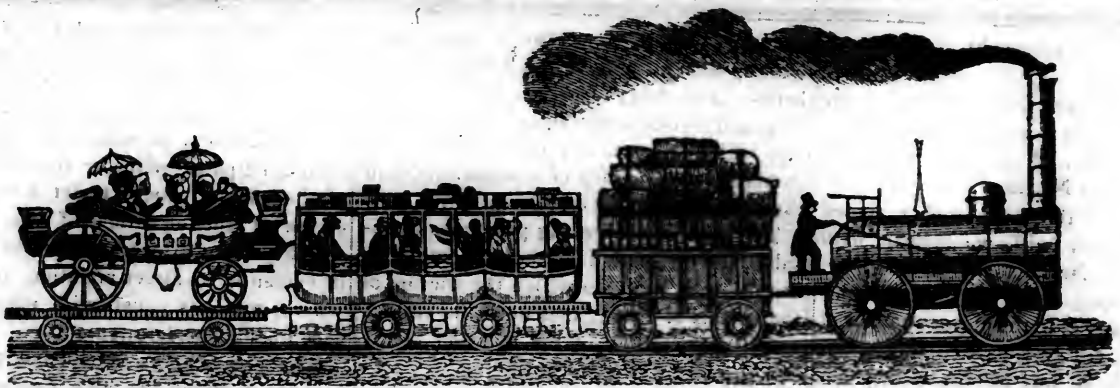
TO BRIDGE BUILDERS.

Sealed Proposals will be received, until the 15th of April, for finding materials and building the superstructure of a bridge, over Harlem Creek and flats, on the New York and Harlem Railroad.

Said Bridge to be on the late improvement of Mr. Town, 24 feet wide in the clear, and 660 feet long between the abutments, to be supported by three piers of masonry. The bridge to be completed by the 1st of Nov. ensuing. Communications may be addressed to the undersigned, at his office, No. 9 Chambers street, where plans and specifications may be seen.

JOHN EWEN, JR. Engineer of the New York and Harlem Railroad.

9-t15a



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, APRIL 9, 1836. [VOLUME V.—No. 14.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 9, 1836.

AVERY'S ROTARY ENGINE.

This engine has become a subject of considerable interest, not only in this country but in Europe. We have been frequently inquired of by letter and otherwise, as to its ability, cost, cost of fuel and attendance, &c. &c.—yet, although entirely satisfied as to its ability and economy, until the present time we have been unable to give a definite answer to these questions. And, indeed, even now, we do not speak with that *precision* in relation to *cost* which we should like, although we are sure to put it high enough; and even a little *beyond* the mark, that those who purchase may, if at all, be favorably disappointed.

After repeating the remark of a gentleman of much experience with steam engines, viz. "that when it was in successful operation, if they would give him a good pair of *leather mittens* [he would hold it"—meaning that he could take hold of the shaft on which the *arm* is fixed, and with which it revolves at the rate of 3000 times a minute, and stop its motion if he had on a pair of "*leather mittens*"—we will proceed to give some particulars in relation to it, which, from personal observation, and from the statement of the intelligent superintendent, we can vouch for.

The arms of the engine are 30 inches long from the exterior of the shaft to the apertures, and the apertures are each the $\frac{1}{16}$ of a square inch—they are inclosed in a circular cast iron case—the shaft receiving the steam at one end and having a pulley for the main band on the other.

The following machines are all attached to, and operated by it, viz:

1 upright saw with 30 inch stroke, or 15 inch crank—averaging 110 strokes per minute.

1 buzz saw, 24 inch, cutting a kerf of $\frac{3}{16}$ of an inch, with 22 to 2400 revolutions per minute.

3 24 inch circular veneering saws.
1 26 " " " "
1 27 " " " " varying from 12 to 1500 revolutions per minute.

1 15 inch buz saw, with 1200 revolutions per minute, and

1 whip saw for curves, with 9 inch sweep and 250 strokes per minute.

1 grindstone.

1 blower for the furnace.

And the pump raising water 30 feet into a resorvoir for its own use.

These machines are not *always all* at work at the same time—as some of them require repairing, or filing, or they are taking off or putting on logs, but this may be said without fear of contradiction—they *can* all be driven at the same time by the engine now in use, for 10, 12, or any number of hours that the superintendent and hands can tend it—and that, too, with the evaporation of an average *not to exceed* 40 *gallons of water per hour.*

The boiler now in use was made for a piston engine, and was intended for 15 horse power.

It has been asked, and frequently, what is the power of this engine. This is a question easier asked by many, than answered—yet most practical men form an opinion for themselves, of the power required to carry this machinery—and it is, of course, in this way, estimated variously.

It cannot, however, we presume, be pu down at less than the following estimate viz:

	Horse Power.		
The upright saw, sawing 110 feet per hour,	5		5
" large buz saw, sawing 120 feet per hour,	5		5
" small " "	1½		1½
" veneering saws,	1	each	5
" whip saw, grindstone, pump, and blower	—		1½
			18

But to avoid over-estimates, we will put the whole at 15 horse power, to accomplish which 40 gallons of water are evaporated at an expense of fuel of *one dollar* for every ten working hours, and $1,25 cents for attendance on the engine and fire.

It should be borne in mind, that these saws are all used in sawing mahogany—except the whip-saw, which is used for sawing all kinds of timber.

In addition to the above, a turning-lathe is to be put in operation in a few days.

The question has been and may be again asked, what will the boiler and other fixtures cost, to put this engine in operation?

It may be answered, although not very satisfactorily, by saying that the boiler and fixtures for driving it will not cost more than for any other engine of equal power. On

this point, we hope soon to be able to speak more definitely.

We desire to call the attention of our readers to an article from the Journal of the Franklin Institute, in relation to this engine, published in No. 13 of this Journal—and also to one in the same number, signed "HIERO," as they will, we believe, with this statement of facts, tend at least to shake, if not to dispel, some of the prejudice against, or disbelief in the power and utility of, this engine. If more particular information is desired, it may be obtained by addressing, post paid, William Avery, or E. Lynds & Son, Syracuse, New-York, or Mr. Joseph Curtis, the agent for this city, or the Editor of this Journal.

By the way of comparing it with other engines, we shall feel greatly obliged to any gentleman who will give us a statement of the *water and fuel used*, and labor performed, by a *piston engine of fifteen horse power!* When received, we will lay it before our readers.—[ED. R. R. JOUR.]

THAMES TUNNEL.—We commence, in this number, a concise description of the Thames Tunnel, with views—and shall continue it in a subsequent number—after which it will be published in book form.

For the Railroad Journal.

STRICTURES ON THE REPORTS OF THE STATE ENGINEERS.

No. III.

We again quote from the Report of John B. Jervis, Holmes Hutchinson, and Frederick C. Mills, on the comparative merits and cost of Canals and Railroads, Doc. 296, p. 33, of the last session of the N. Y. Legislature, as follows—

	Feet per mile.	Tons.
"On a level the gross load will be		75.25
On a road or section having an ascent of	10	49.53
" " " " " " "	20	37.35
" " " " " " "	30	27.24
" " " " " " "	40	20.22
" " " " " " "	50	17.04
" " " " " " "	60	13.92
" " " " " " "	70	11.31"

We demonstrated in our last No., that the absolute power of the locomotive engine as exhibited in the above table, whether upon a level or inclined road, was rated altogether too low, being from 50 to 100 per cent. short of the results obtained by experiments actually made for months previous to the time when the Report in question was rendered. We present the table a second time, for the purpose of showing that the relative results therein given for different inclinations, could not have been estimated by correct formula, and were not in accordance with the "most approved" experiments and facts, as they existed at the time the Report was written.

In determining the resistance to be encountered in the movement of a train of cars, under the circumstances as assumed in the table, two things are to be considered. 1st. The resistance arising from friction, and the want of perfect smoothness and regularity in the rails and wheels, which we will assume the same as in the Report, to wit: $\frac{1}{225}$ part of weight of engine and tender, and $\frac{1}{250}$ part of the cars and their loads. And 2dly, The resistance caused by gravity which occurs upon inclined roads, and which corresponds, (according to the established principles of mechanics,) with the size of the angle of inclination.

To render the preceding principles applicable, the inclination of the road must be within that limit on which the friction of the wheels of the engines upon the rails is sufficient to allow of the exertion of the full working power of the engine.

According to the principles above laid down, and assuming the gross load upon a level to be as above stated, to wit: 75.25 tons, the weight of the engine and tender being taken at ten tons, the following results are obtained:

Inclination of Road pr. Mile in Feet.	Gross Load in Tons taken from the above Table.	Corrected Gross Load in Tons.	Diff. Tons.	Error per Cent.
Level	75.25	75.25		
10	49.53	47.80	1.73	4
20	37.35	33.72	3.63	11
30	27.24	25.15	2.09	8
40	20.22	19.40	.82	4
50	17.04	15.26	1.78	12
60	13.92	12.14	1.78	14
70	11.31	9.71	1.60	16

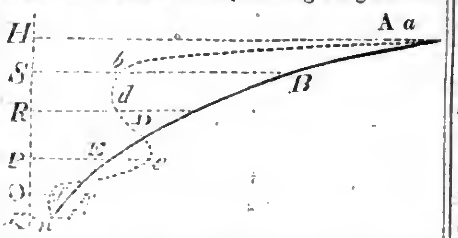
Our readers will perceive that the amount of the variation or error of the results as given in the Report deviates from the truth from 4 per cent. up to as high as 16 per cent.! It is therefore evident that the results given in the Report could not have been formed by the aid of correct mechanical and mathematical principles. Indeed the results themselves exhibit this fact on their very face.

It will be obvious to most of our readers that the effect produced on the several inclinations, (increasing as the latter do by a common difference of 10 feet) must regularly diminish by some particular law. In the results given in the Report this law is evidently violated.

The following are the second differences:
13.54 2.07 3.09 3.84 0.06 0.51

The same differences drawn from the corrected results are as follows:
13.37 5.51 2.82 1.61 1.02 0.69

To render the discrepancy more apparent we have framed the following diagram, in



which the second differences in the second line are represented respectively by the ordinates HA, SB, RD, &c., and those in the first line by H*a*, S*b*, R*d*, &c. Connecting the extremities of the former, and we have the regular curve represented by the continued line A. B. D. E. F. and N., and in the latter case the irregular curve, represented by the broken line *a. b. d. e. f.* and *n*. The first coinciding, as would naturally have been anticipated, with the regular decrease of the effect produced under a gradual increase of the elevation of the plane on which the power operates, while the latter is evidently in direct violation of the law which connects cause with effect, in the case under consideration.

The preceding is conclusive as to the manner in which the table presented in the Report was formed. The process as declared in our last number, must have been an empirical one, as calculations made upon true principles could never have led to such discordant results.

We have dwelt longer upon this branch of the subject than its importance would perhaps seem to demand, but as the statements in the Report were evidently put forward with some pretension to science, we have felt it a duty to lay bare the foundation on which that pretension rests.

We now proceed to give a statement of the comparative force of traction of engines on the Baltimore and Ohio Road, as deduced from the experiments referred to in our last No.

Inclination of Road in Feet per Mile.	Engine as assumed in Report, with results corrected.		Arabian Engine, velocity 11 79-100 Miles per Hour.		Geo. Washington Engine, velocity 11¼ Miles per Hour.	
	Tons.	Ratio to a Level	Tons.	Ratio to a Level	Tons.	Ratio to a Level
Level	75.25		113.00		211.00	
10	47.80	63	73.08	65	139.20	66
20	33.72	44	52.62	47	102.38	48
30	25.15	33	40.16	36	79.99	38
40	19.40	25	31.79	28	64.93	31
50	15.26	20	25.78	23	54.11	25
60	12.14	16	21.24	19	45.96	22
70	9.71	13	17.71	16	39.60	19
80	7.76	10	14.87	13	34.50	16
90	6.16	8	12.55	11	30.32	14
100	4.83	6	10.61	10	26.83	13

The rates here given for the Geo. Washington and Arabian engines, for different ascents, are *below the actual performance of those engines.* This is principally owing, we presume, to the fact that the friction, instead of being $\frac{1}{250}$ of the gross load, as assumed, is probably the $\frac{1}{220}$ or $\frac{1}{200}$ part.

The second column contains the corrected results as ascertained above, for different inclinations, the gross load being the same as assumed in the Report, viz: 75.25 tons. The fourth column shows the force of traction of the Arabian, and the sixth that of the Geo. Washington engine. The Arabian was in operation, and an official statement of its performance rendered for months previous to the Report under consideration being made. We expressed, in our last No., our surprise that the improvements on the Baltimore Road were not referred to or noticed in the Report. Had they been fairly presented, the complexion

of the results given in the Report would have been materially changed.

The gross load conveyed on a level, instead of 75.25 tons, would have been 113 tons, an increase of 50 per cent. At 30 feet per mile, 39.72 tons instead 25.15, being an increase of nearly 60 per cent. At 70 feet per mile, 17.70 tons instead of 9.70 tons, an increase of nearly 80 per cent. It is true that the Arabian engine was heavier than the one assumed in the Report, being 7½ tons, the latter being 6½ tons, but it had *one and one third* times the power.

A difference so great, it will be at once perceived, would have materially affected the cost of transportation upon Railroads; as exhibited in the Report, the reduction in the expense being greater in proportion upon the higher or steeper grades.

In the sixth column above, are the results deduced from the performance of the Geo. Washington engine. This engine was constructed subsequent to the rendering of the Report. The statements in relation to it are introduced here with a view of exhibiting the present state of improvements in the application of locomotive steam power upon Railways. It is presented likewise for the purpose of exhibiting to our readers the character and extent of the improvements which have been made upon the Baltimore Road, within the last three years, and impressing their minds with the degree of credibility and importance to be attached to the performances of the Arabian engine, and also for another purpose, which will appear hereafter. The power of the Geo. Washington was *two and a half times* that of the engine assumed in the Report, while its weight was only one third greater.

We will conclude this number by commenting upon the following, pages 33 and 34 of the Report:

> "There are engines of a larger size than the one assumed, *but it is the most approved at this time* in reference to the weight of engine and the weight of the working wheels. This, however, is unimportant, as the comparison will not be at all affected by varying the power of the engine. The ratio between a level and the ascents will remain the same notwithstanding."

The assertion here unequivocally made, that the ratio of the effect produced between a level and the ascents is not affected by the power of the engine, is incorrect both in theory and practice.

A glance at the statements above given, in relation to the powers of the different engines, shows that the gross load which the Geo. Washington engine is capable of conveying up an inclination of 70 feet per mile, has a ratio compared with a level *one and a half times* that of the engine assumed in the Report, and for an inclination of 100 feet per mile, *double* that given in the Report. It is obvious that as the power of the engine is increased, the gross load conveyed will be greater compared with its weight, and that the effect produced on any given inclination compared with a level must necessarily be greater. Such an engine will convey a load up an inclination along which a weaker engine would not be able to propel its own weight—or an engine may be so weak as to have its power entirely exhausted on a very moderate inclination. In either case the absurdity of the principle asserted in the Report is apparent. We are not surprised at this; it only comprises what we have already had occasion to infer, that the mechanical principles of the operation of engines on inclined roads could not have been thoroughly understood by the writers of the Report.

It is almost needless to add, that the absolute and relative cost of transportation per ton per mile, on different inclinations, as exhibited in the Report, is necessarily erroneous. The manner, likewise, in which the cost of transportation on different inclinations is represented, is calculated to mislead those who are not particularly conversant with the subject, since no allowance appears to be made, or intimation given, of the very great saving in power in descending, which invariably occurs in a reciprocal trade.

We shall resume this subject in our next No., and examine particularly into the principle adopted in the Report of reducing inclined roads to equivalent level ones.

OWEGO.

ON SUPPLYING THE CITY OF NEW-YORK WITH WATER.

To the Editor of the Railroad Journal:

Sir,—The supply of water now being brought into New-York from the Croton river, will be very ample and of the best quality, and it will doubtless, by admitting of a more copious supply in cases of fire, contribute as well to the further security of property as to the general improvement of the health of the city. I have always, however, inclined to think, with what propriety remains to be seen, that that portion of the water necessary to the supply of the Fire Department, considering the great amount of property annually consumed in this way, should be seperate from that used for family purposes; in fact, that for the extinction of fires there should be a distinct supply and mode of supply, distinctly governed and independent of the contingent accidents which sometimes affect the other.

In view of this, the excellent waters of the Croton would be reserved simply for the personal use of the inhabitants—a system of fire police would be established containing within itself all essential requisites, and capable of progressing in improvement independent of the control or opinions of other departments. This system, subject as a whole to the city, had better consist of various independent divisions, each connected with the North and East river. My ideas in the present immature view of the subject, would be to attach a reservoir to each division, situated on the river, and having its tank sufficiently raised to command the top of the highest building in that division, and of capacity sufficient to supply the largest fire ascertained for two hours—a small steam engine or other apparatus would be required to raise the water, and if it were a steam engine, it could always be heated and in operation within the time specified, renewing the supply. From this reservoir four inch pipes would branch into every street of the division, and at the corners of all the streets, and within frequent distances on these streets fire plugs would be placed raised above the pavement, occupying but little space and having quadration cocks, within a proper case, with a common key, one of which would be in the hands of the foreman of every hose company, and one also lying with some respectable house in the neighborhood. No part of this water would be permitted to be used for any other purpose; small pipes of 1½ or 2 inchs diameter would be carried into such properties as desired them, running up the inside of the front wall to the top of the house, and having a communication with each story, always open, and charged when necessary by means of the stop-cock on the street. These and various other arrangements easily suggested could very commodiously and profitably be introduced.

A very important item of the city water is at present used to extinguish fires—this water might as well be salt or river water as any other. My opinion is, that the Fire Department, to be effective, should have the entire control of the water appropriated to its use: at present the individual companies are beautifully arranged and the engines ably manned, yet in such a city as this, there is wanting a more complete system of defence against this destroying element than at present obtains. Compared with the amount of property annually consumed, the cost of such an experiment would be but a trifling tax.

Respectfully, S. D.

Boston, Feb. 18, 1836.

[It has been objected to the use of salt water—that the pipe stop-cock, and all cocks of metal liable to its contact are injured, and in some instances rendered useless. The great injury to furniture, &c., in houses deluged with water, (as is often the case,) to prevent the spread of a conflagration. However, salt water is better than no water.]

PROFESSOR BARLOW'S REPORT ON RAILWAYS.—In the London Mechanics' Magazine for February, which has just come to hand, we find some extracts from the Report of Professor BARLOW, who was appointed by the Directors of the London and Birmingham Railway Company to visit the Liverpool and Manchester Road for the purpose of ascertaining the best form of rail, chair, &c. &c.

The report, judging from the extracts, promises much useful information on the

subject, and we shall endeavor to obtain it and publish it entire.

Since the publication of his first report (of which we gave a full abstract in No. 612), Mr. Barlow has been again engaged by the Directors of the London and Birmingham Railway, "to visit the Liverpool and Manchester Railway, to view that line, and advise this Board as to the weight of rails, the description of chairs and fastenings, the distance of the supports, and the size of the blocks that he would advise the Directors to adopt; and to accompany such advice with any observations generally on the subject."

Accordingly, accompanied by two of the London Directors, and met at Liverpool by two of that town, he entered on his task, furnished by the liberality of the Liverpool and Manchester Railway Company with every necessary facility and accommodation.

The following extract, besides showing the necessity of the investigation, presents a vivid and faithful picture of the uncertainties and contradictions into which practical men fall when they despise the help of theorists, while it gives, and on proper grounds, the weight unquestionably due to the opinions formed by these same practical men from constant observation:

"We met, as appointed, at the Liverpool station of the Liverpool and Manchester line, and employed the first day in examining the state of the rails, chairs, and blocks, modes of fixing, and other particulars. In the course of this examination, I took the opportunity of inquiring on the spot the opinion of the resident engineers, contractors for repairs, workmen, and others, relative to these several points; but I was much disappointed to find those opinions, in most instances, discordant, and in many directly contradictory; a circumstance the more remarkable, as one would have thought that five years' incessant practice would have been sufficient to eradicate many early erroneous ideas.

"I am not myself a practical man, but from my situation and pursuits I have been for nearly thirty years in almost constant intercourse with two of the largest and most varied mechanical establishments in the kingdom, and have, during that time, witnessed or superintended a vast number of experiments and trials on various mechanical subjects, many of which I have afterwards been enabled to examine in the works at large; I am therefore, to a certain extent, acquainted with what theory gives, and what practice requires, and the limits it prescribes; so I am also with the views and arguments of practical men, who I know sometimes, like other persons, in their anxiety to avoid one evil lose sight of other collateral evils, which their remedy increases or creates; but I must say that I never saw this so strongly marked as on the present occasion, nor such a diversity of conflicting opinions on what appears so simple and plain a case. This is a circumstance much to be regretted, not only as regards the doubts which it naturally throws upon the mind of proprietors, embarking large amounts of capital in the undertaking, but also in respect to practical men themselves, whose judgment must suffer depreciation by such discordance. Opinions derived from long experience are exceedingly valuable, and outweigh all others, while they are consistent with facts and with each other; but they are worse than useless when they lead, as in this instance, to directly opposite conclusions.

"In making these remarks, I beg to be understood as intending no disrespect to the opinions of practical men generally, but simply to show that it was impossible, in this case, for me to be guided by them, and thereby to justify the plan I soon determined to adopt; viz. to avoid, as far as possible, argument founded on mere hypothesis, and to substitute for the latter, facts drawn from actual experiments, which should be made publicly, registered generally, and witnessed by any one interested in the decision; and moreover, as I intended to rest my report entirely on these data, I resolved to offer no opinion, till I had time to analyze and compare my results. I am not certain that this plan of proceeding was quite what the deputation most approved, but I feel convinced that it was the only way in which justice could be done to the inquiry, and confidence obtained for the decision."

The dimensions of a railway-bar to support any given *quiescent* load had become pretty well known, but practical men doubted and differed as to what was required by an engine and train *in motion*, whether more or less, and how much. Knowing that the results of theory, when opposed to their previous opinions, obtain little confidence from practical men, and would, therefore, be slighted by part at least of those for whose guidance the inquiry was undertaken, the Professor wisely resolved to found his Report on experiments alone; and these are happily such as may be repeated at any time, and at small expense, till the results from them are established beyond dispute. A horizontal lever, of which the arms were as 10 to 1, was mounted between centres on a plank; its short end was placed in contact with the under side of the rail, and the other showed the deflection ten times magnified. The effects produced by the passing engines and trains were minutely observed with this *deflectometer*; and several instruments were provided, and used at once, so as to show conveniently the effects produced on different parts of the bar and its supports, by the passing of the same load. Though some objections might be made to the manner in which it was used, and, consequently, to the arguments for rendering its indications comparable with those of former experiments, it is certain that it has already furnished important data, and that it will become one of the most indispensable instruments to the railway engineer. Its first trial produced the following lesson for railway managers, which surely will not be lost upon them:—

"Our first experiments were only tentative, with a view to try the instrument, but even in these much was very distinctly shown; when, for example, a train passed over, we could see clearly the operation of each wheel upon the rail, which, where these were well laid, and the joints and blocks secure, were only of a certain amount; but when the rails were unlevel, or other irregularities occurred, some lurch would take place, towards the middle or end of the train, which would strike the rail with sufficient force to throw up the index to nearly double its previous amount, indicating, of course, that it had, in the case in question, sustained a deflection nearly double what it would have done with the same weight in a quiescent state."

Numerous and varied experiments with this instrument, while they indicate a small increase of deflection with increase of velocity, seem also to have ascertained that it is too small to need much addition to the strength of the rails; for on comparing these observations with those made at Woolwich with quiescent weights, it may be doubted whether, when allowance is made for the manner in which the deflectometer was used, any real excess of deflection was occasioned by the passing load. This, however, was not the case with the joint lengths, where the deflection was 40 per cent. additional; it is not suggested how this is to be prevented, but it is attributed partly to the looseness of the chair and block.

It seemed desirable to know, whether the deflection produced by *lateral* pressure on the outward rail in curves, required an addition to the strength of the rail in that direction; for this purpose a deflectometer was constructed of a somewhat different shape. The result, however, was, that rails sufficient for their work in other respects, would not fail under this strain, so that the subject needed no further attention.

The deflectometer rendered very apparent the importance of placing the blocks in every case opposite to each other. Until this and other precautions are taken, the constructors of railways must be content to use rails very much heavier than the work of the road actually requires:—

"In consequence of the imperfection of these parts (the blocks, &c.), a strain is occasionally thrown on the rail which produces a deflection about double that which belongs to the load in question. This effect was frequently and obviously exhibited in the experiments with the trains. In many cases, the deflectometer showed only the common amount of deflection when the engine (by far the heaviest load) passed over; whereas, perhaps in the middle, or at the end of the train, a wagon would lurch over from some irregularities, and throw up the index to double its former amount. This effect was very particularly noticed by the deputation, Directors, Proprietors, and other parties present. It follows, therefore, that till greater perfection can be obtained in railways, a strength of bar more than double that due to the mean strain must be provided. In my former report, I have allowed 50 per cent. beyond the double, as a surplus; but from these experiments, it appears this allowance is in excess, and that from 10 to 20 per cent. beyond the double will be sufficient; that is, for a 12-ton engine, as the weight is at present distributed, a strength of 7 tons would be an ample provision, and with greater accuracy of construction, such as the care now taken may

be expected to ensure, a less strength would be sufficient; or rather, allowing the same strength, an engine of 14 or 16 tons might be passed over with the greatest confidence.

"By referring to the observed results in the Appendix, it will be seen, that one rail is sometimes depressed by one wheel a quarter of an inch, while the other wheel is perhaps on a block; and immediately after the high wheel is depressed, and the lower wheel raised, giving thus a rocking motion to the carriages, the effect of which was rendered remarkably obvious by the little instrument employed. No doubt much of this is due to a want of parallelism in the bearing blocks; and therefore, as one step towards correction, I would recommend it to be made a special instruction, *that the blocks shall in every case be placed immediately opposite to each other*, which, in parallel rails, may always be effected without expense or inconvenience. Other corrections, however, are necessary, which will be noticed in their proper places."

Another branch of the subject is the length of bearing, and the consequent inquiries as to the sectional dimensions of the rail and stability of the blocks and chairs. Adopting the parallel rail, and rejecting the double-headed one, Professor Barlow determines from experience that the head of the rail ought not to have a less sectional area than 2¼ inches, that is, it should not weigh less than 22½ lbs. per yard, and that the entire depth must not exceed 5 inches. Commencing with these assumptions, he gives plans, computations, and tables for rails with bearings of the lengths of 3 feet, 3 feet 9 inches, 4, 5, and 6 feet, the sections being so arranged as to give the maximum strength.

In discussing the best sectional form of rail, Mr. Barlow makes an observation well worthy of remark:—

"In the sections given in a preceding page for rails at different lengths of bearings, it will be seen that I have confined the breadth of the lower web to 1½, or, at most, to 1⅝, inches, and this has been done, although I am well aware that, to extend the breadth of the lower web, and to reduce its depth, would theoretically give the strongest rail; in fact that the double T is, on paper, a stronger rail than the deep and less broad flanched rail, but I am quite convinced it is not so in practice. The lower web comes no other way into use than as it is brought into a state of tension by the action of the centre rib; and although the fibres of the lower web lying immediately below the centre rib are brought into action by it, and that these fibres excite a similar action laterally in those immediately contiguous to them, and these again to the next, and so on, yet in a ductile metal, like malleable iron, this lateral effect is soon lost; so that the extreme fibres of the extended lower flanch become inefficient.

"To convince Mr. Locke and some other gentlemen of the weakness of the double T form, I had one of the rails taken up, and ½ an inch cut away on each side from the lower flanch, reducing its breadth at the point of greatest strain, that is, in the middle of the bar, to 1½ instead of 2½ inches. It was then put into the press, and the trains brought on as usual, under the superintendence of Mr. Edward Woods and Mr. John Gray; Mr. Locke himself being obliged to leave just at the time the experiment was in progress.

"Mr. Rathbone, Mr. Edward Cropper, and myself, were also present, and the result was, that the bar thus mutilated showed greater strength than the mean strength which Mr. Locke found to belong to it when whole. Now, although I am ready to grant that the bar was actually weakened, and that this apparent anomaly is attributable to the imperfection of the press, yet, on the other hand, it must be admitted that it could, with such a result, have lost but little of its strength, and that the iron thus abstracted, viz. nearly ⅛ of the whole section, if judiciously introduced elsewhere, would undoubtedly give a much stronger rail."

While we fully admit the importance of these remarks, we imagine they will require further illustration before they obtain general assent. What is the longitudinal form assumed by the extreme lateral fibres supposed to be so nearly ineffectual? If it be the same as that of their neighbor fibres toward the centre, it has required force to extend them—if it be nearer a straight line, they have hindered to some amount the extension of their fellows. Mr. Barlow does not hazard opinions lightly, and will probably, on some future occasion, give further reasons for the conclusion at which he has arrived.

In testing the stability of the blocks, the deflectometer again did good service. Though no great exactness was attained, it appeared that blocks, five feet asunder, sunk as little under a passing load as those but three feet apart. Considerable difference of opinion seems to exist, as to the economy and propriety on other grounds, of the use of more or fewer blocks. The arguments on both sides are given; some of which seem to show that the Professor's help was by no means superfluous. He gives his own opinion in these words:—

"The conclusion to which I am brought, as to the relative expense of maintenance per block in five feet and three feet bearings, or, more generally, in long and short bearings, after well weighing all these points, is, first, that in embankments, and where there is a soft sub-soil, the expense would be greater at first with the long bearings than with the short, but that it would ultimately become the same, although certainly never less; and, secondly, that on rocky, or very solid bottoms, the expense would be very nearly the same from first to last."

It can scarcely be doubted, that, while the earthern surface on which the block rests is new, it will be a little compressed permanently by every blow, and the number of blows being as the distance between block and block, it will be sooner compressed under long than short bearings; but, as soon as it has become so hard as to return to its shape after the greatest blows to which it is liable, it is of little importance how often it is struck; that is, whether the bearings be long or short.

The form of chair he prefers is one which would admit a plain single T rail; but, as the rail he decidedly recommends has a bottom flanch, it is proposed, that, where the blocks fall, a protuberance shall be left on the middle rib, so as to fill up its thickness to a level with the perpendicular face of the bottom flanch. A rail is thus obtained which admits the use of a plain chair; but the adaptation of particular spots to the chair seems to bring on the same difficulty with respect to the placing of the blocks opposite to each other, as was found in the case of the fish-bellied rail. It seems possible to avoid it in either case by making the bearing places half an inch longer than the width of the chair. The reason given by some for preferring the fish-bellied rail, "that its weak neck allows it to follow a sinking chair," is certainly a curious specimen of engineering sagacity. The further observations on the best form of chair deserve careful attention.

The section on "the formation of the joints" opens very curiously:—

"On carefully examining the joints of the rails on the Liverpool and Manchester line, I am disposed to estimate that about one in six of the plain butt joints are as perfect as can well be desired, and that another one in six are as bad as bad workmanship and negligence can make them; the remaining two thirds varying in character between these two extremes."

Has this celebrated road produced its splendid effects, while one half of its power has been wasted, and its cost of repair doubled by bad "workmanship and negligence?" What may not be hoped for when searching inquiries like the present shall have brought up railway furniture even to the present standard of decent workmanship?

After urging the necessity and attainableness of much greater accuracy, and stating that government work is much better done, the report proceeds—

"In the smaller shells, which are still considerably larger than the opening in a railway chair, and unquestionably much more difficult to cast, not more than a deviation of $\frac{1}{16}$th of an inch is allowed, and I can see no reason why the railway chairs and the end of the rails, should not be submitted to at least as close a gauge. To enforce this accuracy, may perhaps incur some present charge, but do not the wear and tear of the rails and engines incur a much larger constant expense of maintenance? I am sure it is unnecessary for me to urge this point upon those proprietors who witnessed, during the experiments, the concussion on the rail exhibited by the deflectomer, which, of course, produced a light concussion on the engine and carriages. The whole of these were, doubtless, due to irregularities, of which the want of parallelism of the blocks and bad joints were the principal. Some persons present attributed them in part to flat places in the wheel; but if there are flat places in the circumference of the wheel, to what are these attributable but to bad joints? To be convinced of this we have only to consider what must be the effect of a blow on a wheel supporting a load of 3 tons, and moving

with a velocity of 30 or 32 miles per hour, when such a body meets the end of a rail rising ⅛, or, perhaps, nearly ¼ of an inch above another; or when the joints are so open as to allow the wheel to fall from one upon the other, with all the impetus due to such velocity.

"In order to arrive at some estimate of this effect, a bad or open joint was selected, the deflectometer applied to the block, and the shock measured by the instrument. The rail was then taken up and relaid, so as to make the joint as close as usual, leaving the opening at the other end, and the effect was again taken, when it was found that the bad joint increased the force of concussion full 50 per cent.; that is, the engine had to sustain a shock from this circumstance one-half at least greater than was due to a very common joint, and probably double what it would have had to sustain at a good one."

Thus we may add, that the same care which is required by the "scarcely-perceptible" but important curve in the bottom of Mr. Locke's chairs (p. 55) would certainly produce much better articles than those described as in use on the Liverpool and Manchester line.

The following is the summary which the Professor gives of his Report:

"1st. I am of opinion, that as far as is consistent with the amount of the first outlay, it is desirable to increase the weight or section of the rails, and to decrease proportionally the number of bearing blocks.

"2d. That in cuttings and other places furnishing a good firm bearing, the present size of blocks is sufficient; viz. allowing for the intermediate blocks four feet, and for joint blocks five feet, while the bearing length does not exceed five feet; but that on embankments they will probably require to be proportionally increased in size. But I recommend this to be put to the test of actual experiment.

"3d. I am of opinion that the cost of maintenance will, in the former case, after a short time, be in proportion to the reduced number of blocks, but certainly not less.

"4th. I consider the double and equal flanched rail to be inferior, in strength and convenience of fixing, to that which is described and modified to suit different distances, in a preceding page.

"5th. I consider Mr. Sinclair's proposition for rendering the rail plane at its points of bearing, to be in every respect recommendable.

"6th. I am of opinion the form of chair, and method of fixing the rail in the chair, proposed by Mr. Stephenson, is as simple and efficient (adopting the plan of rolling of Mr. Sinclair) as can be desired.

"7th. Yielding, as I am always ready to do, to practical opinions, when they are found pretty generally to agree, I am disposed to think the present mode of fixing the chairs to the blocks, with a wooden plug and iron pin, is, from its simplicity and convenience, the most recommendable.

"Lastly. I am strongly convinced that no change or modification of form will produce any essential improvement, till greater uniformity be enforced in the figure and dimensions of the rails and chairs, and greater attention paid to the parallelism of the blocks, and to a proper adjustment of the distances of the ends of the rails from each other to allow for expansion and contraction."

Some important theoretical investigations follow the Report, which we cannot notice at present, further than to extract two important conclusions.

It is found, "that the sum of all the variable resistances to a load by the deflection of the bar over which it passes, is exactly half the resistance the load would experience in ascending a plane of the same half length, and whose height is equal to the central deflection of the same bar."

From the table-page 88, it seems that the increase of power required by the deflections of the bars, is nearly proportionate to the distance of the blocks; a fact which is certainly to be taken into account when determining the length of bearing.

The appendix details many experiments not given in the body of the Report.

The whole forms a very valuable contribution to our knowledge on some of the most important subjects connected with the construction and management of railways. We cannot but hope, that the same profound mathematician and veteran experimentalist will be again engaged, in illustrating the theory and correcting the practice of this most influential of recent inventions.

RAILWAY TUNNELS.

(From Mr. Gibb's Report upon the several proposed Lines for a Brighton Railway.)

An objection has been made generally to all tunnels—namely, that the air contained in them will be so contaminated by the noxious gas produced by the locomotive engines in passing through them, as to render it unfit for respiration. Whether this objection has ever been advanced, or at all supported, by any scientific man possessing sufficient chemical knowledge to enable him to judge correctly on the subject, is doubtful. The probability, however, is, that the fear of any injurious effects from foul air has originated in those who have witnessed the effects produced by steam engines in passing through the small tunnels on some of our canals; and if they have for a moment imagined that any similarity will be found in the effects in the two cases, their fears are quite justifiable. The tunnels on canals are commonly constructed of such limited dimensions, that it would be highly dangerous to attempt the same application of steam power as will be necessary on a railway; for instance, in the tunnel constructed by Mr. Telford on the Hare Castle Canal, the area above the water in the canal is only about one hundred feet; and even the Thames and Medway in transverse dimensions, perhaps the largest canal tunnel in England, has only an area of four hundred and fifty feet; while the smallest tunnel contemplated on the Brighton Railway, will have an area of at least six hundred feet.

In order to explain to what extent the air in a tunnel is contaminated by a locomotive engine passing through it, let us suppose a tunnel one mile in length to be traversed by a locomotive engine, and its train of a gross weight of one hundred tons. The experience of the Liverpool and Manchester Railway has shown that the average consumption of coke is considerably less than half a pound per ton for each mile it is carried on a railway; but taking the consumption at half a pound, the whole weight of one hundred tons will require the consumption of 50 lbs. of coke. It may be calculated that every 10 lbs. of coke will evaporate a cubic foot of water; so that the whole 50 lbs. will convert into steam 5 cubic feet of water in the distance of 1 mile. Now to convert into steam 1 cubic foot of water, requires 1,950, or say 2,000 cubic feet of air, then 5 feet of water will of course require 10,000 feet; and this will be the whole amount of contaminated air in one mile in length of tunnel. To determine the proportion of such an amount of foul air, and the whole air contained in the tunnel, we may take for example a moderate sized tunnel 30 feet high, and having an area of 800 feet. One mile in length of such a tunnel will contain 4,224,000 cubic feet; hence the contaminated air will bear to the whole quantity in the tunnel the ratio of 10,000 to 4,224,000; or it will be as 1 to 422. It will scarcely after this appear that any valid objection to tunnels, to assert that an injurious effect must result from the contaminated air, when we find that the quantity of this description of air, produced by the passing of the whole train, will be no more than $\frac{1}{422}$ part of the whole quantity in the tunnel.

Let us then venture to hope, that any prejudices which may now exist against the construction of tunnels upon railways will be dispelled, when we find that no injurious consequences will ever result from the foul air, or any other of the numerous evils which have been so forcibly dwelt upon by those who affect to perceive the most unhappy consequences from their adoption.—[London Mechanics' Magazine.]

DEPTH OF MINES.

	Feet.
Kits puhl copper mine in the Tyrol mountains, - - - -	2764
Sampson mine at Andreasberg, in the Hartz, - - - - -	2230
Valencia mine, (silver,) Guanaxuato, Mexico, - - - - -	2170
Pearce's shaft, (copper,) consolidated mines, Cornwall, - - - -	1650
Monkwearmouth colliery, Durham,	1600
Wheal Abraham mine, Cornwall,	1410
Eiton mine, Staffordshire, -	1380

The deep mines in the Tyrol, Hartz and Andes, above described, are all in high situations—the bottom of the Mexican mine is six thousand feet higher than the top of the Cornwall shaft. The deepest perforation beneath the level of the sea, and consequently the nearest approach to the earth's centre, has been made at the Monkwearmouth colliery, which is fifteen hundred and thirteen feet below the surface of the German ocean. Pearce's shaft (thirteen hundred and thirty-eight feet below the level of the sea,) was, until lately, the deepest in the world.—[Geology in 1835, (Mining Review.)]

Fig. 1.

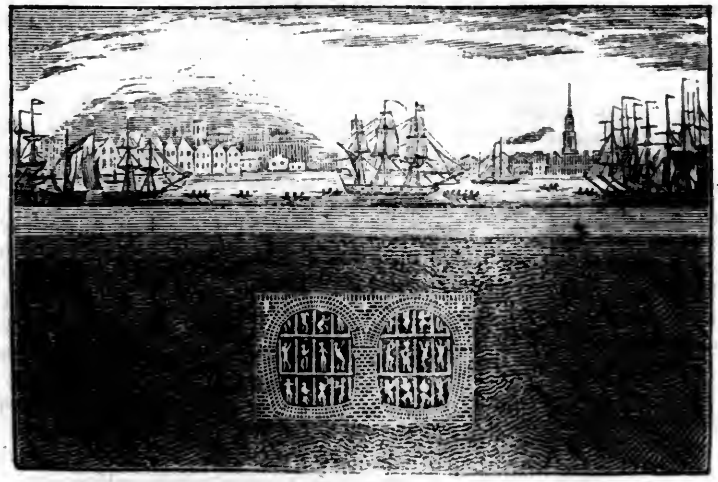
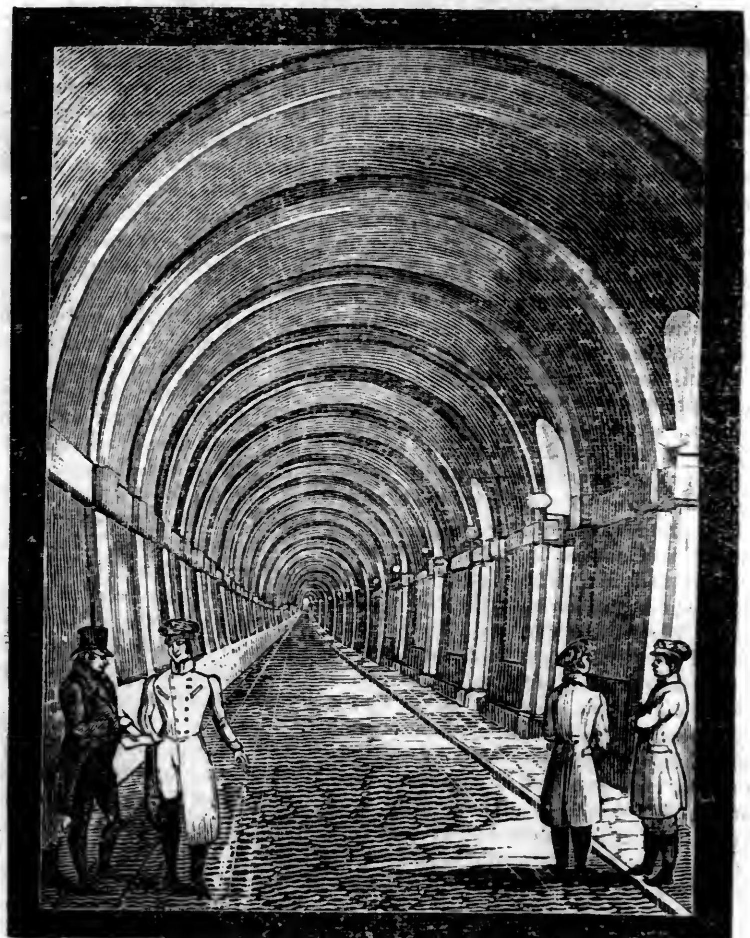


Fig. 2.



INTRODUCTION TO A VIEW OF THE WORKS FOR THE TUNNEL UNDER THE THAMES FROM ROTHERHITHE TO WAPPING.

INTRODUCTION.

Fig. 1 is a view of Wapping, with the churches of Shadwell and St. George's in the East at a distance, and a transverse section of the Tunnel, with a view of the workmen in the different cells of the shield.

Fig. 2 is a view of the western archway of the Tunnel, lighted by gas, as it now appears.

The constant demand of information concerning the unprecedented undertaking of a Tunnel or road-way under a navigable and tide river, must serve as an excuse for the few details which are here submitted.

A very superficial knowledge of the immense mercantile concerns carried on in the neighborhood of the river Thames below London Bridge, will instantly show the great utility, and the consequent importance, of an easy conveyance by land from shore to shore at that part of the river; and it appears that the only effective resource which could be contemplated as of permanent utility, is that of a Tunnel under the bed of the river, of sufficient capacity, however, to form a constant and uninterrupted public highway.

The project of a Tunnel under the river at Gravesend was put forward in 1799, but the scheme was soon abandoned; this was followed by an attempt to form a Tunnel from Rotherhithe to Limehouse in 1804, under the authority of an act of Parliament, at which time a shaft of 11 feet in diameter was sunk to the depth of 42 feet, and from difficulties then encountered it was for a time suspended, and afterwards continued at a reduced diameter of 8 feet, to the depth of 76 feet, at which depth a small driftway was carried therefrom under the river to the extent of

923 feet, and to within 150 feet of the opposite shore, when new difficulties having arisen, the engineer reported that further progress was impracticable, and the work was discontinued.

Various plans were subsequently proposed for working the Tunnel in the bed of the river, all of which, after a time, were abandoned. These proceedings are adverted to as establishing the fact of the importance attached to such an enterprise, as an object of great public utility.

Notwithstanding the discouraging results of the attempts before mentioned, immediately that Mr. Brunel in 1823 proposed and exhibited his plan for constructing at once, and on a full scale, a double arcade, forming an easy road-way under the Thames, it was not only well received, but liberally supported by gentlemen of rank and science, undismayed by the extraordinary risks which an enterprise of such magnitude must present.

The spot between Rotherhithe and Wapping, selected for the intended communication, is perhaps the only one situate between London Bridge and Greenwich, where such a project could be attempted without interfering essentially with some of the great public mercantile establishments on either side of the river; the situation is about two miles below London Bridge, in very populous and highly commercial neighborhoods, where a facility of land communication between the two shores is very desirable, and where a successful issue must be very advantageous, not only to the immediate neighborhoods, but also to the adjacent counties.

While the necessary steps were taking to obtain an act of incorporation, and raise money to carry the plan into effect, the Committee of Subscribers employed a competent person, unconnected with the Engineer, to take borings across the river in that part, in three parallel lines; and on the 4th of April, 1824, he reported, that there was upon each line a stratum of strong blue clay of sufficient density and tenacity to insure the safety of the intended Tunnel, and of considerable value when the excavation commenced; upon this encouraging report the Committee approved of the locality proposed for the Tunnel.

This very satisfactory account relative to the soil found in the line of the intended excavation, induced Mr. Brunel to enlarge the dimensions of his original plan, and consequently the apparatus by which he intended to protect the whole of the excavation, until it was perfectly secured by the brickwork.

The act of incorporation of the Company having been obtained on the 24th of June, 1824, and Mr. Brunel duly appointed Engineer to the undertaking, he began his operations by making a shaft of feet in diameter, which he opened at 150 feet from the river. This he effected by constructing first a substantial tower of brickwork of that diameter, 42 feet in height and 3 feet in thickness, besides the coating; over this he set up the steam engine necessary for the drainage. He afterwards sunk the whole into the ground in the way that the shafts of wells are usually sunk. By this means he succeeded in passing through a bed of gravel and sand 26 feet deep, full of land-water, constituting in fact a quicksand in which the drift-makers had been compelled to suspend their work, and ultimately to reduce the dimensions of their shaft from 11 to 8 feet, as already mentioned.

While this operation was in progress, Mr. Brunel received an intimation from eminent geologists, warning him of the existence of a bed of sand lying at a greater depth, and advising him to keep as near as possible to the bottom of the river. This information corresponded with the account given by the drift-makers respecting the existence of a quicksand, and its depths beneath the level of high water.

The 50-feet shaft having been completed to the depth of 65 feet, a smaller shaft, 25 feet in diameter, destined to be a well or reservoir for the pumps, was afterwards sunk. But on approaching the depth of 80 feet, the ground gave way suddenly under this latter structure, which sunk several feet at once, the sand and water blowing up at the same time. Thus was the previous intelligence confirmed of the existence and the nature of the bed of sand in question, by which information the Engineer of the Thames Tunnel has been guided in the line that he has followed for his structure.

The shaft and reservoir having been completed, the horizontal excavation for the body of the Tunnel was opened at the depth of 63 feet: and in order to have sufficient thickness of ground to pass under the deep part of the river, the excavation was carried on a declivity of 2 feet 3 inches per hundred feet.

It must be remarked here, that the excavation which has been made for the Thames Tunnel is 38 feet in breadth, and 22 feet 6 inches in height, presenting a sectional area of 850 feet, and exceeding 60 times the area of the drift which had been attempted as before alluded to. For a more comprehensive illustration of the magnitude of the excavation made for the Tunnel under the Thames, it may not be improper to mention, that it is larger than the interior of the old House of Commons, which, being 32 feet in breadth by 25 feet in height, was only 800 feet in sectional area; and it may further be observed, that the base of this excavation, in the deepest part of the river, is 75 feet below high water.

It is by means of a powerful apparatus, which has been designated a "*shield*," (a view of which is given in one of the plates,) that this extensive excavation has been effected, and that the double arcade, which now extends to nearly the middle of the river, has at the same time been constructed within it. This shield consists of 12 great frames, lying close to each other, like as many volumes on the shelf of a book-case: these frames are 22 feet in height, and about 3 feet in breadth. They are divided into three stages or stories, thus presenting 36 chambers, or cells for the operators to work in—namely, the miners, by whom the ground is cut down and secured in front; and the bricklayers, by whom the structure is simultaneously formed from the back of these cells.

Powerful and efficient as this apparatus has proved to be in accomplishing so considerable a part of the work as that which has been done, the influence of the tide upon some portion of the strata that constitute the bed of the river, is a circumstance which contributed more than any other to increase the labor, and to multiply the difficulties, and also in giving them occasionally an awful character. That influence upon some of the strata, or upon some portions of the strata, has not been noticed by the drift-makers, owing most probably to the circumstance that more than nine-tenths of their excavation had been carried on under a bed of rock.

The shield was placed in its first position at the bottom of the shaft by the 1st of January, 1826, and the structure of the double archway of the Tunnel was commenced under a bed of clay; but on the 25th of the same month the substantial protection of clay was discovered to break off at once, leaving the shield for upwards of six weeks open to a considerable influx of the land-water, copiously issuing from a bed of sand and gravel fed at each tide: the progress of the work was in consequence much impeded during that time.

On the 11th of March this fault or break in the clay was cleared, and the shield being again under a bed of clay, the work proceeded, and on the 30th of June, 1826, arrived even with the margin of the river, increasiug daily in its progress; and by the 30th of April, 1827, the Tunnel had advanced 400 feet under the bed of the river; these 400 feet of the Tunnel were excavated, and the double archways substantially completed with brickwork in ten months and a half. On the 18th of May, 1827, and again in the month of January, 1828, the river broke in, and filled the Tunnel, thereby occasioning the apprehension that this singular undertaking, which had given such great apprehension, and had caused so much excitement, not merely in England, but in all parts of the Continent, must be abandoned; but, after closing, with strong bags of clay, the holes or chasms in the bed of the river where the irruptions had occurred, upon re-entering the Tunnel the structure was found in a most satisfactory state, and perfectly sound, thus affording the strongest proof of the efficiency of Mr. Brunel's system of constantly protecting as much as possible every part of the soil during the excavation, and finishing the structure in the most solid manner as the work proceeded; it being evident that the work already done must have been abandoned, if any part of it had been carried away by the irruption of the river.

Subsequent to the irruptions of the river before mentioned, such was the desire to see the work completed, that several hundred plans were tendered for filling up the cavity, as well as for

preventing future accidents. When the disadvantages are considered under which these proposals were made, without the projectors of them having possessed any information of the depth and rapidity of the river, of the curvature of its bed, or even of the nature of the soil under which the excavation was to be carried on, it cannot be surprising that the Engineer found among them no effectual remedy, or method of preventing a recurrence of accidents: all the plans, however, were duly examined, and attentively considered; and the Board of Directors expressed, under date of the 16th of December, 1828, their obligations to the many scientific men who had so spontaneously communicated their several ingenious plans for securing the completion of the undertaking.

With regard to the projects which were offered for the continuance of the work, if the authors had previously informed themselves of the several strata of earths through which the excavation was to be made, they would not, as men of experience, have proposed them for adoption. It being as impossible to proceed with the excavation, and the formation of the arches, without constantly and effectually supporting the soil in every direction, as that an engineer could erect the piers of a bridge without preventing by his coffredam the influx of the water: and in this respect no attempt was made to point out a more secure mode of proceeding, or any improvement in that all important shield, which has gradually advanced a distance of six hundred feet, under the constant pressure of a vast mass of soil, ill suited, in point of consistency, to bear the pressure of the water above, varying, but amounting, at ordinary full tides, to that of a perpendicular column of 35 feet.

The works having remained in a state of total inactivity during a period of seven years, have been recommenced under the most favorable auspices; and from the experience gained during the progress of this unprecedented work, the difficulties which have been heretofore overcome, and the measures which will be adopted for preventing future accidents, there is very little probability of any circumstances occurring to hinder the complete success of this important undertaking.

September. 1835.

TYRONE POWER'S IMPRESSIONS OF AMERICA.—RAILROADS.

From this amusing work of a clever ("English and Yankee clever") author, we have extracted the following remarks on the subject of our internal improvement. The writer commences with his opinion of an article in an English review quizzing the Yankees for attempting a railroad.

"I never in my life perused any article more philosophical in spirit or more conclusive in argument; the scheme was clearly shown not only to be absurd but impracticable, and the projectors proved either to be presumptuous imitators, or men profligately speculating upon the ignorant credulity of their fellow-citizens.

"I closed the review, in short, admiring the clear judgment and practical far-sightedness of the writer; pitying the Yankees, for whom I cherished a sneaking kindness, and inwardly hoping that this very clever exposition of the folly of their seeking to counteract the manifest designs of Providence, which had so clearly demonstrated their paths, might produce as full conviction on their minds as it had on mine.

"Well, I forgot the article and its subject, and was only reminded of it by finding myself one fine day whisking along at the rate of twenty miles an hour, over a well-constructed railway, one of a cargo of four hundred souls. The impossibility had, in fact, been achieved; and, in addition to the natural roads offered by Sea, Lake, and River, I now found railways twining and locomotives hissing like serpents over the whole continent from Maine to Mississippi. Binding the cold North to the ever-flowing streams of Georgia and Alabama, literally with bonds of iron, and forming, indeed, the natural roads of a country, whose soil and climate would set at nought all the ingenuity of M'Adam, backed by the wealth of Crœsus and the flint of Derbyshire to boot.

"Now, had such a result been prognosticated only a few years back, the man whose foresight had led to such a large view of the subject would have been mouthed at as mad all over the American continent, and written down knave or ass, or both, in every practical journal of Europe.

"Such great changes constantly agitated, and reduced to practice with a promptitude of which even England, with her wealth, industry, and enterprise, has little notion, make discrepancies between the facts and opinions of rapidly-succeeding travellers, for which neither the veracity nor the judgment of the parties can fairly be impugned.

"Action here leaves speculation lagging far behind; the improvement once conceived is in operation by such time as the opposing theorist has satisfactorily demonstrated its impracticability; and the dream of to-day is the reality of to-morrow.

"I feel, in fact, a difficulty in describing without seeming hyperbole, the impressions I daily received, and beheld confirmed by facts, of the extraordinary spirit of movement that appears to impel men and things in this country; this great hive wherein there be no drones; this field in which every man finds place for his plough, and where each hand seems actually employed either 'to hold or drive.'

"For ever wandering about as I was, and visiting, as I frequently did, the same places at intervals again and again, I had occasion to be much struck with a state of things of which I was thus afforded constant evidence; take for instance:

"My first journey in Sept. 1833, between New-York and Philadelphia, was by steamboat and railway, having cars drawn by horses over thirty-five miles, which thus occupied five and a half hours. In October of the same year I did the same distance by locomotive in two hours. When first I visited Boston, the journey was performed in twenty-four hours, by steamer to Providence, thence to Boston by stage; the same distance now occupies fifteen hours, a railway having been last spring put in operation between Providence and Boston.

"Again, in 1834, the traveller had but one rough route from Philadelphia to Pittsburg. You can now go a third of the distance by railroad, and, getting into a canal-boat, are dragged over the Alleghany mountains, through a series of locks not to be surpassed for strength or ingenuity of contrivance.

"In 1833, the journey from Augusta, Georgia, to New-York, was an affair of eleven or twelve days; it is now performed in three. Steam and railroad, are in fact, annihilating time and space in this country. In proof of it, I can safely assert that if a traveller visiting the South-West, say from Savannah to New-Orleans, will be at the trouble of recollecting this book in the year 1837, he will find the account of the difficulties of my journey extremely amusing; since, in all human probability, he will perform that in five days, which took me, with hard labor, perseverance, discomfort, not to say some peril of life or limb, just eighteen.

"It is these revolutions, and such as these, that form the true wonders of this country; that stimulate curiosity, excite interest, and well repay the labor of any voyager imbued with a grain of intelligence or observation, to say nothing of philosophy.

"It is to these results, their causes, and their immediate and probable effects, his mind's eye will be irresistibly drawn, not to spitting-boxes, tobacco, two-pronged forks, or other *bagatelle*, the particulars of each of which, as a solecism in polite manners, can be corrected and canvassed by any waiter from the London Tavern, Ludgate-street, and by every *grisette* from American Square to Brompton Terrace, who may choose to display their acquired gentility 'for the nonce.'

"It is the absence of a spirit of philosophy generally in our writers, and this affectation of prating so like waiting-gentlewomen, that stings Americans, and with some show of reason, when they see the great labors of their young country and the efforts of its people passed lightly by, and trifles caught up and commented upon, whose importance they cannot comprehend, and the which they have neither leisure nor example to alter or attend to."

REPORT OF THE SELECT COMMITTEE,

On so much of the Governor's Message, as relates to the construction of a Ship Canal around the Falls of Niagara.

The Select Committee to whom was referred so much of his Excellency, the Governor's Message, as relates to the construction of a Ship Canal around the Falls of Niagara, would respectfully report:

That the action of the Committee has been deferred till this late period, with the expectation of receiving the survey and report of Captain W. G. Williams, the United States Engineer, who examined the route of the proposed Ship Canal during the last

per to submit such facts as have presented themselves for their consideration.

The practicability of this great national work does not admit of a single doubt; and in whatever light it may be viewed, it is one justly entitled to the favorable consideration of the General Government. Aside from its advantages to the interest of the Union, the interest of the whole western States and Territories, is deeply involved in its accomplishment. This Canal would open a ship and steamboat communication between the immense regions surrounding the western Lakes and those bordering on the Ontario and St. Lawrence, and perhaps at no distant day with the city of New York.

The commercial advantages to be derived from a communication between Lake Ontario and the chain of western lakes, have in a great measure been secured to the British Government by the construction of the Welland Canal. The enterprising spirit of that Government is not to be satisfied with this connecting link between our inland seas, but is evinced by recent demonstrations of an intention to engage in a still more extensive system of internal improvement.

The following applications to the Provincial Parliament of Upper Canada, during the present winter, will exhibit the strong feeling which exists on the subject.

"For a company to construct a Rail Road from Toronto to the waters of Lake Huron."

"For a Rail Road from the Detroit river to the town of Niagara."

"For a Rail Road from Wellington Square, (at the head of Lake Ontario,) to Goodrich, on Lake Huron."

"For a company with power to make a lateral cut to connect the Welland Canal and Niagara river at its mouth."

"For a company to construct a Canal from Grand river to the river Thames, thence to the town of London."

"For a company for the purpose of opening a Ship Navigation, through the neck of the Peninsula, between the Lake and the Bay of Toronto."

"For a charter to construct a Ship Navigation from Lake Erie to some point in the Niagara river below Fort Erie Rapids."

The attention of your committee has been more particularly drawn to the consideration of the last mentioned plan of improvement. It is intended to lessen, in a great degree, the distance by Canal, communicating between Lake Ontario and Lake Erie. A Ship Canal on the American side, would possess very great advantages in this respect over the nearest possible route on the Canadian shore, and particularly over the Welland Canal, which is forty-one miles in length. From the report of N. S. Roberts, Esq. an Engineer, who made a survey of the route on the American side in 1826, it appears the whole length of the Canal, by way of the village of Manchester, is nine miles and seventy-three chains, and by way of Gill Creek and Bloody run eight miles. It is understood that Captain W. G. Williams, the United States Engineer, will recommend the shortest route. Upon either of the foregoing routes no locks are necessary from the commencement of the Ship Canal, on the Niagara river, two and a half miles above the Falls, to Fort Gray, near the village of Lewiston. "Here the locks commence, and in a distance of one mile and sixty-seven chains, are located 32 locks of 10 feet lift each, making the total lockage at this place 320 feet, from 8 feet below the level of the water at its commencement, to the same distance below the water at its proposed termination, in the harbor of Lewiston." Stone of the best quality, for the construction of permanent locks, will be obtained from the cutting in the immediate vicinity, and it may be observed that no section of the country is better supplied with all the requisite materials for the successful completion of such a work.

The total expense for the construction of this Canal, as estimated by Mr. Roberts, is $930,826. The dimensions of the Canal were calculated for 36 feet width at the bottom, 60 feet at the water line, and 8 feet deep. The proposed dimensions of the locks were 25 feet wide in the chamber, and 120 between the gates.

Your committee regret that they have not yet been able to obtain the recent survey and estimates made by Mr. Williams, as they are decidedly of the opinion that he has recommended the construction of a Canal and locks of sufficient capacity to admit the largest vessels to pass that navigate the lakes. This appears to be demanded, not only by the rapid increase of population, wealth and commerce in the west, but by the extraordinary exertions of the British Government to secure an uninterrupted communication between the western lakes and the ocean, by improving the navigation of the St. Lawrence.

More than a million and a half of dollars have been appropriated for the construction of a navigable channel around the rapids of the St. Lawrence, and the work is now in progress. When the obstructions in that river shall be overcome, steamboats and vessels navigating the ocean will pass into Lake Ontario, and those drawing eight feet water into Lake Erie. The contemplated improvements around the rapids of the St. Lawrence river are to be on a scale sufficiently large to admit the passage of ships of 300 tons burthen. The locks are to be 200 feet in length, 55 in width, with nine feet of water. These important improvements will probably be completed in the course of two or three years, and they will give to the Canadas a decided superiority over the United States, in securing the immense commerce of the west. But another consideration of deep interest is involved in the construction of a Ship Canal around the rapids of the St. Lawrence, and that is, the advantages which this communication, between the Ocean and Lake Ontario, would give to the British Government if the two nations should again assume a belligerent attitude. The improvements contemplated and in progress, are on a most magnificent scale. They are designed to open a safe and uninterrupted ship navigation from the Atlantic to the upper lakes. It is already ascertained that the dimensions of the Welland Canal are too limited to admit vessels of such capacity, as it is proposed to pass around the rapids of the St. Lawrence. For the purpose of increasing the capacity of this Canal a negotiation is now pending between the Provincial Government of Upper Canada and the Welland Canal Company, for the purchase of the Canal. Should this negotiation be successful, it is easy to foresee that the Welland Canal would be so enlarged as to admit the passage of vessels of 300 tons burthen. In that event, who would monopolize the trade and commerce of the west? What flag would be seen floating at Buffalo, Cleveland, Detroit, and Chicago? It would not be the star spangled banner! This must be apparent from the inequality that now exists between the British and American commerce on the Ontario and St. Lawrence. In 1833 more than thirty British steamboats were in constant and profitable employment on these waters, while the Americans had only *three*.

Your committee deem it unnecessary to enter minutely into an examination of the great commercial advantages to be derived from the construction of a Ship Canal around the Falls of Niagara. The importance of connecting the chain of western Lakes, with the Ontario and St. Lawrence, are too obvious to require argument. The experience of the last ten or fifteen years, has demonstrated the superiority of natural water communication, over that of Canals. It is found that Lake and River transportation is from from two to three hundred per cent cheaper than by canals at the present low rates of tolls. Wheat can be carried from Troy to New York for three cents per bushel, while the cost or transportation, the same distance on the canal, would not be less than nine or ten cents. The same inequality in the cost of transportation, will be found to exist upon all the lakes and rivers that admit of ship or steamboat navigation.

Your committee are fully aware that this improvement, aside from the commercial advantages it will confer on the western States and Territories, is a work of a national character, and one in which the interest of the Union is deeply involved.

A period may arrive, when a free navigable communication between the Lakes, by means of a Ship Canal on the American side of the Falls of Niagara, will be essentially important, if not indispensable to the national defence. In the event of a war with Great Britain, such a channel of communicatien would be necessary to the protection of our extended frontier along the Lakes and the St. Lawrence. When the works now in progress, in Upper and Lower Canada, shall be completed, vessels will pass from the Atlantic to the Lakes, thereby rendering it impossible to make any successful defence against an enemy possessed of every means of increasing its strength to any desirable extent. The committee, therefore, believing this work one of great national importance, recommend for adoption the following resolutions:

Resolved, by the General Assemby of the State of Ohio, That the construction of a Ship Canal around the Falls of Niagara, should be regarded as a NATIONAL WORK, giving security to our commercial intercourse with foreign powers, and necessary as an effectual means of national defence.

Resolved, That the interest of Ohio, as a member of the Union, is deeply involved in the construction of a navigable communication between Lake Erie and Lake Ontario, summer. That report, though daily expected, has not yet been received; and your committee have therefore thought pro-

and that his Excellency, the Governor, be authorized to transmit to the Ohio delegation in Congress, copies of the foregoing report and resolution, recommending their co-operation in obtaining an appropriation for the construction of a Ship Canal around the Falls of Niagara.

(From the Columbia Telescope.)

LOUISVILLE, CINCINNATI, AND CHARLESTON RAILROAD.

The Act incorporating a company for the construction of a Railroad from Charleston to Cincinnati and Louisville, on the Ohio River, having become a law in the States of North and South Carolina, Tennessee, and Kentucky, the Commissioners appointed by the Legislature of this State to cause the necessary surveys to be made, met in Columbia on Friday last, the 25th inst. The following named gentlemen compose this commission, all of whom were present:—Gen. Hayne, Chairman; Colonel Blanding, Gen. Thos. F. Jones, Hon. P. Noble, Dr. Thos. Smith, Charles Edmonston, Esq.

The Board adjourned on Saturday, after making all the preliminary arrangements for entering immediately upon the necessary explorations and surveys.

Col. James Gadsden was unanimously appointed Chief Engineer; and with the assistance of the following officers, (who have been ordered on this duty by the Secretary of War,) it is expected will enter immediately upon the exploration of all the passes through the mountains, viz:

Capt. Williams, Lieut. Dayton, Lieut. White, of the U. S. Army, and* Mr. Featherstonehaugh, a Civil Engineer in the service of the government—all of them advantageously known to the public.

In addition to these officers, it is understood that efforts will be made by the Board to obtain the services of Col. Bisbane, now in command of a Regiment in Florida, and Capt. Huger and Lieut. Colcock, of the army—officers whose zeal and abilities eminently qualify them for the work.

It is expected that these officers will be able to make such progress in the surveys, as to enable the Commissioners to lay before the Convention, to be assembled at Knoxville, on the 4th of July next, satisfactory information as to the difficulties to be encountered in the several mountain ranges which traverse the proposed route, as well as the means of surmounting them. It is expected, that in surveying the route through the State of Tennessee, Assistant Engineers may be furnished by the Board of Internal Improvements of that State, the Legislature of which has, we understand, pledged the State to the amount of *seven hundred and fifty thousand dollars*, for the construction of the Road. In Kentucky, also, it is expected that the Commissioners will be aided in making the surveys, as a proposition for a liberal appropriation for that object, was before the Kentucky Legislature, when last heard from. It was also proposed in that body to appropriate *one million dollars* towards the work, with, as we are informed, a fair prospect of success.

Gen Hayne, as Chairman of the Board, and as agent of the State, under the appointment of the Governor, will, we are informed, have the general superintendence of the operations during the recess of the Board, and for that purpose, will consult and arrange with the Engineers the course of proceeding.

In the appointment of Col. Gadsden to the important office of Chief Engineer, there is every reason to believe that a gentleman has been selected whose distinguished talents and high character will command public confidence in an eminent degree. This gentleman, (who is well known throughout the Western States,) is a native of South Carolina, and a grandson of the venerable Gen. Gadsden, of revolutionary memory. He was for many years an officer in the corps of U. S. Engineers. He was present in that capacity during the New Orleans campaign, and served also as an *Aid de Camp* to Gen. Jackson. He was greatly distinguished for his gallantry and military talents, as well as his skill as an Engineer, and was honorably mentioned in the official reports of his commander. So highly was his talents and character estimated by the Government, that on the resignation of Gen. Bernard, he was appointed to succeed him as Chief Engineer and head of the Bureau in Washington, charged with the superintendence of all the scientific surveys made under the orders of the War Department; which station he filled until the new organization, by which that office was abolished. Col. Gadsden was also at the head of the Board employed by the Charleston and Columbia Committees in November and December last, to explore the passages through the Allegany and Cumberland mountains; on which subject he made, in conjunction with his colleagues, (Col. Brisbane and Mr. Holmes,) a report which, we understand, gives ample testimony of his scientific attainments, sound judgment, and practical knowledge. The valuable information which it affords will be of great service in making the surveys now to be commenced. On the whole, it is believed that a gentleman better qualified for the office could not have been obtained in the United States, and we trust that his valuable services may be secured to his native State.

The other gentlemen named, (with the exception of the Civil Engineer,) are also, we are informed, natives of South Carolina, and are all young officers of high promise, who, we are sure, will enter upon their task with a zeal worthy of the great work in which they are to be engaged. It may well be a subject of honorable ambition for any man to connect his name with this noble enterprise. With Mr. Featherstonebaugh we have no personal acquaintance, but if he be the gentleman of that name who has been so long before the public, he is much and deservedly distinguished for his scientific attainments. As an eminent mineralogist, our mountains will afford him a fine field for his researches.*

We understand that after making all the necessary arrangements for the prosecution of the work, the Commissioners adjourned, to assemble again at Flat Rock, on the 20th of June next, with a view there to meet their Engineers, and prepare with them a report, to be laid before the Knoxville Convention, on the 4th of July.

Prior to the adjournment of the Board, Col. Blanding laid before them a mass of valuable information on the subject of the proposed Railroad, especially in connection with the resources of the extensive region with which it will open communication—which was deemed by the Board of such importance, as to induce them to request that he would prepare a report on those subjects, to be published for general information. This document will not only be valuable for its statistical information, but will also embrace a satisfactory explanation of the various amendments which were made to the Charter by the Legislature of Kentucky, most of which, in the opinion of Col. B. will tend to promote the progress of the work, and extend its usefulness.

We annex hereto an address to the people of this State, inviting them to appoint Delegates to represent them at the Knoxville Convention, to which we would earnestly call public attention.

ADDRESS.

The undersigned, in obedience to the direction of the Commissioners, would invite the attention of his fellow-citizens to the subject of the Railroad Convention, which is to be held at Knoxville, in the State of Tennessee, on the 4th of July next.

The object of that Convention is to bring together, by their Delegates, the people of all the States directly interested in the proposed Railroad, which is to extend from Charleston to the Ohio River. It is very desirable that South Carolina should be fully and ably represented in that Convention. No State can have a deeper interest in the proposed road. It is now certain that Ohio, Tennessee, Kentucky, North Carolina, and Georgia, will send to that Convention many of their ablest men, deeply interested in the success of the work; and it is expected the measures to be there adopted, will exert a controlling influence upon the undertaking. In order that these measures should be conceived in wisdom, and be guided by a spirit of conciliation and harmony—it is of the last importance, that ample information should be spread before the Convention, in relation to the resources and character of the whole country through which the proposed road may pass. With these views the citizens of South Carolina are earnestly requested to assemble in their respective judicial districts, and appoint Delegates to the Knoxville Convention. The magnitude and importance of the proposed work, not only to our own State, but to our whole country, will suggest to every patriotic citizen the high duty of suffering no feelings of local interests or sectional jealousies, to find a place in the measures to be adopted, in relation to this noble enterprise. Let Delegates be selected from among those best informed on the subject of the productions, the cost of labor and materials, and other facilities for the construction of the proposed road, and let them carry with them ample information on all these points, charged only by those they represent, to use their best efforts to promote the grand object, the success of which will be an enduring monument of the wisdom and patriotism of our people.

ROBERT Y. HAYNE, Ch'n, &c.

Columbia, S. C. March 28, 1836.

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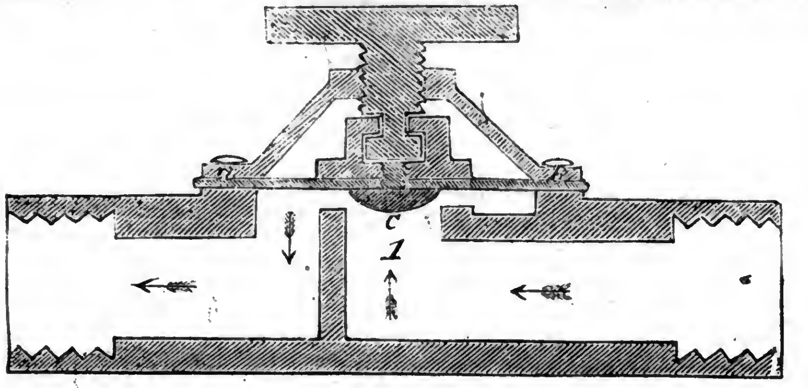
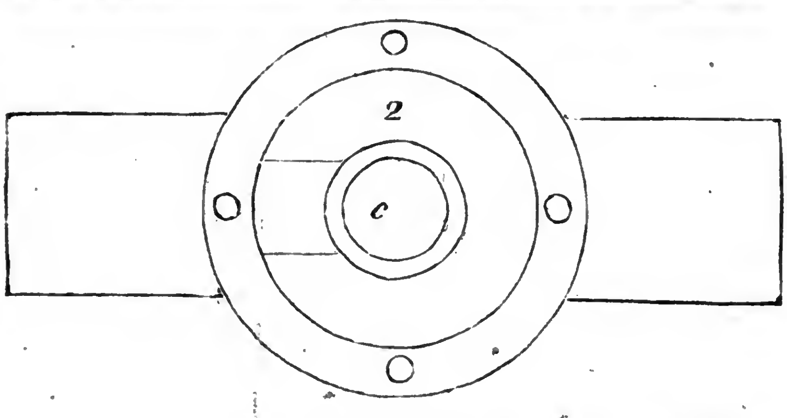
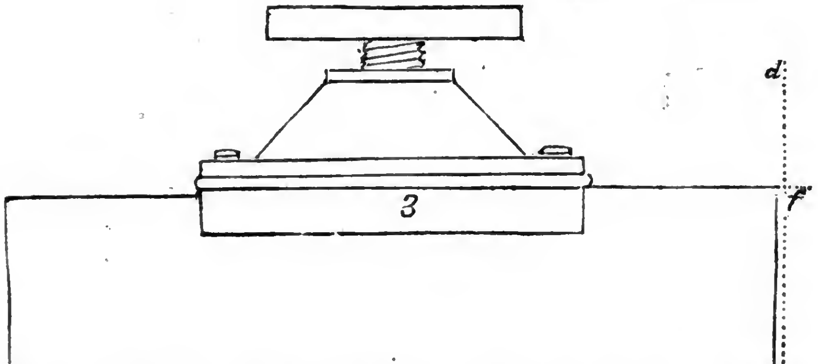
* Lieut. Reid has since been added.

* This is the amended title adopted by the Legislature of Kentucky.







CARTER'S PATENT VALVE FOR REGULATING THE FLOW OF GAS AND OTHER FLUIDS.

The apparatus hitherto in use for regulating the flow of gas has been formed upon the principle of the ordinary liquor-cock, and that, even for its original purposes, is but an imperfect instrument.—Mr. Carter, in constructing his new apparatus, has altogether discarded the cock-plug and substituted a valve, by which all the parts subject to friction are kept separate and totally excluded from the action of the gas. The plug and socket of the ordinary cock are acted upon chemically by carburetted hydrogen gas, be the instrument ever so well constructed and of the very best metal; and to shield them from corrosion, and prevent their becoming in consequence immoveable, they must be frequently lubricated with oil or some other unctuous matter. Now it must be evident, that where oil can be admitted as a lubrication there must be a way for the escape of gas, in consequence of its very volatile properties; hence the frequent annoyance to consumers by escapes of gas, and the losses to proprietors by the waste from innumerable leaks, which, though trifling upon a single service or street burner, amount upon the aggregate to a very serious sum.

Mr. Carter, by a simple and novel arrangement, has succeeded in keeping all the parts of his apparatus which are subject to friction entirely separate from the gas; and in wholly confining the gas to the conducting pipe when shut off. The valve by which the flow is regulated can neither stick fast nor leak; and any escape of gas is rendered impossible.

We anticipate from the introduction of this improved valve a great increase in the consumption of gas; for there need be no longer any danger of explosion from the accumulation of the inflammable fluid in cellars, or of annoyance from its escaping into the apartments of dwelling-houses where gas-lights may be used.

Description of the Engravings.

Fig. 1. A longitudinal section on the vertical line *de*, fig. 3.

Fig. 2. Section on the horizontal line *f*, fig. 3.

Fig. 3. Geometrical elevation of the apparatus complete.

The figures are of the full size, and represent the half-inch service-valve.

At *a*, fig. 1, is a cap, secured firmly by screws, which serves the purpose of fastening and protecting the pliable substance *b*. When the gas is to be admitted this pliable substance is raised by the screw through the centre of the cap; and when it is desired to shut it off, it is pressed upon the aperture *c*.

In fig. 1 this pliable substance may be described as a neutral point, neither raised nor depressed, although partially open; but when raised by means of the screw as much above the level as it requires to be depressed for the purpose of shutting off the gas, the column of fluid on passing through the aperture (*c*) expands into a column of more than eight times the capacity of the service; consequently, the small elevation of the valve requisite to prevent any undue strain upon the pliable substance *b*, is more than sufficient to carry as much fluid as the diameter of the pipe can convey.

The apparatus, when placed in the position of figs. 1 and 3, with a fall towards the main on the one side, and a fall towards the meter on the other, can never be choked by condensation; and if placed in the position of fig. 2, or vertically, it must be evident that no inconvenience can ever accrue from any accumulation of condensed matter.

The valve may be made of any dimensions, so as to suit equally the smallest burners and the largest service-pipes.

In applying this valve to water-works, Mr. Carter proposes to make the cap cylindrical which covers and secures the pliable substance, so that the disc may be extended to the full dimensions of the enlarged column; the extended disc will afford a protecting resistance against the pressure of the enlarged column of water upon the pliable intervening substance.

URE'S PHILOSOPHY OF MANUFACTURES.—The following is the preface to a late interesting work by Dr. ANDREW URE, upon the manufacturing operations of Great Britain.

We give the preface, with a view of calling attention to the work, from which we shall make copious extracts hereafter.

The present is distinguished from every preceding age by an universal ardor of enterprise in arts and manufactures. Nations convinced at length that war is always a losing game, have converted their swords and muskets into factory implements, and now contend with each other in the bloodless but still formidable strife of trade. They no longer send troops to fight on distant fields, but fabrics to drive before them those of their old adversaries in arms, and to take possession of a foreign mart. To impair the resources of a rival at home, by underselling his wares abroad, is the

new belligerent system, in pursuance of which every nerve and sinew of the people are put upon the strain.

Great Britain may certainly continue to uphold her envied supremacy, sustained by her coal, iron, capital, and skill, if, acting on the Baconian axiom, "knowledge is power," she shall diligently promote moral and professional culture among all ranks of her productive population. Were the principles of the manufactures exactly analyzed, and expounded in a simple manner, they would diffuse a steady light to conduct the masters, managers, and operatives, in the straight paths of improvement, and prevent them from pursuing such dangerous phantoms as flit along in the monthly patent-lists. Each department of our useful arts stands in need of a guide-book to facilitate its study, to indicate its imperfections, and to suggest the most probable means of correcting them. It is known that the manufactures of France have derived great advantage from the illustrated system of instruction published under the auspices of its government and patriotic societies.

The present volume, introductory to a series of works in more ample detail, is submitted to the public as a specimen of the manner in which the author conceives technological subjects should be discussed. Having been employed in a public seminary for a quarter of a century, in expounding to practical men, as well as to youth, the applications of mechanical and chemical science to the arts, he felt it his duty, on being solicited from time to time by his pupils, now spread over the kingdom as proprietors and managers of factories, to prepare for publication a systematic account of their principles and processes. With this view he resolved to make afresh such a survey of some of the great manufacturing establishments, to which he had liberal access, as might qualify him to discharge the task in a creditable manner. This tour of verification would have been executed at a much earlier date, so as to have enabled him, ere now, to have redeemed his pledges both publicly and privately given, but for an interruption of unexpected magnitude.

The Right Honorable the Lords of the Committee of the Privy Council for Trade and Plantations requested him, about three years ago, to undertake a series of experiments on the refining of sugar, in order to ascertain the relation of the drawbacks on exportation of refined loaves to the duties paid upon the raw article. Under an impression that these researches might be set sufficiently in train, in the space of two or three months, to lead to the desired information in the hands of experienced operatives, he undertook their arrangement; but encountered so many difficulties from the delicacy of the material operated upon, and other circumstances stated in his official report printed by order of the House of Commons, that he did not get entirely extricated from them till nearly two years were expired, nor till he had suffered considerably from anxiety of mind and bodily fatigue. Being advised by his medical friends to try the effects of travelling, with light intellectual exercise, he left London in the latter end of last summer, and spent several months in wandering through the factory districts of Lancashire, Cheshire, Derbyshire, &c., with the happiest results to his health; having everywhere experienced the utmost kindness and liberality from the mill-proprietors. Neither they nor the great mechanical engineers who construct their buildings and machinery, use any mystery or reserve towards a visitor actuated by legitimate feelings and principles; but, on the contrary, most readily show and explain the curiously-productive inventions which surround them.

The few individuals who betray jealousy of intelligent inspection are usually vain persons, who, having purloined a few hints from ingenious neighbors, work upon them in secret, shut out every stranger from their mill, get consequently insulated and excluded in return, and thus, receiving no external illumination, become progressively adumbrated; till, after a few years of exclusive operation, they find themselves undersold in the market, and deprived of their oldest or best customers by the inferiority of their goods. Were it not invidious, the author could point out several examples of clever people having thus outmanœuvred themselves, in trying to steal a march upon their friends in the dark. Mystifiers of this stamp are guilty of the the silly blunder of estimating their own intrinsic resources above those of all the world beside. It is, however, not more for the advantage of the kingdom, than for that of every individual manufacturer in it, to receive light from all quarters, and to cause it by reflection to irradiate the sphere around him.

In tracing the progression of the British system of industry, according to which every process peculiarly nice, and therefore liable to injury from the ignorance and waywardness of workmen, is withdrawn from handicraft control, and placed under the guidance of self-acting machinery, the author has made it his business to study the descriptions of most of the patents of that nature obtained in Great Britain, France, and America, during the last twenty years,—a task in which he has been assisted by Messrs. Newton and Berry, of Chancery-lane, gentlemen deservedly esteemed for the soundness of the specifications which they professionally prepare for patentees.

To James Cook, Esq., of Mincing-lane, he is indebted for the extensive assortment of samples of raw cotton, wool, flax, and silk, which have formed the principal subjects of his microscopic researches upon textile fibres, as also for much valuable information on the statistics of trade.

Nor ought he to leave unacknowledged the polite readiness of S. M. Phillipps, Esq, Under Secretary of State, and of Mr. Porter, of the Board of Trade, to aid his formation of a census of the factory population, and his inquiries into the commerce of the kingdom.

In delivering this general Treatise on Manufacturing Industry into the hands of the public, the author is not unconscious of defects, both in its matter and arrangement; for most of which, however, an apology may be found, in the vague and contradictory opinions entertained by experienced manufacturers on many departments of their business. Those of his readers who have most deeply considered the difficulties of his undertaking will not be the least indulgent.

The body of facts distributed throughout the volume have been most carefully verified, and will, it is presumed, bear the strictest scrutiny, though a desire to keep the volume at such a price as would bring its purchase within the reach of working-men has precluded the multiplication of notes of reference to authorities. The main portion of these, indeed, would have been to the reports of Parliamentary Committees; many great folios of which have been diligently consulted in quest of authentic information—though sometimes to little purpose. In consequence of the judgments of even honest men being strangely perverted by passion, prejudice, and self-interest.

The engravings at pages **48, 49, 120, 162, 271, 273**, afford specimens of the original drawings of machines made under the author's eye, for illustrating modern manufactures; the complete series of which, when published in his forthcoming works on the cotton trade, dyeing, calico-printing, &c., will, it is hoped, constitute an interesting gallery of practical science.

London, June 18th, 1835.

From the Annals of Education for April.

FUNDAMENTAL PRINCIPLES OF THE PRUSSIAN SCHOOL SYSTEM.

We have rencently conversed with several officers of the Prussian government in reference to their system of education. To enter fully into this system and to understand completely any portion of it, it must be remembered that in this kingdom, the State, the church, and the school, are inseparably united by numerous and intimate bonds. The government is at the head of the church and the school—if we may be allowed to use the latter term in the same general sense as the other, to include all the schools of the kingdom. It assumes the right to prescribe that every village must have its church and its school, that every man shall have the means of religious instruction—that every child shall attend some school. It does this on the ground that its citizens should be prepared to become good subjects, and that they cannot be so without receiving both intellectual and religious instruction. Its right is undisputed to preserve the bodies of its subjects from injury, and to have them trained to military exercises, and military skill, that they may be prepared to serve and defend their country by physical power, and prevented from becoming burdens for want of it. It claims the same right to guard their minds from debasement and corruption—to require, that they should receive that instruction which will aid them in gaining a subsistence, and being useful to their country; and that moral training, which will make them good subjects.

It does not seem to enter into the conception of any officer of State, or church, or school here, that order can be secured

in a community without religion, or that morality can have any other sold basis than *Christian instruction and Christian training, in a Christian spirit.* In reference to mere secular instruction, the state prescribes the subjects and directs the modes of teaching through a number of instructors, and a body of inspectors appointed for this purpose, and appointed simply for their qualifications in this respect without any of those distracting questions and jealousies about party or sect which would embarrass our governments. But in regard to religion, it assumes only the right to decide, and to insist, that *instruction shall be given;* leaving to the clergy of each church the entire direction of the subjects and the manner of instruction.

The laws, however, decide one point absolutely, that religious instruction must take the first place in importance, and from a part of the business of this school daily, for not less than one hour in six. It will not permit that it should be confined to the weekly catechetical instruction of the clergy, which is given with a regularity and minuteness unknown to our clergy in general, and still less to the irregular and uncertain instruction of parents, so many of whom cannot if they will, or will not if they can, attend properly to this part of their children's education.

In the application of these principles the laws appear to secure every important point. Provision is first made for the preparation of Christian school masters, of the leading denomination, by the establishment of distinct seminaries for teachers, sustained by government, but regulated and inspected by the clergy of the respective churches. Where the parents in a school district are agreed in reilgious opinions, a teacher of the same sect gives religious instruction, under the direction of the pastor, and everything goes on with regularity and in harmony.

In places where each of two or more denominations is sufficiently numerous to *sustain* a school, the Government, although connected of itself with the reformed, or as it is now termed the evangelical church, consisting of the old Lutherans and Reformed united, establishes and sustains schools for each. The Catholic Seminaries supply teachers for the Catholic schools, and even the Jewish children are furnished with an instructor of their own sect.

The most perplexing case is that in which the inhabitants of a small village or district are so divided that no single sect is sufficiently numerous to sustain a school. Here the laws direct that a "simultaneous school" shall be established; that is,—one in which children of *all sects* are united for the purpose of mere intellectual instruction. Still, the Government here insists, that religious instruction shall be given in connection with the school. Pastors are accordingly required to give instruction to the children of their respective flocks, during the week, and are subject to the supervision of the Inspector of Schools, in regard to the faithful performance of this duty; whilst no interference is allowed as to the opinions taught. There is so little jealousy between *good* men, even of different denominations, that the teacher of such schools is sometimes of one sect, sometimes of another.

It is in this manner that the Prussian system of education establishes certain fixed points of support, which leave room for universal and indefinite improvement, and which brings every institution of society in harmony with the rest. It secures permanent superintendents devoted to these objects, previously well-qualified, and gaining every year stores of experience for themselves, and the minister of education, by their regular tones of inspection and examination, and aided by the more detailed reports of local inspectors. It is in this manner they furnish every child in the land with a complete and harmonious course of instruction of the best kind, and *confer no power* on a subject, without endeavoring to instil the principles and form the habits of thinking and feeling which shall direct him in *using it aright.*

The nature of the Government also enables them to execute a law,—which however reasonable, might meet with resistance elsewhere,—to secure by civil regulation the attendance of every child on the instruction thus provided.

It would seem at first sight difficult to apply such a system to countries differently situated. It is certain indeed, that where the direction rests with the mass of the people, light must be more extensively diffused, and education better understood, and more highly appreciated, before such measures can be executed, or even adopted. It is not less true, however, that if we admit the fundamental principles, that the State has as much right to claim the mental, as the bodily services of its citizens, and to require suitable preparations for it, and that religious instruction is indispensable, as the basis of moral principle, and of a spirit of obedience to the laws, and of genuine liberty, the plans adopted to carry them into effect, are the most simple and excellent which could be devised.

Frankfort on Mayne, Nov. 27, 1835.

THE POOR BOY.—We delight to trace the progress of genius, talent, and industry, in humble life. We dwell with pleasing emotion on the character and conduct of individuals who, from a 'low estate' of obscurity and poverty, have raised themselves by their own native energy, to affluence and stations of respectability and renown. Our country is full of examples of this description. They fall under our observation every day. Gideon Lee was once a poor boy, and in the occupation of a farmer. He is now in affluent circumstances—recently Mayor of New-York, and at present a member of Congress.—Charles Wells, late Mayor of Boston, was a journeyman mason. Samuel T. Armstrong, the acting Governor of Massachusetts, and at the head of several philanthropic institutions, was once a journeyman printer. There are those living, who recollect George Tibbets, a day laborer, and know him now as a gentleman of wealth, influence, and enterprise—the Mayor of the city of Troy, Stephen Warren, the well known and esteemed President of the Troy Bank, rich in this world's goods, and rich too, in public spirit and deeds of benevolence, came from an obscure town in Connecticut, pennyless—a shoemaker. Perseverance, energy and industry, and moral worth, produced this consummation of human wishes. With one more example we will close our sketch.

Thirteen years since, a poor boy, 'hired himself' to the captain of one of the steamboats on Lake Champlain, in some humble occupation. Few know the temptations to which young men are liable in the mixed, irregular company of a steamboat —surrounded by evil company, and under equally bad influences. But the poor boy had a talisman to keep him from falling.—He recollected that there was one human being who relied on and cared for him.—'He was the only son of his mother, and she was a widow.' He faithfully discharged his humble duties. His conduct was marked by those who passed that way, and by his employers. Aspiring for what he merited, he gradually reached the top of his profession. He commanded one of the first steamboats on the Lake. His uniform politeness and attention to those who were necessarily thrown in his way, commanded for him universal respect and esteem.—His reputation reached the ears of the greatest steamboat associations in the world; and many who knew him when a boy on the Lake, now see him at the head of the most splendid boat that foams and dashes through the waters of the noble north, and from a salary of $5 per month, his pay increased to $1500 per annum.

Thirteen years have not altered the good principles of his youth; he still retains that simplicity and purity of character which must ever be regarded as the true nobility of human nature.—[N. Y. Messenger.]

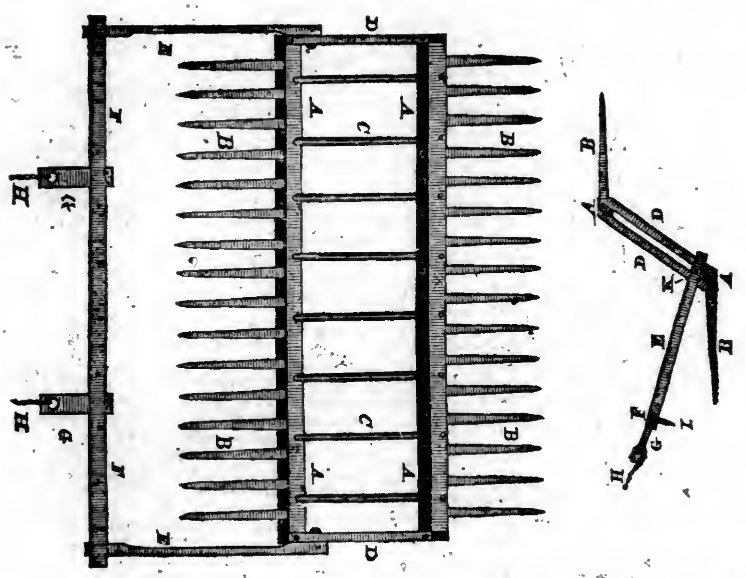
SUGAR FROM INDIAN CORN.—M. Pallas lately presented to the Academie des Sciences of Paris a sample of this substance, extracted from the stem of the plant, which has been found to contain nearly 6 per cent. of sirop boiled to 40 degrees, a part of which will not crystalize before fructification; but it condenses and acquires more consistency from that period to the state of complete maturity. The most favorable time to obtain the greatest quantity of sugar, is immediately after the maturity and gathering of the fruit. The matter left after the extraction of the sugar, is capital to feed cattle or to make packing paper.—[London Mechanics' Magazine.]

RAILWAY TRANSIT.—It would require 12 stage coaches, carrying fifteen passengers each, and 1200 horses to take 180 passengers 240 miles in twenty-four hours, at the rate of 10 miles an hour. One locomotive steam engine will take that number, and go two trips in the same time, consequently will do the work of 2400 horses! Again, it would require thirty mail coaches (six passengers each,) and 3000 horses, to take 180 passengers and mail, 240 miles in twenty-four hours, at the rate of 10 miles an hour. One locomotive steam engine will take that number, and go two trips in the same time, consequently, will do the work of 6000 horses!—[T. M. Hackney.]

PUDNEY'S PATENT REVOLVING HORSE RAKE.

From the deep interest we feel in every thing which tends to facilitate the labor of the agriculturist, especially in the important branches of haying and harvesting, we presume our readers will be pleased with the following notice of an article, which has been well recommended to us from sources entitled to the fullest credit, and whose good opinions were the results of experience.

This machine is so simple and plain in its construction, as scarcely to need any other description than the following engraving.—We give the diameter for its proportion in the inventor's own words, and we also copy his advertisement on the cover of the Cultivator.



References.

A, A, heads. B, B, teeth. C, C, connecting rods. D, D, end bars. E, E, end shafts. F, F, cross-bar. G, G, short shafts. H, H, trace chains. I, short teeth in the under side of the cross-bar. K, slide pin.

Directions for making.

The heads may be from 7 to 10 feet long, and 2½ by 3 inches diameter. In the edges, or narrowest sides of the heads, the teeth may be inserted into holes 1 inch in diameter, and about 6 inches apart. The teeth, including the tenon, may be 2 feet long, and an inch and a half in diameter at the shoulder; the other end being made sharp or pointed. The connecting rods may be about 2 feet 4 inches long, including the tenons, and an inch and a quarter in diameter. They may be either round or square. The end bars may be square, and an inch and a quarter diameter, and as long as the connecting rods. The holes in the head, into which the connecting rods are inserted, must be bored in an oblique or slanting direction, as shown by the end bars in the end view; the connecting rods, the end bars, and the tenons on the ends of the heads, all slanting in the same direction. The end bars are fastened to the heads by means of a bolt or rivet, which passes through them, as well as through the tenon on the ends of the heads. These tenons may be an inch in thickness. The cross-bar may be 3 or 3½ inches wide in the middle, and narrower at the ends. It may be — inches thick.—The end shafts may be 4 feet long, 2½ inches thick, and shaped as shown in the engraving. The short teeth may be 3½ inches long from the shoulder to the point, and inserted into holes three-fourths of an inch diameter, and one foot apart, in the under side of the cross-bar. The shoulder on the short teeth may be on the back side of them, and the holes into which they are inserted need not be bored more than half way through the cross-bar. The short shafts can bear about the proportion to the rest of the rake shown in the engraving. The size and proportions of the different parts can be varied to suit the work to be performed. If the ground to be raked is rough and uneven, a short rake will work much better than a long one. But if the meadow to be raked is smooth and level, and the owner wishes to rake fast, a rake 10, or even 12 feet long, can be used. For raking grain, on smooth ground, the rake may be made long enough to rake two swaths at once—the horse going between them.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANICS' MAGAZINE, is removed to 132 *Nassau street*, opposite CLINTON HALL, and two doors *below Beekman street.*

☞ Will those Editors to whom the Journal is sent, do me the favor to notice this removal, send their papers in exchange, and request the friends of the Periodicals in the country to direct their orders to me at 132 Nassau street.

The favor shall be reciprocated at any and all times, by

D. K. MINOR.

March 23, 1836.

TO ENGINEERS AND RAILROAD COMPANIES.—The Proprietor of the Railroad Journal proposes to act as Agent for ENGINEERS, and RAILROAD COMPANIES, in the purchase, or procuring of *Instruments, Books, Account Books, Stationery, &c.*

In the selection of *Instruments* the aid and advice of practical Engineers will always be had. In the furnishing of Blank Books for the Company's use, they will be made to *order*, or to correspond with those in use in this city, if no special order is given, and of the best materials and workmanship. Articles of Stationery of the best quality will be furnished at fair prices—and cash or city acceptances expected on forwarding the articles.

Immediate attention will be given to orders received and the articles furnished at the earliest possible period.

D. K. MINOR.

New-York, April 16, 1836.

EDITORS and PUBLISHERS of Newspapers are respectfully requested to take notice and bear in mind that I propose to act as AGENT to procure and forward promptly, *Printing Machines, Printing Presses, Types* and *Fixtures* of every description, necessary to furnish a Printing Office complete.

Also to purchase and forward *Paper, Ink*, and other materials used in the line.

Also to COLLECT ACCOUNTS due in the CITY and STATE OF YEW-NORK and in the State of *New-Jersey, Pensylvania*, and *all* the *New-England States.*

My heavy losses by the late conflagration render it necessary that I should redouble my diligence and exertion; and it has occurred to me that an AGENCY of this kind, conducted by an experienced and careful man, will be of much service to gentlemen at a distanee who cannot conveniently visit the city to make the selections themselves. I therefore offer my services in *this line*, or to give any other orders in relation to other matters which may be desired by my friends out of the city.

My long acquaintance with the business, and with the manufacturers of the articles alluded to, and with the collection of *accounts* for Newspapers and Periodicals, will, I trust, enable me to execute orders entrusted to me, to the entire satisfaction of those who may feel disposed to patronize me in this new branch of business.

My commissions will in all cases be reasonable.

☞ No orders will be given for materials unless the payments, or paper offered, is satisfactory to the manufacturer.

D. K. MINOR.

TO CONTRACTORS.

Sealed proposals for the graduation, bridging and superstructure of the JACKSON and BRANDON RAILROAD: for the erection of a BRIDGE over Pearl river, and the remaining incidental work necessary to the completion of said road, will be received at the Railroad Office in Jackson, until the 10th of May next.

Plans and specifications will be exhibited at the office, and the necessary explanations given, by the Assistant Engineer upon the line, one week previous to the letting.

It is expected that testimonials of characters, &c. will accompany the propositions of those who are not personally known to the Agent, and the Company reserve the right of rejecting any bids not deemed to their advantage.

W. PETRIE, Chief Eng. & Agent.
J. & B. R. R. & B. Co.

Jackson, Mi. March 15, 1836. 12—3t.

GEORGIA RAILROAD & BANKING COMPANY.

NOTICE TO CONTRACTORS.

SEALED Proposals will be received at this office, between the 1st and 3d of June next, for laying the superstructure on 50 miles of the Georgia Railroad—all materials to be furnished by the Company.

The first ten miles to be commenced by the 10th of September, and completed by the 15th January next—the remainder of the line MUST BE finished on or before the 1st of May, 1837.

Plans and Specifications of the work, may be seen, and all other information obtained on application at the office, one week previous to the letting.

J. EDGAR THOMSON, Chief Eng'r.

Engineer's Office, Augusta, Geo. April, 2d, 1836. 12—4t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9-1y

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NOTICE TO CONTRACTORS FOR EXCAVATION AND EMBANKMENT.

Proposals will be received at the Office of the Munroe Railroad Company, Macon, Geo., between the 19th and 21st of May next, for Excavating and Embanking the whole of the Railroad from Macon to Forsyth, a distance of 25 miles, embracing much heavy graduation.

For further information, apply to

DANIEL GRIFFIN,
Resident Engineer.
J. EDGAR THOMSON,
C. Engineer.

Macon, March 28th, 1836. 11—5t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

☞ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

☞ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

☞ Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J6 ROGERS, KETCHUM, & GROSVENOR.

CHICAGO LOTS.

Notice is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section Number Fifteen, in the Township Number Thirty-Nine, North of Range Fourteen, East of the third principal Meridian, adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17, 1836. 13-8t

PROSPECTUS OF VOL. II. OF THE CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public. The reasons that induced him about a year since to establish his weekly paper, operate with renewed and increasing force in favor of his present design. He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of his future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

*** All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, No. 132 Nassau street, by

D. K. MINOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroad.

No. 264 Elizabeth street, near Bleecker street, New-York.

☞ RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlem Railroad now in operation. J25tf

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TO CONTRACTORS.

NOTICE is hereby given to all persons who may feel disposed to take Contracts on the Illinois and Michigan Canal, that the Board of Commissioners have determined to commence that work as early in the spring as circumstances will permit. The Engineers will commence their surveys about the 10th of March, and will have several Sections ready for contract by the first of May. It is therefore expected that definite proposals will be received from that date to the first of June. In the mean time the Board invite an early inspection of that part of the route to Chicago, and will afford any information that may be required of them.

All communications will be addressed to "The Board of Commissioners of the Illinois and Michigan Canal, at Chicago."

By order of the Board.
JOEL MANNING, Secretary

January 20, 1836. 8-6t

TO BRIDGE BUILDERS.

Sealed Proposals will be received, until the 15th of April, for finding materials and building the superstructure of a bridge, over Harlem Creek and flats, on the New York and Harlem Railroad.

Said Bridge to be on the late improvement of Mr. Town, 24 feet wide in the clear, and 660 feet long between the abutments, to be supported by three piers of masonry. The bridge to be completed by the 1st of Nov. ensuing. Communications may be addressed to the undersigned, at his office, No. 9 Chambers street, where plans and specifications may be seen.

JOHN EWEN, JR.
Engineer of the New York and Harlem Railroad.
9-t15a

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice..

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
Superintendent, at Newcastle, Delaware.

feb 20—ytf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined Iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

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ARCHIMEDES WORKS.

(100 North Moor st. N. Y.)

NEW YORK, February 12th, 1836.

The undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

RAILWAY IRON.

95 tons of 1 inch by ½ inch,
200 do. 1¼ do. ½ do.
40 do. 1¼ do. ⅜ do.
800 do. 2 do. ½ do.
800 do. 2½ do. ½ do.
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys and pins.

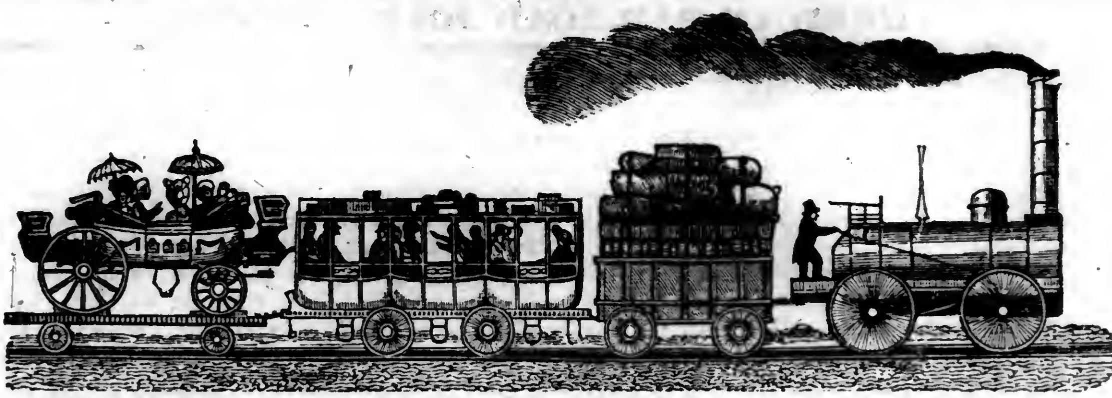
Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½ and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them. 4—d7 1meowr



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, Editor.] SATURDAY, APRIL 16, 1836. [VOLUME V.—No. 15.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 16, 1836.

☞ In consequence of an accident, by which EIGHT pages of this number of the Journal was thrown into PI, or broken down, and had to be entirely set up again, our advertisements are omitted this week.

ERRATA.—The *last* number, or 14, dated April 9th, appears, by a *battered* type, No. 11.

☞ In consequence of the *delay* of the Journal, after the fire, the numbers have been, since that time, *generally* issued about *four* weeks later than the date on them. This *unavoidable* delay, on my part, has been a source of much inconvenience and disappointment to some of our readers, and of course, of deep regret to us—and therefore, in order to obviate the difficulty as soon as possible, we have endeavored to print *two* numbers a week, in order to remove the cause of the complaint—and as we are now within *two* weeks of the regular date, we hope soon to be able to say that we are, at least, "*even* with the world."

NEW-YORK AND ERIE RAILROAD.—It is with most sincere pleasure that we record the final passage through the Senate, and approval by the Governor, of the bill to expedite the construction of this road.

Our legislature has proved to us that the best interests of the people at large are still consulted, in spite of all the noisy bullying and artful sophistry got up on this occasion. No public work has ever been projected, leading to more splendid results. The North and the South, East and West, city and country, will all share in common, its benefits.

Now, gentlemen of the New-York and Erie Railroad Co., the State has, at length, in part done its duty to the inhabitants of the Southern counties, and if you are the men we have always taken you for, you will show them such a work as has never yet been seen, either for solidity of structure, rapidity of transit, or utility of purpose; and, what is still more important, executed with a promptness that shall disappoint its friends, and shame its enemies. The aid of the State is now pledged, and you *should*, as we are sure you *will*, complete your road as rapidly as your enterprise may dictate, and the nature of the case will admit. Your reward is before you. How can we better close our advice than in that homely but expressive phrase, "Go ahead."

We do most heartily congratulate the public upon this event, so important to our city and to the whole State, and venture to predict that in less than five years, the noblest Railroad in the world will be in successful operation.

Since the above was written, we learn, as will be perceived by the following notice, that the directors have resolved to offer immediately *one hundred and eight* miles for, addition to the *forty* now under, contract. This looks indeed as though the Company had adopted our motto—"Go ahead."

We have seen the model of a Dry Dock, by J. W. Holly, as exhibited at the Exchange for several days. The principle of its operation is very simple. A chamber closed by lock gates is to admit the vessel; water is to be thrown in until it can be floated into a basin, the bottom of which can be kept dry, when the gates are closed. The vessel is to be properly supported, and the water let out as usual.

This form of a dry dock would be most economical and expeditious in its operations, where a stream of water could be had to supply the basin, and in most cases this could be accomplished with ease.

The inventor proposes to throw water into the basin by means of a steam engine, when the natural advantages of a stream cannot be obtained.

The great simplicity and trifling cost are prominent advantages in this dry dock

For the Railroad Journal.

CLINTON, No. III.

TO THE MERCHANTS, TO THE SHIP-OWNERS, TO THE MECHANICS, *to all who are interested in the prosperity of New-York, I address myself.*—My purpose is to enforce salutary truths of the highest moment to your interests. Pennsylvania, under her new order of things, is pushing her canal through to Lake Erie. The present summer, and one more being past, will, in all human probability, see canal boats passing from that Lake to the western division of her great canal. New-York, from her position, is practically cut off from the immense trade of the Ohio. True, by the grand canal and the Lake, she can throw in, through the Ohio canals, late supplies of goods, while your active rivals of Philadelphia and Baltimore work wide awake—both up and doing—are in the full supply of the market three weeks before you. If this cannot be wholly, it can be partially, remedied. But the western country is, from its vastness, a world of itself, and while the trade on the Ohio will be immense, who can measure the business, the demand for goods, the abundant returns in every thing that constitutes the element of mercantile business and profit of their inland seas, Lakes Erie, Huron, Michigan, Superior, and onward, nearly equalling in extent and fertility the Mediterranean and its tributaries?

The great and growing trade of this extensive region it is in your power, if not to monopolize, at least to secure a large proportion of, by prompt and energetic action. I mean, by a railroad in the most direct line practicable from your city to Lake Erie. Every mile saved is important, every hour gained is worthy of consideration. The Tioga branch of the Susquehanna, from Bath, by Painted Post, and Newtown, cuts the State line of Pennsylvania, a few miles above Tioga Point, where it meets that river, and descends in its main direction to Pittston in Luzerne County, not considering its sinuosities, but taking its general course in almost a direct line to New-York. Indeed, this point is of so great importance to your interest, that all your intelligent men, your enterprising young men especially, ought to make themselves fully masters of the subject. Instead of inquiring, "What news from Washington? Has the expunging resolution passed? Have Wise and Bynum kissed and made friends?" the exciting question should be, "By what route can we reach Lake Erie by railroad to most advantage? Have you examined the map? Have you measured the air-line distance? Do the waters of the Susquehanna, for near a hundred miles, cut through the ranges of mountains, and open an easy way to form a railroad from the Lake to our city?" Put a thread, one end at New-York, and the other on the Lake, so as to touch Buffalo, and behold! the valley of the upper Susquehanna spoken of, will be found with Pittston at the mouth of the Lackawana, in almost a direct line. Nature has painted out the ground and enterprize marshals the way to fortune.

I wish, Mr. Printer, some competent engineer,* would make an estimate, as nearly as can be, from the data before him of—first, the cost of a railway, on the nearest practicable route, from New-York to Lake Erie. Secondly, the quantity of merchandize and produce (excluding coal) that would probably pass on the road. Thirdly, the cost, per ton, toll and transportation included, per mile. Fourthly, the time cars, with lighter kinds of merchandize, dry goods, &c., and passengers, might pass from the city of New-York to Buffalo. And fifthly, the probable extent of the canal trade, both ways, from Pittston—*i. e.* from Pittston to New-York, and from Pittston to Buffalo and the intermediate country.

Let the fact make its due impression. Let it be talked of in every intelligent circle; let it be borne constantly in mind, that the rich and inexhaustible coal mines of purest anthracite, at Pittston, Luzerne County, are on an air line, only one hundred and six miles from the city of New-York! Do you doubt it? Do you say it is impossible? I reply, go take your map; put one point of your dividers on New-York and extend the other to Pittston at the mouth of the Lackawana, in Luzerne County, (directly in a line to Buffalo, too,) and now measure the distance on the scale--see! it is only one hundred and six miles!—as true as you live: and that very soon—the sooner the better for us all—there will not only be a railroad from the city to those coal mines in Pittston, but we shall see cars laden with coal come from those mines and unload their burdens at our wharves the same day, while passenger cars will in all probability go and return in a day.

I wish this matter would be duly appreciated. The coal trade is yet in its infancy; thus far the demand has outrun the supply. What the value of coal has been in New-York the past winter you can best tell—I presume from seven to nine dollars a ton. A necessary of life, indispensable to existence as bread, the demand will go on augmenting with increasing population, all along the sea-board; and from the fact stated of the nearness of the Pittston coal fields, it is apparent that New-York may share largely with Philadelphia the new and increasing business resulting from the coal trade. It should be borne in mind that now a large, if not the principal, supply of coal comes from Schuylkill County, and is transported more that two hundred miles before it reaches your wharves,* while the Pittston coal can be brought by railroad, a distance not exceeding 125 or 130 miles, perhaps less—but little more than one-half the distance you get your present supply! Were it only to open to New-York the vast anthracite deposites of Luzerne, wisdom, I am persuaded, would say "yes, by all means; make, forthwith, by the nearest and best route, a railroad to Pittston. Two hundred thousand tons of coal a year would certainly descend upon it; paying a handsome per centage in tolls, and the value of the increased trade, to supply the fertile region along the Susquehanna, would of itself be an object of importance." My advice, in relation to the road would be, to make it on the cheapest plan possible, calculating in the course of ten years gradually to renew it, with the improvements which time and experience will most certainly develope and approve. Fifteen thousand dollars a mile would put the work in operation. Miles 130 + \$15,000 = \$1,950,000—say two millions. Now, 200,000 tons of coal a year, at one cent a ton per mile toll would amount to 260,000, the interest at 5 per cent of more than five millions, and this without taking into the amount the return trade, or carriage of other articles.

My whole plan embraces a continuous railway from New-York to Buffalo. This may be divided into three sections. First, the railroad to Pittston, at the mouth of the Lackawana; secondly, up the Susquehanna to the New-York State railroad, through the southern tier of counties; thirdly, from that railroad to Buffalo. It should be here distinctly stated that the State of Pennsylvania is now prosecuting to early completion the canal from the State line down to Pittston, to which point the Pennsylvania Canal from Columbia is finished, and now in perfect operation. And that the State of New-York is going on with her railroad, (which comes within four or five miles of the State line, where the Pennsylvania canal will strike it,) westerly to Portland on Lake Erie. So that, if the first division indicated, that is, from your city to Pittston, should be pushed vigorously to completion, the two upper sections of the road might be made at perfect leisure, as there would be a perfect communication from Portland on Lake Erie, to Pittston, by the time the first division from Pittston to New-York would be finished.

Let this striking fact be placed in a paragraph by itself, that, by Pittston and the Susquehanna, the distance from New-York to Lake Erie is sixty miles shorter than by any other route. CLINTON.

* Doubtless you have many engineers of ample skill; but permit me to say there is one, a young man of first-rate talents and attainments, now engaged on the railroad from Brooklyn down Long-Island, who, I wish, could be drawn to look into this matter. I know he is competent and worthy of all confidence. Should this meet the eye of Mr. L., will he accept the respectful salutations of CLINTON, and turn his attention to this interesting subject?

* In Parker's Report to the Senate of Pennsylvania, the distance is set down as 234½ miles.

NEW-YORK AND ALBANY RAILROAD.—It will be recollected that in 1832 a charter was granted for this Railroad, with a capital of \$3,000,000. This Road, however,

has not been, as we were in hopes it would be, commenced—and it is therefore necessary that the subject should be again brought before the Legislature.

Of the importance of this route to the citizens of the *city* of New-York, the counties through which it is designed to pass, and to all whose business requires them to travel between the Commercial Emporium and the political Capital, or the interior and extreme parts of the State in a northerly direction, it is entirely useless to speak. Those who have had the misfortune to pass over the route between New-York and Albany during the winter season, can at least appreciate its value; and we should suppose that our citizens would be able, from the rigors of the past winter, during which time, they have been shut out from supplies, to estimate its importance to them. There are, however, many residing beyond its influences, who are not like to be materially affected by the want of it, who may be called upon to act upon the measure, and it, therefore, will not be deemed inoportune, or improper in us, to publish, or rather *re*-publish some important facts in relation to the business of the counties *near* and *through* which it will pass, collected by a committee of gentlemen appointed for that purpose, which, if correct—and we have reason to believe them, at this time, *entirely* within the amount—demonstrate that it will be not only exceedingly useful to the business of those counties, and to the city of New-York, but also highly profitable to those who may invest their funds in its stock.

We are fully of the opinion, and have often expressed it through the Journal, that those who own property along the line of an important *contemplated* Railroad, had better contribute *one fourth* part of it, to a common fund for its construction, without anticipating *any* returns in the way of *dividends*, rather than that the road should not be made. This, however, is not necessary, as every man who shall invest *one hundred* dollars in this Road, may rely upon receiving, after it shall be completed and in use, at least *ten per cent.* per annum from *it;* and if he owns property *on* or *near* its line, he may rely upon an increase in its value of *five* to *fifty* per cent., and in some places, *one hundred* to *five hundred* per cent. the moment it shall be completed.

Thus far we have viewed it mainly as a benefit to those on its line—it will be found of equal advantage to this city—as it will open an easy, cheap, and expeditious communication, during the whole winter, with the period at which, as we are now situated, we are cut off from supplies from the most productive portion of the surrounding country; and connected, as it will be, with the numerous Railroads leading from Albany, Troy and to the intermidiate flourishing towns in New-York, Connecticut, and Massachusetts, there will be a con-
l trade with our merchants during the
tinua
whole winter—and of course a continual supply of fresh provisions for our citizens. Of the extent of business of the country on the line of the Road, there are *very few indeed* who have a correct idea; and the extent to which it would be increased is less duly appreciated. The remark that "Railroads *create their own* business," will be here clearly exemplified.

The facts, estimates, and statements herewith submitted were collected and made several years since, and it will be proper, in coming to a conclusion at *this* time, to take into the account the wonderful increase of business, as well as the astonishing improvements in the construction of Railroads and Railroad machinery.

"The county of Westchester is the first district to which our inquiries will be directed. This large, populous and wealthy county will be intersected by the Railway at nearly equal distances between the shores of the North and East Rivers. The inhabitants of the most productive parts of this county will thus obtain ready access to the city markets, and the impulse which will thereby be given to the agricultural and manufacturing industry of the county must, from the very circumstance of its contiguity to the city of New-York, afford a large annual amount of tonnage and passengers to the Railroad. In one of the remote towns in this county the tonnage for a Railway has been estimated at near 2000 tons annually, and the passengers at 800 in each direction. The population of this county, in 1830, was 36,476; the valuation of real and personal estate, in 1831, was 9,397,840 dollars.

The county of Fairfield, in Connecticut, lies near the contemplated route of the Railroad, and the interior portions of it can have no other favorable outlet for the products of their industry, which now contribute much to the general business of the city and country. A branch Railway of nine miles will reach Danbury, one of the shire towns of this county, overcoming an elevation of but 48 feet. Some estimate may be formed of the industry and amount of business of this flourishing town, from the fact that two hundred thousand feet of boards are annually used in the construction of packing boxes for the single article of *hats* sent to the New-York Market. The number of passengers booked by the stages at the same place, is said to be six thousand annually.

The county of Putnam, though of limited extent, will afford much for the support of a Railway. Extending from the Hudson at the Highlands to the east line of the State, its most valuable and productive portions will be found contiguous to the Railroad. A partial estimate of its transportation has been made by citizens residing near the eastern border of the county, which amounts to 7000 tons, and 6000 passengers annually. Population in 1830, 12,701. Valuation of real and personal estate in 1831, $2,198,889.

The county of Litchfield, in Connecticut, next claims our notice. The interior position of this large county, and its proximity to our borders, and to the route of the Railway will secure to the latter almost the whole amount of its export and import trade. Possessing, in the Housatonic and its tributaries, a vast amount of water power; rich in its soil and its extensive deposits of iron ore, lime-stone and marble; its productions must be greatly multiplied by the increased facilities which the Railway will afford. The iron of this county possesses the highest reputation, and is now transported from Salisbury, on the borders of this State, to the United States Armory at Springfield, by land, at an expense of twelve dollars per ton. Some estimate of the present business of the county may be formed, by an examination of the following statement of its productions, and their annual value, by John M. Holley, Esq., which has recently been published, and in preparing which, he informs us, that a very considerable list of articles, each of small comparative value, are entirely omitted:

	Value.
Pig and bar iron, &c.,	$293,000 00
Manufacture of Iron, &c.	
Scythes,	53,000 00
Hoes,	7,150 00
Axes,	25,500 00
Rat and mouse traps,	9,500 00
Shoe tacks and sparables,	40,000 00
Shovels and spades,	6,500 00
Augers,	2,000 00
Steel,	8,000 00
Pitchforks,	20,000 00
Ploughs,	3,800 00
	$177,650 00
Other Productions.	
Wool,	$151,000 00
Woollen cloths,	215,000 00
Cotton do.,	15,000 00
Hats,	70,700 00
Shoes and boots,	112,000 00
Carriages and wagons,	38,000 00
Clocks,	382,000 00
Leather,	181,000 00
Cabinet work and chairs,	27,000 00
Cordage,	500 00
Machinery, part wood and part iron and steel,	19,000 00
Brick, clay furnaces, and marble,	38,200 00
Rakes and brooms,	5,000 00
Lime,	5,000 00
Musical instruments,	2,200 00
Buttons,	20,000 00
Cheese,	115,000 00
Butter,	17,600 00
	$1,414,200 00
Pig and bar iron,	293,000 00
Manufactures of iron, &c.,	177,650 00
Total,	$1,884,850 00

The number of passengsrs to and from New-York, furnished by this county, is very great, and constantly increasing.

The county of Dutchess, which has been long distinguished for its agricultural industry and wealth, will contribute largely to the permanent business of the Railroad. Much of its finest soil lies contiguous to that beautiful valley through which the Railway is designed to pass. Careful estimates of the present amount of transportation have been made in some of the towns in the eastern portion of the county, and the result is highly favorable. An average of eight towns in this county, may be supposed to give their support to the Railway through the year, not to include the business which would be derived from the other towns, and from the flourishing village of Poughkeepsie, in the winter season. The present transportation of three of the above towns is estimated at 10,167 tons, at the annual cost of 36,168 dollars. Applying this ratio to the eight towns, and then deducting one half of the amount, will afford the estimate which we shall venture to give of the present transportation of this county which will pertain

to the Railroad, and is equal to 13,556 tons annually at an expense of 48,224 dollars. The number of passengers which can be obtained from this county is not known. Population of the county, 59,926. Valuation of real and personal estate in 1831, 16,188,739 dollars.

We are next called to notice the amount of business which can be obtained for the Railway, from the county of Berkshire, in Massachusetts, the inhabitants of which, owing to its peculiar position, are more deeply interested in the success of this enterprise than almost any other section of country. An examination has been made of the amount of transportation in thirteen towns in the county, which amounts, independent of certain articles not enumerated, to 20,981 tons annually, which, at the existing rates, costs 106,157 dollars. The remaining seventeen towns of this large county, are represented as affording at least an equal amount, making an aggregate of 212,314 dollars, exclusive of a large number of passengers from the county and from other parts of the country more remote from the Railway. A respectable inhabitant of that county, in a letter to the Corresponding Committee, says: "Although the result of this examination exceeds even our hopes, still, in my view, it is not the most interesting feature of the subject. The business which a Railway would *create*, and the increased activity which it would give to branches now pursued, is the great point. We have marble in this town suitable for every part of the most splendid dwelling, from the foundation stone, to the mantel and pier-table in the parlor. Every variety of color from white to black is here, with the exception of that which is denominated Egyptian. Yet it avails us nothing: we have no means of transporting it to market. What is here said, will, in many particulars, apply with equal force to many other towns." The article of hay, of which in the winter season vast quantities would be sent to the New-York market, has not been included in the estimate.

In the county of Columbia we may estimate an average of nine towns as being immediately connected with the Railway. One of these towns affords a greater amount of transportation than any other town from which returns have been received, and the whole are averaged as equal to the three towns in Dutchess, whose returns have been mentioned. Deducting one half the amount of this estimate, for proximity to navigation and other considerations, there will remain 15,250 tons, at the annual cost of 54,252 dollars. The population of this county is 39,954. Valuation of real and personal estate 9,776,941 dollars.

Passing over the towns which will be intersected by the Railway in Rensselaer county, and the city of Troy, we will consider this county, as well as that of Albany, as forming the northern terminus of the route, the estimate for which will claim our attention hereafter.

The data on which we proceed in estimating the amount of business which will be afforded to the Railroad, though founded on careful estimates in some towns, is necessarily imperfect with regard to others. Some of our estimates may possibly be overrated, others certainly fall short of the truth, and in those towns where a careful re-examination has been made, the amount is found to be greatly increased, and there is good reason for believing that the returns on which our results are chiefly predicated, are more precise and authentic than are often obtained in similar cases. We shall now complete our approximate estimation of the business of the country contiguous to the route of the Railway, and shall then give to the travel and transportation, which will pass through the entire length of the route, a separate consideration.

We accordingly present the following summary:

Reduced estimate of nine towns in Columbia county,	15,250	at the cost of	$54,252
Estimate of Berkshire,	41,962	tons at	212,314
Reduced estimate of Dutchess county,	13,556	"	48,224
Litchfield county, estimated at ¾ of Berkshire,	31,472	"	159,236
Putnam county, partial estimate,	7,000	"	28,000
Fairfield county,	7,000	"	28,000
Westchester county, estimated equal to Putnam and Fairfield,	14,000	"	56,000
	130,240		$586,026

We have thus a total of 130,240 tons now transported annually at the expense of 586,026 dollars. It may be proper to suggest, that much of this business now pays an additional freight on the Hudson, a portion of which will be saved to the Railway, by passing direct to New-York; and although the Railway prices must be lower for the same distance than is now paid for transportation on common roads, still the increased mileage in passing to that city, will go far to compensate for the decrease in price. The effect of the Railway will also be, to greatly multiply the amount of products transported, so as to preserve, if not increase, the gross amount now paid for transportation. Besides this, the general increase of business which may be expected to occur before the period can arrive at which the Railway will be opened, especially with the stimulus of the Railway in prospect, may be supposed, of itself, more than sufficient to make good the above amount to the Railway. Some facts relating to the increase of business in Berkshire will show this in a strong light. About the year 1826 an examination was made into the amount of transportation then afforded by that county, in reference to an extension of the Sharon Canal through the rich valley of the Housatonic. It was found that its transportation was then performed at the annual expense of about 100,000 dollars; and the Committee who instituted the inquiries ventured to predict, that with the aid of the facilities which a Canal would afford, this amount would be doubled in six years. Since those inquiries were made, six years have elapsed, and without the aid of the contemplated Canal, the transportation now exceeds 200,000 dollars; and intelligent persons in that county, who are conversant with its industry and statistics, avow their belief that with the facilities which a Railway on that route might afford, the present amount would be quadrupled in another equal period.

We shall therefore be fully justified in assuming an amount of transportation in the first years of the Railway operations, equal to the summary above recited. Lest, however, we should appear too sanguine, and to remove all possible objections, we will deduct 40 *per cent.* from the foregoing estimate of transportation, which reduces the amount to 351,616 dollars.

We come next to the estimate of the *passengers* which would be afforded to the Railway from the same district of country; and in making this inquiry we are obliged to proceed on data less precise than that which has governed our estimate of heavy transportation. We are, notwithstanding, in less danger of overrating the subject, for all past experience has shown that the amount of travel in our country, particularly on routes connected with its commercial metropolis, increases annually, in a ratio far beyond that of its business or population; and in no case is this increase so high as when connected with the establishment of steamboats and Railroads.

In twelve towns in Berkshire, the passengers to and from the Hudson, are estimated us now paying an amount of 10,720 dollars annually. But the estimate is made on the present residents in these towns, not including transient visiters: and with the increase which will accrue in five years, together with the vast multiplication of travel which the Railway will occasion, and the increase of mileage in the transit of a great portion of these passengers to the extreme points of the route, it will be fair to estimate the amount from this source from these twelve towns, on the opening of the Railway, at 30,000 dollars annually, and the travel of the whole county at 60,000 dollars. Nor will this estimate appear exaggerated, when we consider that the most productive business of a Railway is found to consist in the conveyance of passengers.

We will, however, estimate the travel of

Berkshire county as producing annually to the Railway the sum of	$40,000
Litchfield county,	30,000
Columbia, (including winter travel,)	20,000
Dutchess,	20,000
Putnam,	12,000
Fairfield,	12,000
Westchester,	18,000
	$152,000

We now devote our attention to that part of the travel to and from the intermediate points on the Railway, which is furnished from the cities and counties which are situated at its northern and southern terminations. This important part of the estimate must begin with the city of New-York, which will possess, in this Railway, if we except the Hudson River, its most interesting and frequented channel of intercourse with the country. Thousands of its citizens will be induced to seek, through this accommodation, a respite from the cares of business, in the rural scenery and free air of that delightful region of country, which borders on the route. Thousands also of the strangers who visit the metropolis will be attracted by these inducements, and the exhibitions of manufacturing and mechanical skill which this enterprising country affords, to visit places and objects in the vicinity of the Railway. To form a just view of the amount of this intercourse, and of the business transactions incident upon it, we need but remember that the resident population of the city in 1830 exceeded 207,000 persons; that it is now equal to at least 225,000; and that its real and personal estate is valued at 139,280,214 dollars. Brooklyn, which is but an extension, of the city, had, in 1830, a population exceeding 15,000, which is rapidly increasing, and its valuation is near seven millions of dollars. At the northern termination of the route we have the flourishing cities of Albany and Troy, a large portion of whose citizens are natives of New-England, who maintain a constant intercourse, both mercantile and social, with the land of their fathers; and if we look beyond these limits to the north and to the west, we find the same relations existing, and a corresponding frequency of intercourse, which must needs contribute largely to the resources of the Railway. The valuation of Albany county is 12,739,639 dollars. Its population, in 1830, was 53,570. Valuation of real and personal estate, in

Rensselaer county, including Troy, 9,615,-392 dollars. Population, 49,472.

It is highly probable that this class of travel to and from the intermediate portions of the route will equal that which is furnished by the intermediate country itself, amounting, as we have seen, to 152,000 dollars annually, and making a total of 304,000 dollars; a sum, it will be perceived, which is still below the estimated transportation of the same country. In compliance, however, with our former rule of caution we will reduce this amount to 200,000 dollars.

We have thus an aggregate of 200,000 dollars for the entire intermediate travel of the railway, including not only that which is afforded by the counties which are intersected, but also that which emanates from the county of Rensselaer, and the cities of Albany and Troy on the north, and the city of New-York on the south. Nor can we think this item to be overrated, for, on comparing it with the known amount of travel on stage routes through less important districts, it would evidently justify a larger estimate.

We come now to consider the probable income of the railway, from the business passing from the extreme points through the entire length of the railway, and will first attempt an estimate of that which will pass in the winter months, say an average of three months in each year.

Although the amount of travel between New-York and Albany by the post-road, at this season of the year, is comparatively small, yet all must be convinced, that under the operation of the railway, the business and travel would not only be greatly increased, but more equally diffused through the different seasons. During the season of navigation, not fewer than eight steamboats pass daily on the Hudson through the entire route. One boat is said to have carried 25,000 passengers annually, on an average of past years, and some boats have much exceeded this number. If we allow a season of 35 weeks, and six passages per week, it will give 112 passengers per day for each boat, or an average of near 900 per day; and we may safely allow 75 per day, in each direction, as the average of the long travel in the winter months, when intercourse shall be established by a Railway. This number, at five dollars each, which would be a moderate winter price, will amount to 58,500 dollars. This average may seem too small, and doubtless is so, but it must be remembered that we have previously estimated all the travel to intermediate points on the route. The amount of property to be carried through by the Railway cannot be so satisfactorily ascertained; but as the Railway will form the sole channel of communication between New-York and the interior at that season, and will greatly facilitate commercial exchanges, we will assume the amount of the winter transportation to be equal to the foregoing item, or 58,500 dollars. To this may be added, for light articles transported at other seasons of the year, 12,500 dollars.

There remains but one other source of income to be estimated, which is that arising from the long travel in summer, or that which passes through the entire length of the Railway during the season of navigation, and which, as has been premised, is not relied upon in calculating its profit or utility. It would be a mistake, however, to infer that no income will be derived from this source. The nature of the case, as well as past experience, shows that an increase of the means and facilities of conveyance always increases travel; and that many travellers will be drawn to the railroad from motives of interest or curiosity, and still greater numbers from considerations of convenience, or a desire of change; so that a considerable portion of what is called *pleasure travel*, as well as of the men of business, will be induced to pass in one direction by the steam-boats, and in the other by the railway.

If the number of passengers which now pass daily in the steam-boats, between the extreme points of the route, be reckoned at 800 on an average of six days to the week, they may, at the expiration of six years from the present period, be safely estimated at 1200 per day. Perhaps one-third of th number would be induced to take the railroad; but we will allow 150 per day, in each direction, as the average of the long travel by the railway at the period of it completion; which, in a season of 38 weeks, reckoned at 6 days in a week, gives 68,400 passengers; which, at $2,50 each, will be 171,000 dollars. These amounts require no reduction.

We present the following recapitulation:

Estimated transportation of the country connected with the railway, less 40 per cent.,	$351,616
Winter freights,	58,500
Other light freights,	12,500
Reduced estimate for way travel pertaining to the route from the cities and other parts of the country,	200,000
Winter passengers through the entire route	58,500
To which may be added the estimate for passengers through the entire route during the season of navigation,	171,000
Total estimate of annual income,	$852,116

From the London Repertory of Patent Inventions.

ON SOME RECENT EXPERIMENTS MADE WITH A VIEW TO PROTECT TIN PLATE OR TINNED IRON FROM CORROSION IN SEA-WATER, WITH SOME PROBABLE APPLICATIONS; AND ON THE POWER OF ZINC TO PROTECT OTHER METALS FROM CORROSION IN THE ATMOSPHERE. BY EDMUND DAVY, F. R. S., M. R. I. A., ETC., PROFESSOR OF CHEMISTRY TO THE ROYAL DUBLIN SOCIETY.

If a piece of tin plate is exposed in sea-water for a few days, it will exhibit an incipient oxidation, which will gradually increase; the tin will be preserved at the expense of the iron, which will be corroded. But if a small surface of zinc is attached to a piece of tin plate and immersed in sea-water, both the tin and iron will be preserved, whilst the zinc will be oxidated, on the principle first made known by the late Sir H. Davy.

The author has exposed for nearly eight months in sea-water a surface of tin plate nailed to a piece of wood by means of tinned iron tacks, inserting between the wood and the tin plate a small button of zinc. Under these circumstances the tinned plate has remained clean and free from corrosion; the zinc has of course been corroded. In a comparative experimet, in which a similar piece of tin plate was nailed to the same piece of wood, and exposed, during the same period, to the same quantity of sea-water, without the zinc, the edges on two sides of the tin plate were quite soft from the corrosion, which had extended to about one eighth of an inch. These experiments seem worthy of being repeated and extended

The present demand for tin plate is very great; should these statements be confirmed, a vast increase in its consumption might be anticipated. The opinion may be entertained that it is practicable to substitute double tin plate for sheet copper in covering the bottoms of ships, &c. using zinc in small proportions as a protector. Such applications would probably occasion a saving of nearly three fourths of the present expense of copper sheathing.

It also seems deserving of inquiry, whether tin plate vessels, protected by zinc, may not be advantageously substituted for copper vessels in many of our arts and manufactures, and even in domestic economy. Although it might be presumed, from Sir H. Davy's experiments and observations,* that zinc would protect tin plate from corrosion in sea-water, the author is not aware that any direct experiments on the subject have been published. Sir H. Davy briefly refers to some obvious practical applications of his researches, to the preservation of finely divided astronomical instruments of steel by iron or zinc; and that Mr. Pepys had taken advantage of this last circumstance, in inclosing fine cutting instruments in handles or cases lined with zinc. The author has not heard whether such applications have succeeded, but he has made a number of experiments with a view to protect brass, iron, copper, &c., from tarnish and corrosion in the atmosphere by means of zinc; the results obtained, however, lead to the conclusion, that contact with zinc will not protect those metals in the atmosphere, the electricity thus produced, without the intervention of a fluid, being apparently too feeble to counteract the chemical action of air and moisture on the surfaces of the metals.†

CENTRIFUGAL FORCE.—At Little Green Logwood mill, Middleton, near Manchester, occupied by Mr. George Wolstencroft, there is a grindstone used for grinding the rasping knives for cutting logwood, upwards of 15 feet in circumference, and 11 inches and upwards thick. On the 24th ult., as Mr. John Wolstencroft, the son of the occupier, and another young man, were grinding the knives at the stone, the young man had screwed the machine in which the knife is held for grinding, rather too tight; this being observed by Mr. John, who also saw that the stone was revolving at a tremendous speed, he desired the young man to be cautious. No sooner had the words dropped from his lips, than the stone broke in several pieces, one of which, weighing not less than 6 or 7 cwt., forced its way through a wall a brick and a half thick, and drove a large quantity of the bricks upwards of 20 yards from the wall.—[A similar accident occurred some years ago. See vol. xviii. p. 32.]—[London Mechanics' Magazine.]

* Phil. Trans., vol. cxiv., for 1824; [or, Phil. Mag. first series, vol. lxiv., p. 30, 233; vol. lxv. p. 203.—EDIT.]

† [The negative results thus obtained by Mr. E. Davy, agree exactly with those of some trials which I have witnessed for protecting steel by this means.—E. W. B.]

LIVERPOOL AND MANCHESTER RAILWAY.

The eighth half yearly meeting of the shareholders of the Liverpool and Manchester Railway Company was held on Wednesday, the 27th of January, in the Cotton Sale-room, at the Exchange, Liverpool; Charles Lawrence, Esq., in the chair. The Report of the Directors for the last six months, which was submitted to the meeting, was highly satisfactory to the shareholders, showing a considerable increase of receipts, and in some important points showing a positive, and in most a comparative, reuction of expenditure. The receipts appear to have been—in the

Coaching department	*l*67,897	19	2
Merchandise department	46,375	15	8
Coal department	3,682	8	8
	*l*117,956	3	6

The increase in the merchandise department is the more gratifying, inasmuch as it has taken place in the face of a considerable reduction in the rates of freight made by the Mersey and Irwell Navigation Company, whilst the rates of carriage by the railway remain unaltered. The total expenses (including 3,409*l.* 16*s.* paid for goods destroyed by fire) amount to 71,995*l.* 13*s.* 4*d.*, leaving a nett profit of 45,960*l.* 10*s.* 2*d.* Out of which the Directors recommend that a dividend should be made of 5*l.* per share for the half year; and that 6000*l.* should be appropriated to the purchase of heavier rails, leaving a balance of 1,569*l.* to be carried to the credit of next half year's account. The cost of locomotive power, which has been for some time the heaviest and most formidable item in the expenditure of the Company, appears to be undergoing a gradual diminution. For the last half year it amounted (including the cost of three new engines) to 15,681*l.* 17*s.* 9*d.*, being about 800*l.* less than during the preceding half year. This is a very satisfactory reduction, when it is recollected that there has been a large increase of business, the receipts of the last half year having exceeded those of the half year preceding by upwards of 18,000*l.* In the maintenance of way there is an increase of about 1,500*l.*; and it does not appear probable that any considerable reduction will be made in this branch of expenditure until the line generally shall have been laid with heavier rails. The Report stated that the works connected with the tunnel under the town of Liverpool, and the new entrance in the Old Haymarket, were advancing towards completion, and would be finished by the end of the month of May. It was stated, in reply to the inquiry of a proprietor, that the propriety of forming a new station for passengers at Manchester was under consideration, and that, if formed, it would be covered by a roof, as at Liverpool, to protect the passengers from the weather. The Report, which appeared to give general satisfaction, having been agreed to, and a dividend of 5 per cent. on the last half year having been declared, the meeting broke up.—[Manchester paper.]

Our countryman, Mr. Perkins, has brought out a new steam-boiler for locomotives, of which he speaks in high terms. He claims for it no less than 13 advantages over his previous boiler. We will publish, in our next, his description, or so much of it as we find in the London Mechanics' Magazine.

MR. PERKINS' CIRCULATING STEAM-BOILER.

In 1832, Mr. Perkins took out a patent for a new steam-boiler on the circulating principle, which was more than once noticed in our Journal for that and the following year, and the advantages which it offered freely allowed; while, at the same time, its originality was as freely questioned—that is to say, Mr. Perkins was alleged to have but resuscitated, or rather re-invented (no doubt very unconsciously), a mode of construction first promulgated two or three years before in the pages of the *Mechanics' Magazine.* Mr. Perkins has now produced what he calls "a new modification" of this circulating steam-boiler; and in the first number (just published) of the *Magazine of Popular Science*, edited at the Adelaide Gallery (which owns, we believe, Mr. Perkins for its originator, if not founder), there is a very elaborate exposition of its merits from the pen of Mr. Perkins himself. We are far from subscribing to all Mr. Perkins says in favor of his new boiler, even as thus modified, for notwithstanding he assures us that his statements can be demonstrated "not only theoretically but practically," there are some of them which it would be difficult to reconcile with any received theory; and we cannot forget that this very boiler has been *tried* on the Liverpool and Manchester Railway, *but not adopted*; though Mr. Perkins, in his present essay, takes no notice whatever of that trial or of its results! But mixed up with Mr. Perkins' rather extravagant laudation of his invention we find so many valuable practical hints and so much ingenious and suggestive speculation, that we must place the whole of his paper, with but little abridgement, before our readers. Of the new periodical in which it appears, we must not omit the opportunity of saying that the projection of it does great credit to the Institution from which it emanates; and that though in this its first number it has rather too much of a horn-book character, there is nothing either in its plan or in the talent displayed in it, to forbid our entertaining strong hopes of its proving a most useful auxiliary in the cause of practical science. We cordially wish it every success.—[ED. M. M.]

Extracts from Mr. Perkins' Paper.

The following are the advantages which result from a new modification of the circulating steam patent, granted to me in 1832:

1. Absolute removal of all the danger arising from explosion.
2. Great economy in fuel.
3. Much reduction of boiler-room, as well as of weight.
4. Not one third of the water in the boiler now used, being necessary.
5. There being no possibility of any deposit of foreign matter in the generators.
6. No furring up of the boiler, as all the deposit will of itself collect in a place provided for it, and be blown off at will.
7. The generators always being kept at the evaporating point.
8. The impossibility of burning any part of the boiler or generators by the most intense heat.
9. The boiler and generators not being in the least affected by expansion and contraction, owing to the peculiar arrangement of the tubes or generators.
10. The perfect and simple method of separating the steam from the water and foreign matter.
11. The getting up of the steam in less than half the time now required.
12. The simplicity of the construction of the boiler, and the ready method of repair.
13. The absence of all destructibility by burning,—in consequence of using anthricite coal,—although the fire be urged to its greatest intensity.

The above facts can be demonstrated not only theoretically but practically. An operating model of this boiler may be seen daily at present at the National Gallery of Practical Science.

Explanation of the first-mentioned Advantage.

The great drawback upon the important invention of steam navigation has been the disastrous effects caused by the explosion of steam-boilers. The great importance of a perfect remedy will readily be admitted. The many experiments which I have made within the last ten years, go to prove that if the steam be generated in tubular boilers, no danger can result from explosion; but there are many almost insurmountable objections to tubular boilers as hitherto constructed, particularly for steam-navigation. The boiler which is now about to be described, possesses apparently all the properties which have hitherto been sought after. To show the reason why this boiler is free from explosions, the causes (of which there are at least three) must be described.

This *first* and most common cause is from the pressure of common steam. What is meant by common or pure steam, is such as has not been sudeenly elevated, or such as has not been compounded with an explosive mixture, by the improper management of the boiler.

The first kind of explosion is quite harmless, as the boiler simply rends or gives way in the weakest place, which is caused from wear, or some defective spot. The *second*, which I some years since accidentally discovered and published, (and which has since been experimentally proved to be correct, by the celebrated French philosopher, M. Arago,) arises from the water getting too low in the boiler. The fire then impinging on that part of the boiler which is above the water, causes the heat to be taken up by the steam, which rises by its superior levity to the top of the boiler, causing it sometimes to become red-hot, and so elevating the steam to a much higher temperature than its pressure would indicate. Now, when the boiler is in this state, and the safety-valve suddenly raised, the water will be re-

lieved from the steam pressure, and rush up amongst the surcharged steam which thus receives its proper dose of water; at the same time, that part of the boiler which has been raised in temperature, giving off its heat to the water so elevated, steam is generated in an instant, of such force as no boiler can resist. This kind of explosion has of late years been very frequent and disastrous, particularly in America.

The *third** and less frequent kind, although most terrific, is undoubtedly caused by an explosive mixture having been formed in the boiler. It has long been known that hydrogen has been often liberated, by the boiler being overheated by improper stoking, as well as not being properly supplied with water; but simple hydrogen cannot explode,—and where it could get its atmospheric air, which is absolutely necessary to form the explosive mixture, it has been difficult to understand. We have only, however, to look at an air-drawing feed-pump, and the source will be readily seen, It is frequently the case that the feed-pump draws air as well as water, arising from its unsoundness, &c. The more air the pump† draws, the less water is forced into the boiler; of course, the boiler is more and more exposed to the fire, and the heated parts of the boiler become oxydised, and rapidly liberate hydrogen; and as sufficient air has been pumped into the boiler to form the mixture, it will be ignited by an overheated part of the boiler, and the tremendous effect can only be equalled by an explosion of gunpowder.

The construction of this boiler may now be described; but the practical objections to the tubular, the compound tubular, and the common boiler must also be described, so that the remedy to these practical defects may be better understood. The two greatest practical objections to the tubular boiler are its furring up and burning out. After great expense and time, I came to the conclusion that until these two practical difficulties could be removed, they would be fatal to the economical generation of steam for any other purpose than that of steam-gunnery. I have, however, at last been so fortunate as to hit upon a modification which has completely removed all objection to this method of generating steam, and which I will now attempt to describe.

This new boiler is made up of generating tubes and the common flat-bottom wagon-boiler; from this flat-bottom a series of tubes hang perpendicularly over, and in, the fire, from one to two feet in length, according to the size of the boiler, and from two to three inches in diameter. On the upper side of this flat-bottom is a continuation of these tubes projecting the same distance into the water in the boiler. In the interior of the tubes which hang in the fire, is fixed a thin tube, wo inches in diameter; when the tube is 3 inches, internal diameter; open at the top and bottom, and ten inches in length, this tube stands upon three legs, each one inch long, and the water stands level with the top of it. These generating-tubes are hermetically-sealed, so that the steam which is formed in the interior of the upper half of the tube cannot possibly escape.

The important effect of circulation is more apparent in this modification of the boiler than in any other which I have tried. The upper, or evaporating part of the hermitically-sealed tube, contains steam of a temperature of about 80° above the boiling point, when the steam is generating at atmospheric pressure; but when generating at a higher pressure, the evaporating point increases in a geometrical ratio. This part of the tube, which is surrounded with water, is incased in a very thin tube, open at top and bottom, which causes a very rapid circulation, and sweeps off the heat so effectually, as to be certain of keeping the steam in the upper part of the tube, at the evaporating point. Experience shows that, after the steam begins to form, not only the fire part of the tube, but the evaporating part of it, which is in the boiler, receives no more addition to its temperature, not even one degree—which proves the great importance of rapid circulation.

It is well known that water is a worse conductor of heat (particularly downwards) than any other matter; but at the same time, the property which water has of carrying heat upwards, is greater than any other matter. Now, this law of the upward-carrying power of water is taken advantage of, and by filling the tube about one third full of water, the steam which is generated is given off at the top of the internal tube, and will constantly keep the evaporating chamber filled with steam, of a temperature in proportion to the density of the steam in the boiler. The effect of the most intense heat serves only to generate steam the faster, without raising the temperature of any part of the boiler, generating-tubes, or steam; while without circulation, the boiler would, as is often the case, get red-hot, and generate less steam, by driving off the water from contact with it, and materially injure the boiler. So long as there is enough water in the bottom of the boiler, to be above the bottom of the circulating-tube, say two inches, no derangement of the tube can take place, as the steam and water will, although it is obliged to rise 12 inches, sweep off the heat from the evaporating-tube, which will prevent an explosion of the tube, and which would inevitably take place, when the boiler gets empty or dry, were it not that in the centre of the sealing-plug is affixed a fusible metallic plug, which is rivited into it, and will melt before the steam is sufficiently powerful to burst the tube.

For marine and locomotive purposes, it has been found that brick-work must be dispensed with, on account of its weight and bulk; of course, the fire must be made within the body of the boiler. Now, it so happens, that this new modification of the tubular boiler is extremely well calculated for an internal fire-place; for we have only to extend the outward row of tubes down to the firebars, and we have the most convenient and economical fire-box.

Second Advantage.—Although it is not yet accurately ascertained what the saving of the fuel is, yet, from repeated experiments, I have no doubt that it will amount to one third of the fuel now used by the best marine boilers.

Third Advantage.—The reduction of boiler room is owing to the greatly increased evaporating surface in the boiler, which allows much reduction in size, and for the same reason in weight.

Fourth Advantage.—In consequence of the interior of the boiler being filled with evaporating tubes, which displace a large portion of the water, as well as the reduced size of the boiler itself, it is not too much to say, that one third of the water commonly used will be sufficient.

Fifth Advantage.—In consequence of there being no possible escape from the hermetically-sealed tubes, there cannot be any deposit, as the same water in the generator may be worked over and over again, *ad infinitum.*

Sixth Advantage.—The furring up of the common boiler is occasioned by the sluggish circulation of the water in the boiler, and the extra heat at the bottom of it. But forced circulation not only takes up the extra heat, but keeps all the foreign matter in motion, and as there is a much more rapid circulation at the fire-end of the boiler than at the other, all the matter that would otherwise deposit and become fixed, finds its way to the other end, and can be drawn off by a stop-cock at pleasure, as it will never incrust.

Seventh Advantage.—The generator cannot get above the evaporating* point,

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* This theory has not, to my knowledge, been published; and until recently, I did not see how the atmospheric air could find its way into the boiler, which is so essentially necessary to form the explosive mixture.

This kind of explosion cannot take place in the new boiler, since no hydrogen is formed in it; for no part of the boiler is exposed to the fire but the bottom, which is certain to be kept at a temperature quite as low as the water in the boiler, which surrounds the generators, by the dashing down of the water outside of the circulating tubes.

Having had about twelve years' practice in generating high steam, from 1,500 pounds to the inch downwards, and having established the fact, that no dangerous result has occurred, although a great number of explosions have happened; and having at length removed all practical difficulties, I feel warranted in undertaking to guarantee to the public a system of generating steam of any required power, not only with increased economy, but with perfect safety.

† If the feed-pump is surrounded with water, as is inevitably the case with condensing-engines (and only such are used in this country for steam-navigation), atmospheric air cannot get into the boiler. Upon inquiry, I find that nearly all the feed-pumps used in America, are worked without having water outside the pump. This undoubtedly is one of the reasons why there has been so many more accidents in America than in England.

* To prove the best temperature to generate steam, I prepared an iron cup, of massive thickness, cast for the purpose; it was heated to a white heat, and, whilst it was allowed to cool gradually, several measures of water were placed in it, one at a time, each in succession, as soon as the previous one had evaporated to dryness.

The 1st measure in evaporating occupied 90 seconds.
2d 80
3d 59

The vapor, or steam, thrown off, began now to appear, and became more distinctly visible with the evaporation of succeeding measures of water

4th measure in evaporating occupied 30 seconds.
5th 20
6th 12

7th measure showed what I had termed the evaporating point, and in a dense cloud of steam, evaporated suddenly in 6 seconds.

8th measure occupied a longer period, viz. 10 seconds.
9th measure in evaporatisg occupied ... 20
10th 32

And the 11th measure did not boil.

The first measure of water, although contained within the iron cup at a white heat, was perceptibly not in contact with the metal, but was repelled to some

since the extra heat is for a certainty swept off by the rapid circulation.

Eighth Advantage.—Experience shows that wherever circulation is active, no heat can get above the evaporating point, let the heat be ever so strong.* This boiler is so constructed that no part of it is exposed to strong heat, where strong circulation is not at the same time going on; consequently no over-heating can by any means take place. It is a fact, that no extra heat can get into the steam, since no heat is suffered to pass into the boiler above the water, let it get ever so low.

Ninth Advantage.—The tubes of the locomotive tubular boilers now in general use, are riveted at each end; and as no provision is made for guarding against expansion and contraction, the wear and tear is enormous. The tubes, however, in this boiler are connected in the middle, and each half is allowed to contract and expand without impediment.

Tenth Advantage.—To separate the steam from the water and foreign matter, a small steam-chamber is attached to the top of the furnace-end of the boiler. A pipe somewhat larger than the steam-pipe passes from the top of the boiler to the bottom of this steam-chamber. Directly over this pipe, a dome is fixed, about three quarters the diameter of this chamber; the depth of this dome is rather more than half a sphere, and within two inches of the top of the pipe. From the bottom of the chamber there is also fixed a return-pipe half the size of the steam-pipe, which leads down to within two inches of the bottom of the boiler. The operation is thus: When the steam rushes into the chamber, it takes with it more or less water and foreign matter (this is what is technically called priming,) which strikes the concavity of the dome, and throws down the water and foreign matter to the bottom of the chamber, while the steam in a pure state passes off through the steam-pipe, and the foul water returns to the bottom of the boiler through the return-pipe.

Eleventh Advantage.—The steam is got up much quicker than in any other boiler, in consequence of the great evaporating surface within it, and the diminished quantity of water in the boiler.

Twelfth Advantage.—The construction of this boiler is extremely simple, the bottom plate, after having been perforated with proper-sized holes, female coupling screws are firmly rived into it; the lower half of the tubes, which has been reduced one third in size, about two inches from their ends, is formed into a male screw, to fit the female coupling-screw. This male screw is faced perfectly flat, and the shoulder is made to be screwed firmly in contact with the bottom of the boiler. The upper half is screwed in the same manner. The face of this screw is rounded, so that when it is brought in contact with the flat surface of the lower half, it may be the more certain to make a perfect joint. The upper half is not allowed to touch any part but the flat surface of the lower half of the tube. The plug-nut, which is used for hermetically-sealing up the tube, is perforated in the centre with a small hole,—say one eighth of an inch in diameter, and filled with a fusible metal, which will be driven out before the tube will rend, and which could only take place should the water be allowed to escape from the boiler.

The wagon-boiler is considered the weakest form, but this new boiler is altered somewhat in shape; the bottom is perfectly flat instead of concave; the sides are also flat; the top is semicircular. The female coupling-screws undoubtedly materially strengthen the flat bottom. The boiler is to have tie-bolts from the top, the number of which is to be determined by the strength of the steam to be generated in the boiler; they pass down vertically between the tubes, and are screwed into the flat bottom of the boiler. Tie-bolts are to be used also to hold the flat sides of the boiler from bulging out when used for high steam. None of the nuts of the tie-bolts are exposed to the fire, consequently no objection can arise from that source. This boiler may be made much stronger than any other, on account of its diminished size; setting aside the absence of any danger from the second and third cause of explosion, which has been described, the ends of this boiler, which are flat, may be made sufficiently strong by ribs. In fact, this boiler must be pronounced a perfectly safe one, since only the first kind of explosion can take place, which is absolutely harmless; the first kind has also been described. The ease with which this boiler can be repaired is not one of its least recommendations. Duplicates of the tubes may always be at hand, and if any give way, from unsoundness or any other cause, they can be readily replaced, as they are fac-similies of each other.

Thirteenth Advantage.—All persons who have been in the habit of using anthracite coal, know that the intensity of its heat is so great, that if urged to its greatest power, the best fire-brick is readily fused. It is on this account that it is so difficult to be used for raising steam; still, some careful stokers have used it to great advantage. It is, however, done at a great sacrifice of heat, —for slow combustion and thin firing only will answer. To produce the greatest effect, rapid combustion with a deep fire is necessary. In the new boiler, the heat cannot possibly be too great. This coal, which is called in Wales, stone-coal, may be obtained there in any quantity, and is undoubtedly the most economical where it can be used, as is the case in this boiler.

distance from it in a state of buoyancy, and there moved freely in every direction. So circumstanced, the water evaporated slowly; but when, by the evaporation of successive measures, and the lapse of time, the iron was cooled down to the "evaporating point," the water then evidently came in contact with the iron, and the augmented rate of evaporation was as 90 to 6, or as 15 to 1, the rate being increased or multiplied 15 times; or, in other words, a given quantity of water was converted into steam, 15 times quicker at a moderately low, than at an intensely high heat.

* It is a curions fact, that there are now many boilers which have been in constant use for more than fifty years—the cause is, that these boilers are sufficiently large to make all the steam required, without being forced; this is done with a great sacrifice of fuel: but since it became necessary to economise fuel, the boiler has been very much reduced in size and altered in form, exposing many parts to be overheated It is true, such boilers raise much more steam with the same fuel, and undoubtedly much more is saved in fuel than is lost in wear and tear of the boiler. This is noticed, to show the great advantage of so constructing the boiler that the heat will always be kept down.

From the London Mechanics' Magazine.

ENGLISH AND AMERICAN STEAMERS—AVERY'S ROTARY ENGINE.

Sir,—I should feel obliged for further information, through the medium of your Magazine, from some of your many American readers, relative to Avery's recoil engine, and also a New-York steamer, mentioned in the *Encyclopœdia Metropolitana*, the De Witt Clinton.

The cylinder of the De Witt Clinton is 63 inches diameter; 10 feet double strokes; revolutions 26 per minute; effective pressure, 12 lbs. per square inch on the piston —323 real H. P. Is it not a mistake to call it 646 H. P., as nothing is said of two engines, and one is more powerful than any at work in England *at present*. The Radamanthus is 220 nominal H. P.; has two engines; 55 inch cylinders; 10 feet double stroke, 20 per minute going together with low steam; say effective pressure 10 lbs. per square inch on piston—about 290 real H. P. The De Witt Clinton draws only 4 feet 6 inches water, and ought to be impelled by one such engine faster than any sea-going boat in Europe, at least before the wind. Four valves are mentioned 17½ inches in diameter; the number required for a double-acting engine. How are these managed with 20 lbs. steam per square inch on the safety valve? That the thing is well managed in America I doubt not; the load must be near three tons on each of the steam valves, unless they are balanced as in Watt's plan, or made like Hornblower's double-seated valves, such as are used in Cornwall; or Tredgold's packed cylinder modification; or according to some other similar plan. The expression, "steam 20 lbs. per square inch on the safety valve, *expanded inch cylinder*, 10 *lbs. average*," I presume means steam 20 lbs. per square inch on the safety valve expanded in the cylinder to 10 lbs. average. The engine apparently works expansive—how much is the question? Do the Americans usually follow their Consul's example, as given in the *Edinburgh Review*, and divide the lbs. per square inch on the safety valve for expansion? In this case, I shall assume 30 lbs. pressure on the piston per square inch; expanded, perhaps, to 22 lbs.; rather high for condensing. Or, is the steam cut off at one third? If so, this would give 10 lbs. per square inch pressure, or 4 lbs. below atmosphere, at the end of the stroke, or an expansion of three times, and an efficiency of gross power of about 18¾ lbs. per square inch on the piston. But this would scarcely produce 12 lbs. ditto effective pressure; while the first plan gives rather too much. A corrected statement would oblige, and is requested.

The following estimate was made on the first appearance of the account of Avery's engine, for a gentleman who had some idea of erecting one to work a small circular saw, to cross cut borrel-staves, &c. All

the difficulties of the quantity of fluids issuing from a given aperture, at a given pressure, are avoided; as the estimate is founded on the possible effective power which can be produced by the fuel used. Both the weight of the fuel, one half of wood, and the time of consumption, must be assumed in consequence of the defective account. In mining engines, 24 hours is a day; in manufactories, sometimes only 12 hours, which I assume; and, taking half a load as half a ton is 1,120 lbs., and *oak* to coal being (see Engineers' Pocket-Book) as 1,089 lbs., to 1,120 lbs., the fuel is equal to 618 lbs. of coal, and 7 lbs. of water evaporated per lb. $=$ 4,326 lbs.; say 70 cubic feet of water. The steam in lbs. per square inch, on safety valves, is 80 lbs. atmosphere $94\frac{3}{4}$ lbs. pressure; $=$ to 23,500 lbs. do, on the square foot, $+$ 310, about the volume of steam due to one of water (see Tredgold) at $6\frac{1}{3}$ atmosphere, then we have 4,185,000 lbs. $+$ 70 $=$ 282,950,000 lbs., one foot high efficiency for 12 hours $=$ 39,300 —, 1 atmosphere wasted $=$ 32,750 lbs. 1 foot high per minute. Taking however two fifths of this for effective power for 12 hours, for half a load of oak wood. It appears from Dr. Davies Gilbert's investigation, that the effective power can, in no case exceed half the efficiency; and that, for this, the velocity of the motion of the aperture, at the end of the arm, must be three fourths of that due to the steam pressure, or a velocity about equal to a common shot. The velocity of 37,660 feet per minute is not half that which is most effective; though it must be admitted that four hundred and twenty miles per heur is *considerably fast*. The American engine seems just within the limits of possibility, since the power is five times that assumed by Mr. D. Gilbert, and the velocity so much less, that iron arms may be just enabled to withstand the centrifugal force. More facts of work performed are requested. The principle of recoil is the first known application of steam power, though for useless purposes; but the execution of *duty* will reflect credit on American ingenuity; the more so from the well-known and frequent failure of similar attempts in Europe. The advantages of expansion, however, must be abandoned, even if Avery's engine should chance to rival the *common* high pressure engine, not worked expansively.

How to observe requires an observation, and deserves more. The distinction between steam pressure and steam in lbs. per square inch, on the safety valve, should be attended to (the gross pressure in the cylinder, as well as the effective ascertained is known). This is equally required for high pressure engines, since the wasted atmosphere is one-third of the efficiency or gross power of steam of 30 lbs. per square inch on the safety valve, and one fifth of steam of 60 lbs. ditto; and, in all cases, if worked expansively, it should be stated at what part of the stroke the steam valve is closed. Believing that many American steamboat engines, (from various hints, however, rather than statements) are worked expansively, I am desirous of information as to what extent expansion is there in practice carried, when acting against an uniform resistance.

Yours, &c.,

E.

—— Mines, Cornwall, Feb. 16, 1836.

VISIT TO THE QUICKSILVER MINES OF IDRIA; IN A LETTER FROM AN OFFICER IN THE AMERICAN NAVY.

You know I travelled through Germany as a pedestrian—a mode of travelling which I would recommend to others through that interesting country.* You must imagine me then on the second day of my journey, from Trieste to Vienna, in a region thickly settled and well cultivated, and with a mixture of hill and dale sufficient to make it highly picturesque. An old countryman with whom I stopped to converse about noon, informed me that by taking a cross-cut over the country, I should make my road to Idria much shorter than by following the highway, and as I am fond of by-ways I received his information with pleasure, and soon after struck into a wagon track, to point out which to me, he kindly left his work. The wagon track, after leading me through some retired villages, dwindled into a foot-path, and even this soon after disappeared and left me alone among the hills: but a lover of nature is never solitary, and particularly with such varied and beautiful scenery as almost every step opened to view. I am strongly tempted to describe some parts of it, and also the simple and hospitable manners of the people—but this would not be exactly suited to a Journal of Science. The country towards evening, became a constant succession of steep rounded eminences, generally of considerable height, and just before sunset, reaching the summit of one of highest, I had just under my feet the pretty little town of Idria. It is situated at the bottom of a deep valley or green, the houses were white, and as the streets have to follow the windings of the green ravines, it has a simple and very pleasing appearance. Near the center, is a conical hill with a church on its summit from which a line of a dozen little chapels, along the side of the eminence, showed the course of the Via dolorosa—sometimes an appendage to papal churches. A stream of water about forty yards in width, dashing along the bottom of the valley, and several of the excellent German roads, running zig-zag up the steep ascents completed the view. At the entrance of the village my passports were examined, and the officer having ascertained that I wished to examine the mines said he would send a person to accompany me. Accordingly, a sergeant soon after called at the public house where I lodged, to say that the mining operations were carried on day and night, and that I could enter at any time: I had noticed from the hills a dark crowd of men in front of a large building, and those he told me, were the evening gang about commencing the descent. I appointed 6 o'clock in the morning, and on waking, found him waiting for me. At the building alluded to, which is on one side of the village, and covers the entrance to the mines, we changed our dresses, ane the keeper unlocking an iron gate, we found ourselves in a horizontal gallery three or four hundred yards in length, running directly into the hill, at the foot of which the edifice is created. Here we came to a small chapel with a light burning before the picture of the virgin, and turning short to the left commenced the descent. It has nothing difficult, being effected the whole way by means of stairs in pretty good order: indeed, the mines have nothing corresponding to the ideas of terror which we are apt to connect with such places, except the atmosphere, which throughout the mine, must be strongly impregnated with mercurial vapor, and is constantly producing salivation among the workmen. Having descended by seven hundred and twenty-seven steps, reaching to a depth of one hundred and twenty-five fathoms, we arrived at the region where chiefly the cinnabar is procured. The mining operations are carried on principally in galleries, the friable nature of the ground or rock seldom admitting of larger chambers. The cinnabar is in strata of from two to six inches in thickness, and of a variety of colors from dark to light red, the quicksilver sometimes being mixed with it, sometimes occurring in the intervening strata of earth or stone. Sometimes the cinnabar is of a brilliant red, and once I found it in small crystals, but such specimens are rare: generally it is of a dull red color, and the stone is so brittle that nothing more than a pick-axe is required. The strata affording the quicksilver appeared to have no particular direction, and occupy about one third or one half of the entire mass of rock. Proceeding a short distance, however, we came to galleries where the cinnabar is less common and the quicksilver is the chief object of search. It occurs here sometimes imbedded in a friable rock, sometimes in a kind of earth, in appearance and hardness resembling talcose slate, but principally in the former. Generally, it is in particles too minute for the naked eye, but often when the rock is broken, small globules present themselves, varying from a size just large enough to be seen, up to that of a common pin's head. These globules are not distributed at random through the mass, but the substance in which they occur forms strata usually about one inch or two in thickness.

Descending still lower, we soon came to the richest part of the mine. Here the *gangue* consits almost entirely of the talcose earth mentioned above, and the globules are so large that when it is broken, they fall out and roll to the bottom of the gallery. The laborers here are relieved every four hours, being unable, from the state of the atmosphere, to work longer than this at one time. In the other parts of the mine they work eight hours. There are three hundred and sixty altogether employed in the mines, divided into three companies, and working, each, eight hours out of the twenty four; their pay is only from 15 to 16 kreutzers (12 to $13\frac{1}{2}$ cents) per day, the usual pay of

* We most heartily second the writer's recommendation. For health and information no mode of travelling is equal to it, and what is of more importance to some, it is fashionable in Europe just now.

day-laborers throughout Germany. I found several of them suffering from the effects of the mercury.

Having loaded myself and the guide with specimens, I returned by the same way to the upper mine and proceeded next to examine the washing rooms, which are situated a few hundred yards from the mines. The *gangue* containing the metal is carried to this house, and if it is of the earthy kind, it is broken up and thrown upon large seives, by means of which the loose or native quicksilver (called here yung frau or virgin quicksilver) is separated from the earth: the latter is then cast into shallow boxes open at the ends and a little inclined, and a gentle stream of water being made to pass over it, a rake is used, and the earthy matter is carried off. There are seven of these boxes in succession, and by the time the residuum reaches the last of them, it resembles a heavy gray powder, and is sufficiently pure to be carried to the vapor furnace. The stony fragments require only a slight washing to cleanse them from the outward earthy impurities.

The furnace is half a mile lower down the valley and at the extreme end of the village. It consists of a circular walled building about forty feet diameter by sixty in height, on each side of which is a continuous range of chambers ten or twelve feet square, and nearly as many in height: by means of small square openings in the partition walls, the air is allowed to pass from the centre building to the remotest. Each has also a door communicating with the external air. These buildings are all of stone and are plastered within. The *gangue*, after being prepared in the washing house as already described, is removed to this edifice and placed in earthen pans four inches deep and fifteen in diameter, which are piled up so as to fill the centre building. The doors of the chambers are then carefully walled up; and a strong fire having been lighted under the centre building, the quicksilver rises in the form of vapor, and passing into the small chambers, is there condensed by the cold atmosphere around them. Some of the gangue, you will observe, is brought here in the form of the native rock: I understood them to say that the expansive power of the vapor, together with the heat of the fire, was sufficient to cause the rock to disintegrate and thus allow the escape of the quicksilver. When this process is over, the door ways of the chambers are once more opened, and the quicksilver, which is found chiefly adhering in drops to the sides and ceiling, is scraped off, and running into a hollow in the floor, is taken thence to the cleaning and bottling room. It appears to act on the mortar of the chambers, for I found the latter flaky, and the crevices all filled with small globules.

The cleaning process is very simple, a piece of canvass being merely spread over a funnel, and the quicksilver being made to pass through this, comes out sufficiently pure. That intended for home consumption is then tied up in sheepskins, while that for exportation is put in iron bottles large enough to contain sixty-eight pounds. The furnace is kept in operation only during the winter months, and then the vapor which escapes from it is a serious annoyance to the town: they have a blast three times every fortnight.

The price of quicksilver at the mines is 112 florins for one hundred German pounds, or about 44 cents for an American pound. The quantity annually procured is about one hundred and sixty-four tons: formerly it was greater, and brought a better price, their market, which is chiefly in China, having been injured by competion from the quicksilver mines near Almeria, in Spain. —[Am. Journal of Science and Arts.]

From the Annals of Education.

EDITORIAL CORRESPONDENCE.

Coblentz, on the Rhine, Nov. 26, 1835.

Unexpected circumstances of a private nature, have made it my duty to visit Switzerland at a season which is not favorable, and the facilities offered by steamboats on the Rhine, led me to choose that route. But I find myself amply repaid for all the "disagreeables" by the interesting character of the scenery, compared with the monotonous, wearisome roads of France; and, above all, by the gratification of my own taste, on this classic ground of education.

In travelling through Germany, one who is interested in education meets continually with kindred spirits. In consequence of the share which the government takes in education, it is not so frequently a trade. There is less of private speculation, and the little jealousies and narrow views to which it gives rise. The wise measures of the government have also had the effect of making education a profession, both honorable and lucrative—and of inviting men of talents and eminence to devote themselves to it. As a necessary consequence, it has called up the attention of all who cultivate their minds, much more than in other countries; and you will find most men of intelligence familar with principles in daily use, which are regarded as idle theories by not a few of our teachers.

It is not less striking to a stranger, to find men of all professions who speak so decidedly as to the necessity of religious school instruction. But I must reserve this topic for a separate article, in order to do it justice—I will only remark, in passing, that they consider our practice on this subject as equally *unchristian* and *impolitic*; as preparing our way to the grave of free nations; as increasing the spirit of licentious liberty to such a point that we shall be obliged to admit, if we do not demand, a military despotism.

To one who feels that on the education of the young depends the destiny of his country, and all the objects of affection it contains; who believe that the progress and the extension of improvements in education is the only means of enlightening and civilizing and christianizing the world, it is truly cheering to find some of the most eminent and able men of church and state, devoted to the single duty of studying and examining—of making experiments and ascertaining results, in this "science of sciences"—men too, who know and feel, that such a term involves no exaggeration, and indicates no peculiar professional or personal enthusiasm. It is even gratifying to find, that such men, occupied exclusively with a subject, which has been regarded as too inconsiderable, or too uninteresting to require an *entire periodical*, and eager to communicate every information to an inquirer, are obliged to reflect, and make special arrangements, before they can devote a few hours to a stranger.

In passing through Cologne, seven years since, I visited the school Inspector of that district, and found him in the midst of a mass of papers, assisted by a secretary. He received me with great kindness, and gave me such documents as would aid me in my inquiries; but as my stay was short, he could not lay aside or arrange his occupations so as to allow me much time for conversation. In my present hurried journey I was unable to call upon him.

At Neuwied,* on the Rhine—a few miles from this city—I stopped to visit a public seminary for teachers; and here I found several able men whose whole time and power were devoted to study and experiment and instruction as to the best mode of "keeping a school"—a task for which any youth of seventeen, any poor scholar of a college, any one who is unfit for any other profession, is quite competent in our country; and all this care and labor is even wanted on *elementary schools*. When will it be seen that it is a more delicate, a more difficult task to be the teacher of a school of children, than to be a professor in a university? The seminary at Neuwied, I will describe hereafter, when I have leisure to copy and complete my notes.

In Coblentz I found two school officers, who received me with great kindness, and in whom I was much interested. One was a Catholic who has given up his office, but who had just returned from a tour, in which he had assisted in organizing a Catholic seminary for teachers. I could not but wish that some of our statesmen could have seen the spirit with which a man, whom they would not hesitate to receive into their ranks—could enter upon, and speak of this humble, or, as I regard it, this *noble* employment.

The other gentlemen is a Protestant, the inspector of this district. I found him also in the midst of his business—and it was not till he had examined his papers and memorandums, that he could venture to promise that he would see me on that day. He invited me to the evening meal of his family. The opportunity was, however, so precious, that I could scarcely give up any of its moments to that free, social intercourse, which is so characteristic of a German family; and I found so much patience and indulgence with my inquiries, that I was tempted, I fear, almost, to exhaust it. This gentlemen was kind enough to give me, in parting, several interesting pamphlets, and also a copy of some of his obsevations in MS. during his tour of inspection. He has since been so attentive as to send

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*This place will be remembered by some, as the residence of Maximilian Prince of Neuwied, who published his travels on the Rhine. He has a fine collection here of American animals.

me an elementary work on music, published for the use of Prussian teachers, which I hope will furnish some assistance to those who are laboring on this subject, in our own country.

On the way hither, I met with a very interesting man who has no official connection with education, but who gave evidence of reflection and of interest in the subject which is rare with us, and which was least to be expected in a veteran officer of the Prussian army. In his general views he fully sympathised with others I have mentioned, but on one topic, I found his opinions unexpectedly and fully coincident with my own.

He observed that the Universities were becoming more and more sources of disorder and of "*demagogy*," if I may use the expressive German word. For the first it will be sufficient to say, that a private Musical Society in Heidelberg, was recently assaulted by a band of students, who were determined to enjoy its pleasures uninvited, and that on their being repulsed, they resorted to the war-cry of the University, ("*Bruschen heraus*." Out students!) rallied the whole body to revenge the pretended injury, and produced a mob which resulted in some serious, if not fatal wounds. For the last, it is only necessary to allude to the fanatic assassin, Sand.

"And how," replied I, "can you expect it to be otherwise on the present plan? You keep your sons under the paternal roof, in the midst of all the restraints of social life, and family endearments, until the age when the passions just begin to assume their *greatest strength*, and reason is too immature to govern them; and then send them forth *unattended*, *unrestrain d*, and in their private life almost unobserved, in the midst of others as immature, and as ardent as themselves! How can any man who knows human nature expect any other result, than that the young seaman who is launched for the first time on a stormy ocean, and without a pilot, should lose the command of his helm? Happy if he escapes shipwreck! For myself, continued I, I regard this very course as a source of ruin to a large number of our young men." "You are right," was his reply; and he went on to express his own views with great force and clearness. I have not time to give you the details. He added, that for this very reason he had not suffered his own sons to leave their home until they were twenty-two years of age. Would that some of our American parents would adopt this course, even partially. It would save many a melancholy shipwreck of character and hope—it would save many a parent's heart from "*the anguish of death.*" Sad error, to plunge a youth into temptation before he has learned to resist it,—to hurry him into the duties of life before he is competent to perform them!

Hofwyl, Dec. 19, 1835.

In conversing with gentlemen interested in education in Germany and Switzerland, I have uniformly found the most painful surprise, that a nation so enlightened, and generally considered so free from the corruptions of the old world, as the United States of America, should have any doubts on the great question, whether it is a duty of the State to see that *every child actually receives instruction*, and is thus made capable of knowing, and of doing his duty as a citizen; and whether religious instruction ought to form a part of the course of every elementary school.

The uniform remark is, that it is impossible our institutions can be permanent—nay that they can long exist, unless they are sustained by intelligence and virtue in the people, a principle which was long since announced by the "Father of our Country"—and this, without universal instruction,—without thorough—early religious instruction, they believe it is idle to expect. They say that our very prosperity increases our danger—that all this material and pecuniary power, if it be not directed by a higher degree of cultivation, extended to all the people; if above all, it be not guided and restrained by moral principle, deeply fixed, and firmly based on religious truth—will only produce among us, in another form, that absorption in material things, that sensuality which destroyed every vestige of liberty and greatness in the Mistress of the world. They see in this neglect, the sources of those disorders which now render us the objects of pity, even to the subjects of despots in Europe, and as friends of mankind, and, many of them free governments, they tremble at these bodings of moral ruin, where they imagined an asylum of liberty and virtue.

They hear with surprise that the jealousy of those sects, which differ only in a few points which they generally admit are not essential, should he suffered to prevent religious instruction. They ask how it is, that with so much light, and so much of the spirit of religion as we possess, such narrow feelings can be allowed to interfere with so important an object. They are still more astonished to learn, that this jealousy frequently forbids even instruction in the history of the bible. But they ask—"Will not your pastors, then, supply this defect by regular lessons, as is done where our villages are divided in religious opinion?" and their astonishment, is, if possible, increased, to hear that *Christian parents*, and *Christian pastors*, who think it desirable that their children should spend six hours daily—the *best*, if not the whole time which they are capable of spending in intellectual effort in acquiring knowledge which is bounded by this life and its material objects,—and this for six days in the week—should consider it sufficient to devote one day only to those subjects which are equally necessary to their character and happiness here, and to that eternal life which is to come.

We need not say that we can offer no adequate apology for this inconsistency with other principles and professions; that we can give no reason but those of habit, and prejudice, on which the abuses of the old world are founded, and which we treat with so much contempt, when they are referred to, in justifying or excusing institutions and measures which are unlike our own.

SUGGESTION IN CIVIL AND MILITARY SURVEYING.—NEW INSTRUMENT FOR MEASURING DISTANCES, ETC.

The following article from the United Service Journal, is well worth attention. The instrument there proposed, would not only be found useful in determining distances for the details of the topography of the surrounding ground—but we are convinced, that properly constructed, it can be applied to the nice measurement of all distances—as the instrument contains within itself a constant base line.

We have seen much of surveying instruments of every description, and have paid some attention to the comparative accuracy of different forms—and we do think that an instrument on this plan containing the means of *perfect* adjustment, (two or at most four adjustments would be required,) would measure distances from one to two thousand feet far more accurately than tapes, chains, or any of the usual instruments for lineal measurement.

Instead of a single straight edge, we would suggest a pair of them, forming a groove in which the support to the mirror should slide, and by making this support of considerable length we obtain a more accurate instrument, as the inclination of the moveable mirror would be less liable to variation.

The mirror might be moved by means of a long micrometer screw, and from this the reaching of the smaller posts might be made, instead of from a vermier, or even with it to operate as a check.

To fit such an instrument upon a tripod—to add the necessary apparatus for levelling, &c., would require but little ingenuity.

We intend having such an instrument made, and testing it rigorously—we shall then be enabled to speak from our own experience in the matter.

It is evident to every one that the distance of objects perfectly inaccessible may be obtained at one observation and reaching, it being only necessary to select a well defined line or object, as the branch of a tree or point of a rock.

The latter part of this article we have inserted with the view of showing that the measurement of distances by means of two wires in a telescope, &c., *is* (as we have always maintained) *no new discovery*, though we have seen an instrument on this principle, for which a patent was obtained, commendations given, praising in particular the novelty of the method, &c., and above all for which an exorbitant price was demanded.

We think any man can put two horizontal wires in his telescope, and use them as

is detailed below, without fear of any one's patent right.

Several useful hints as to keeping record of levels, will be found at the end of the article. G. C. S.

"As the district occupied by the army of an enemy cannot be surveyed in the usual manner, excepting at imminent hazard to the officers engaged in the operation, the mode of doing so must be such as is employed for ascertaining inaccessible distances. Some of the most prominent objects of the country might very properly be laid down on the plan by triangles having large base lines; but it would be almost impossible to ascertain the position of objects of secondary consequence, not to speak of details, in this manner, as the angles would be so multitudinous and confusing, as to defeat the end that was intended. To supply a remedy for this defect, many scientific persons have proposed to measure the distances of these minor objects from a minute base. All the plans, however, that have as yet been proposed are attended with great difficulty and trouble to the surveyor, as the base being invariable in its length, the instruments are required to be very delicate in their construction, so as to be able to measure very small differences in the angles of the triangles, and even after all the result obtained cannot be depended upon as to correctness. Sir David Brewster's telescope with the divided object glass is certainly less objectionable than most methods; but still the measurement of the base, together with the two adjustments of his instrument at every series of operations for ascertaining a distance, must be the means of wasting a deal of time, which is so precious to the surveyor in the field. If, however, the angles adjacent to the base were made *immutable*, and the base itself were lengthened or shortened, according to the distance of the object to be measured, the operation would then become much more expeditious, and it would be as easy to compute two or three miles as so many hundred yards.

The simplest method for carrying this principle into effect, is to fix securely (see figure in next page) on a straight edge, *a c*, a mirror, *a*, the face of which describes an angle of 45° with *a c*, and through the centre of which a part is left transparent, resembling one of the glasses of a quadrant or sextant, so as to allow the object *c* to be seen by the observer, whose eye is supposed to be at *d*; *c* is another mirror, the face of which describes with the base *a c*, an angle less than 135°, which is secured upon a square sliding along the edge of *a c*, which of course must be made as straight as possible. The square *c* may be moved along the straight edge *a c* either by a rack and pinion or by a shifting screw; *d* is a telescope simliar to that of a sextant, only larger, so as to make the object *b* more distinct; *a c* is graduated as before stated, and a nonius scale is fixed upon the sliding square *c*. After having directed the telescope upon the objecbt *b*, the square *c* is slid along *a c*, till *b* is reflected from the mirror *c* on that of *a*, and thence to the eye at *d*, causing the reflected object to coincide with the same as seen by the eye through the transparent part of the mirror *a*. The distance *a b* as indicated on *a c* is then read off, and either noted down in a field-book or pricked off immediately upon the plane table. If 1 foot along *a c* be made to represent 2000 feet along *a b*, then 1 foot of *a b* will be indicated by nearly the $\frac{1}{166}$ part of an inch, which is very easily read off with the assistance of a nonius, much more so than the minutes of a degree on a common theodolite, where it is usual to measure with the nonius the $\frac{1}{1300}$ part of an inch An error, therefore, cannot easily be created in this operation; but a mistake is more likely to occur in an imperfect coincidence of the object with its image; the probability of which, however, would be greatly lessened through care and a little practice on the part of the observer. Some persons, however, may object to this instrument, on account of the great difficulty in constructing a perfect straight edge; but I have seen two made by Mr. Adie of Edinburgh, out of a common pit-saw, whicb, could not in any part have deviated the $\frac{1}{4000}$ part of an inch from a right line, as when they were applied to one another, the light was completely intercepted by them. What has therefore been accomplished in one instance may be expected in another. Where, therefore, good workmanship has been displayed in an instrument, an *accurate observer* need not expect an error of more than about a foot in a mile, by my method of measuring inaccessible distances. Should a surveyor wish to take in a circuit of more than a mile in radius from one station, instead of having a large base, he would probably find it more convenient to have several supernumerary slides in the case of his instrument, each of which might have their mirrors so adjusted, as by their means to be able to measure 2000, 4000, and 8000 feet or yards of distance in 1 foot of the base *a c*. In this manner the length of the instrument need not exceed much more than two feet and a half, and would therefore be of a size far from bulky or unmanageable.

An observation likewise might be taken by it quite as expeditiously as with a theodolite or sextant, so that far from its becoming an annoyance to a surveyor, in cases where very great accuracy in the plan of a country is not requisite, it might supersede the use of not only the theodolite, but the chain likewise.

To exemplify the truth of this, let *a* be the station where a surveyor has fixed his instrument, the support of which may be a plane-table; *b* is the object whose distance from *a* the observer wishes to ascertain. Let *b a c* be a right-angled triangle, of which the angles *b a c* (a right angle) and *b c a* are constant and invariable, whatever may be the distance of *a b*, *a b'*, *a b''*, &c. As the sides of similar triangles are proportional, *a c'* will be to *a b'* or *a c''* to *a b''*, &c., as *a c* is to *a b*. The obsever has, therefore, merely to measure the base *a c* which may be graduated in the same manner as a plane scale, so as to give the exact length of *a b* in miles, yards, feet, or any other measure the surveyor may prefer. If therefore *a c* be 1 foot in length, and the angle *b c a* be previously so arranged by the mathematical instrument-maker, as to make the distance *a b* = 1 mile in length, 2 feet or twice *a c* will show that the distance *a b'* is exactly two miles, or if *a c''* were six inches in length, the quantity *a b''* would then be half a mile.

The celebrated James Watt proposed to measure distances, by means of a telescope fitted up with wires, as in the adjacent figure. An assistant was to convey to any station, the principal desired, a staff graduated from a foot or so from the end resting on the ground, upwards into, say feet, tenths, &c. A vane with a horizontal line drawn upon it, which could be seen at a considerable distance through the telescope, was to be secured at zero on the staff, whilst another and a similar vane was required to slide along the staff at pleasure. The surveyor was to fix the nether wire *b* of his telescope upon the lower vane, whilst he directed the assistant by signals to raise or depress the moveable one, till it coincided with the upper wire *a*. The staff was then to be taken to him by his assistant, and the distance, as shown by the upper vane from the lower one, was to be noted down in the field-book as that between the two stations. The Edinburgh Philosophical Journal states that by this method Mr. Watt surveyed part of the line of the Caledonian canal previously to its formation. Much time would be saved by dispensing with the vanes, and having the graduation on the staff made sufficiently distinct, as to be legible through the telescope at a considerable distance, say 2000 feet. I have actually measured distances in this manner, which were wonderfully correct. But the great objection to Mr. Watt's methed is the loss of time which occurs in waiting till the assistant has removed the staff from one station to another, as well as the great liability the surveyor undergoes of having his directions misunderstood. This principle, however, might very safely be employed, in measuring the distances between one station and another, in the operation of levelling, so as

to act as a check on the person who has the management of the chain, particularly when crossing a ravine, where the assistant is apt to become negligent in his measurements. The telescope of the level might be fitted up with additional hairs, so as to subtend, *if possible*, 2 feet of the staff in 100 feet of the distance. In that case, however, the surveyor would be under the obligation of fixing his instrument in the line of the levels, which would not otherwise be necessary.

As I have adverted to the subject of levelling, it may be as well to state, that I have found it very convenient to have one side of the staff graduated black on a white ground, and marked 1, 2, 3, &c., feet and tenths from the bottom; whilst on the reverse side the graduation is made with *red* paint on a white ground, but numbered 3, 4, 5, &c., beginning from a distance of *seven and a half tenths* of a foot from the end which rests on the ground. By the two sides of the staff, a very different number representing the height of the ground is obtained, that from the latter side being constantly 225 feet higher than what the other indicates. An error in the levels can thus by a single glance be detected, as the quantities read off being so wide of each other, the memory no longer acts disadvantageously in a repetition of the observation. Instead, therefore, of being obliged to recommence the levels from the outset, when a surveyor suspects an error to have taken place, he would merely proceed to that part where his observations did not correspond, and not only time would be saved by his adopting these checks to his work, but he would acquire such a confidence in it that nothing could destroy.

HENRY E. SCOTT.

From the London Repertory of Patent Inventions.

OBSERVATIONS ON INSECTS PRODUCING SILK, AND ON THE POSSIBILITY OF REARING SILK CROPS IN ENGLAND. BY THE REV. F. W. HOPE, F. R. S., ETC.

Previously to entering on the subject of this paper, I will offer some statistical *details*, illustrative of the vast importance to the commercial prosperity of this great country, of the few insects producing silk. These details may stimulate the entomologist to pursue particular lines of inquiry; and may we not hope that the result of such researches will be the addition to our productive sources of various new species of these little laborers, to whom man owes so much?—species which might be available at our own doors, by the capacity of enduring our climate, and thriving on its vegetable productions, and in case it were necessary, by having recourse to artificial means for their culture? May we not suppose the manufacturer would find his hot-houses for silkworms as profitable a speculation, with extended demand, as the fruiterer does his hot-house for the supply of the comparatively limited demand for the luxurious desserts of the rich?

In the years 1832–3, respectively, the quantity of silk imported for home consumption was 4,392,073 lbs. and 4,758,453 lbs., being an increase of 3¼ per cent. in the latter year. The value of the exports for those years was 529,990*l*., and 740,294*l*., being an increase of 40 per cent. in one year. The average for ten years, from 1814 to 1823, and the succeeding ten years, exhibits a more striking and gratifying difference; the first period giving for annual home consumption 1,580,616 lbs., and the last ten years, 3,651,810 lbs., being an increase of 131 per cent.

On the authority of Mr. Winkworth, I state the number of persons employed in England in the silk trade in 1823 at 500,000; and at the present moment there are probably 700,000 engaged in it. Leaving these details for the present, let us now proceed to the examination of insects producing silk.

The chief insects which produce silk are ichneumons, spiders, and moths. My friend, Mr. Stephens, will this evening exhibit to your notice a specimen of ichneumon-silk; and as it is more likely to prove an object of curiosity than utility, I pass on to spider-silks.

Several genera of spiders produce silk of various strength and qualities, such as the gossamers, and our domestic species, to well as many others. In France, Monsieur Bon had gloves and stockings manufactured of it: sufficient experiments, however, have not yet been made as ascertain the quantity and quality of spider-silk.

If in Rome the whimsically extravagant emperor, Heliogabalus, collected 10,000 lbs. weight of spiders, as a vain display of power, surely in this metropolis we might collect a sufficient quantity of cobweb to perfect any experiments on a silk likely to be as strong as that obtained from *Bombyx Mori*, and probably less impervious to wet; a silk, however, not likely ever to be much in vogue, from the natural antipathy which prevails against spiders, from the difficulty and expense in collecting the web, and the impracticability in breeding spiders in any numbers, arising from their voracious and predatory habits: but the cocoons might be gathered and unwound. Abandoning our indigenous webs, such as float over the fields, as well as those which hang in dusky wreaths in garrets and in cellars, we may naturally expect to meet with exotic and tropical species which yield silk worth attention. It is probable that the cylindrical sacks of the gigantic *Mygale* may be advantageously collected, as the cocoons equal in size large walnuts, in one nidus of which 100 young ones have been discovered: it is reported, also, that some kinds of web are so strong that birds are entangled in the meshes, and that their webs oppose a certain degree of resistance even to man himself. In concluding my remarks on spider-silk, I would recommend that attention be directed to the silk obtained from *Epeira clavipes*, a spider abundant in Bermuda: fine specimens of its silken cocoon may be seen at the British Museum; and other species of the same genus also are deserving of attention.

MOTH SILK.

The principal moths producing silk belong to the genera *Clisiocampa Bombyx*, and *Tinea*. The *Bombyx Mori* (the proper type of the genus) yields it in great abundance: This species has become naturalized in the fairest portions of the globe.

As it appears from the statistical details, that silk is so intimately connected with our commercial and manufacturing interest, it is evidently worth while, for the prosperity of those interests, to recommend its increased cultivation; and really, if ever there was a period when its cultivation could be carried on with increased success, it is the present moment. Look at our Indian possessions in the full enjoyment of peace: the English, ruling these extensive territories, might induce the natives to grow (if I may use the term) any quantity of silk, sufficient to glut all the markets of Europe. In these regions there are generally eight successive silk crops; some authorities assert even more. Extending, moreover, our views to China, as the trade with that country is now thrown open to British capital, enterprise and industry, we may naturally expect that a stimulus may be applied there to its increased production. Abandoning, for the present, however, foreign produce, it remains to state the possibility of growing silk in England, and this part of my subject requires a thorough investigation. Prussia, Bavaria, and even Northern Russia, whose climates are not superior to our own, grow annually large quantities of silk; and why does not England do the same? the answer is, the price of labor is here too high; secondly, the experiments tried have already failed. Notwithstanding these assertions, I think that it is possible to grow silk in England, and grow it even with success and profit. To meet these objections, I would suggest, first, that we ought to breed silkworms in hothouses throughout the year; and, secondly, that the Pavonia Moths of Europe and other countries, as well as the Atlas Moths of Asia, should be reared in like manner. It has already been remarked, that several crops are obtained in the East within the year; and why may we not also expect in England several, by means of breeding the worms in hothouses? In India, the longest period for a generation of silk-worms appears to be forty days: even allowing fifty days in England for a generation, we may then expect seven crops of silk. If we only obtain four, that is double the number produced in Italy, where they annually rear but two. I need now scarcely add that four crops will no doubt repay the speculator for rearing silk. To reduce, however, his expenditure as much as possible, I would recommend him to feed the silkworms with lettuce instead of mulberry leaves; first, as there is less expense in the cultivation; secondly, as the lettuce can be grown cheaply in cucumber frames during the winter months; and, lastly, as the quality of silk does not depend so much on the *quality* of the *leaf*

as it does on the *degree* of temperature in which the worm is reared, I would strenuously recommend the lettuce. Should the food of the mulberry tree, however, be preferred to the lettuce, we can still adopt the discovery of Ludovico Bellarde, of Turin. His plan consisted in giving the worms the pulverized leaves of the mulberry trees slightly moistened with water: the leaves were gathered in the previous summer, dried in the sun, reduced to powder, and then stowed away in jars for the winter food, or till the tree was in full foliage. Repeated experiments made by Bellarde prove that the worm preferred this kind of food to any other, as they devour it with the greatest avidity. To reduce still further the expenditure, old men, women, and children, might be employed in feeding the worms, as is the case at present in India: indeed, might not the poor in the workhouses be rendered available, thus affording them amusement and profit?

With regard to rearing other silk-moths, I am well convinced that the *Pavonia minor* might be propagated to any extent in this country, as the larva are general feeders, probably the Laquey Moths might also be reared with success; the larger *Pavoniæ* of Europe and other countries, should also be tried. But a great object would be to import the eggs and breed the Atlas Moths in England, which have already yielded a fine silk, well worthy the attention of the manufacturer of Great Britain.

As there is not time at present to enter into the merits of the Tasseb, Arrindi, Bugby and Kilisurra silkworms of India, I merely mention the chief writers on this subject, viz. the celebrated James Anderson, Dr. Roxburgh, General Hardwicke, and Colonel Sykes; the two last, I am happy to say, are members of this Society, and I am sure will most willingly give all assistance in their power towards the attainment of so desirable an object as that of rearing silk in this country.*

In concluding these remarks, I would suggest the formation of a committee to investigate all that relates to silk. Let the silk manufacturer learn that the committee is disposed to give him all the assistance in its power, that it is equally desirous of his advice and observation; let the mechanic learn that we need his practical aid, on which he alone can give us useful assistance. A report, emanating from this Society, embodying in it the opinions of the manufacturer and entomologist, would do some good. If the object of producing silk in England fail altogether, we shall still have the merit of meaning well; should it succeed, however, thousands of our poorer countrymen will find employment and reap the benefit. —[Transactions of the Entomological Society of London, vol. i.]

* Should the first attempts fail, eventually there is every reason to believe that success must follow perseverance, as it has already done in other countries. Till that wished for period arrives, I would earneastly recommend not only the increased cultivation of silk in India, but in all our colonies, most particularly in New-Holland. At the Cape of Good Hope, at the Mauritius, at Malta, at the barren rocks of St. Helena, the silkworm has been introduced with partial success; and from those countries may we not in future calculate on some increasing produce?

CURIOUS DISCOVERY.—NOTICE OF A NEW MODE OF PRESERVING ANIMAL BODIES.—COMMUNICATED AT THE EDITOR'S REQUEST, BY MR. HENRY N. DAY.

The following account of an interesting discovery, recently made in Italy, is taken from a pamphlet published in Florence, during the last summer.

The author of the discovery, Sig. Girolamo Segato, is already favorably known to the scientific world, as the author and engraver of improved maps of Africa and Morocco. Ardent in the pursuit of science, he traversed the deserts of Northern Africa, and by his researches, corrected and considerably advanced the knowledge of those regions. It was while travelling in these parts, that he received the first hint of this great discovery. In the path of one of those interesting phenomena of the African deserts—a vortex of sand—which his curiosity prompted him to trace, he, one day, discovered a carbonized substance, that upon closer investigation proved to have been originally animal matter, and to have been carbonized by the scorching heat of the sand. He afterwards discovered an entire human carcass, partly black, partly of a sooty hue, about a third less than the ordinary size of man, and all perfectly carbonized. It occurred to him that this accidental process of nature might be imitated by art, to the perfect preservation of animal substances. To discover *how*, occupied now his whole attention. At the end of some months, devoted to this pursuit, the happy thought flashed upon his mind, which was to lead him to the discovery of the desired secret. Compelled to return to Italy, by a dangerous malady brought on by nearly a week's exposure to an unwholesome atmosphere, in a pyramid of Abu-Sir, which he had entered for the purpose of extending his scientific researches, he was obliged to intermit for a time his favorite pursuit; but after regaining his health, he again gave himself to it with renewed ardor; and after a short time succeeded, to the highest degree of his most sanguine expectations.

The following are some of the results obtained by the discovery.

Entire animal bodies yield as readily to the process, as small portions. They become hard, taking a consistency entirely stony. The skin, muscles, nerves, veins, blood, &c., all undergo this wonderful change; and to effect this, it is not necessary to remove any part of the viscera. The color, forms and general characters of the parts remain the same. Offensive substances lose their smell. Putrefaction is checked at once. What is most wonderful of all is, that if the process be carried only to a given degree, the joints remain perfectly flexible. Skeletons even remain united by their own natural ligaments, which become solid, although they retain their pliancy. Moisture and insects never injure them. Their volume diminishes a little; the weight remains almost the same. Hair continues firm in its place, and retains its natural appearance. Birds and fishes lose neither their feathers, membranes, scales, nor colors. The insect preserves its minutest appendage. The eyes in most animals, sparkle as in life, and from their want of motion alone would you suppose vitality extinct.

The following are some of the objects, that have been subjected to the petrifying process, and are now exhibited in the studio of Sig. Segato. One of the first of his experiments, was performed upon a Canary bird, (Fringilla Canaria, Lin.) It is still preserved unaltered, although it is now ten years since the experiment was performed; and it has been submitted to the action of water and of insects. A parrot (Psittacus aestivus, Lin.) retains its original brilliancy of plumage, unimpaired. Eggs of the land turtle, turtles, various tarantulae, a water snake, a toad, various kinds of fish, snails and insects, are in a perfect state of preservation. To these, are added various parts of the human body. A hand of a lady, who died of consumption, preserves the emaciation of the disease and of death. Another of a man is flexible in the different phalangic articulations, and yet unalterable; a foot with the nails prefectly fast, a collection of all the intestines of a child, in their natural colors and forms, with the fecal matters unremoved; the liver of a man who died from intemperance, dark and lustrous like ebony; an entire human brain with its convolutions, of extreme hardness; the skin of a woman's breast, naturally configured; a pate of a girl perfectly flexible, from which the hair hangs in curls; the head of an infant partly destroyed, and discolored by putrefaction. There is also in the cabinet of Sig. Segato, a table constructed as follows. A spheroidal surface of wood contains a parallelogram, composed of two hundred and fourteen pieces, regularly arranged. These to the eye appear like the most beautiful pietre dure that have been produced by nature. Their various colors, polish and splendor, and their surprising hardness would leave no doubt of their stony character. The sharpest file, with difficulty, makes an impression on any of them; some it does not attack at all. These pieces are all portions of the human body, hardened by this new process; as the heart, liver, pancreas, spleen, tongue, brain, arteries, &c., &c., all resembling the most highly polished precious marbles. An entire body has not yet been tried, principally on account of the limited resources of Sig. Segato, although the expense would be but about one tenth of that of embalming by the ordinary process.

Great advantages to science, especially to natural history and human anatomy, are expected to result from this discovery; and it is even confidently believed that the remains of friends, of men of science and of worth, may be preserved for ages in the exact form and appearance, in which the hand of death found them, with nothing offensive or revolting about them.

As vouchers for the accuracy of the statements contained in the pamphlet, the

certificates of many of the distinguished physicians, professors and men of science in Florence, where Sig. Segato resides, are appended. Among them, it is sufficient to mention the names of Sig. Betti, Professor of Physiology; Sig. Zannetti, Professor of Human Anatomy; and Dr. Gazzeri, Professor of Chemistry.—[Am. Jour. Science and Arts.]

From the London Repertory of Patent Inventions.

OBSERVATIONS ON THE RAVAGES OF LIMNORIA TEREBRANS, WITH SUGGESTIONS FOR A PREVENTIVE AGAINST THE SAME. BY THE REV. F. W. HOPE, F. R. S., ETC.

In laying before the Society some specimens of wood perforated by *Limnoria terebrans* (a crustaceous animal allied to the marine *Oniscidæ*, or sea wood-lice), my chief object is to elicit any observations which may tend to counteract its ravages.

A very able paper, by Dr. Coldstream, appeared in April last, in Professor Jameson's Journal, wherein its history, habits, and anatomical details are sketched with an accuracy which does honor to this useful pupil of Leach. It lives on the wood, which it perforates, and, as far as I have observed, so also does *Ligia oceanica*, and probably others of the *Oniscidæ*, marine as well as terrestrial. This fact, however, I believe, was first made known to us by Dr. Coldstream, who states that the contents of the stomach resemble comminuted wood. From finding the common wood-louse in outhouses, and *in and about* decaying timber, it appears to me not improbable that they also may partly feed on wood.

I hope I may here be allowed to express a wish that some of the members present will examine the contents of the stomach of the common wood-louse under a powerful microscope, and give us at some of our meetings the result of his investigation.

As the generic characters of *Limnoria* are well laid down, and as the animal is figured in the above quoted journal, I pass on to the objects of its attacks, and also to the remedies which have been applied to counteract its effects.

Fir, birch, and oak were nearly all attacked by it. Teakwood alone remained unperforated; probably, therefore, other *ironwoods* may be employed with like success. Among the experiments made to resist this evil, the following were the most important:

1st. Covering the piles with broad-headed nails, called scupper nails, the oxidation of which impregnating the wood yields a taste disliked by the animal. This plan, for a time, succeeds: the rapid consumption of iron, from the action of salt water, at length rusts off the broad heads, and it is necessary continually to replace them. Some have used copper sheeting with partial success; others have used common tar, with which they daub the piles before they bury them in the sea; but in a short time, from abrasion, the piles are robbed of this coating, and become perforated by the *Limnoria*.

There is an announcement in the public journals, that Mr. Stevenson has discovered a varnish capable of protecting wood from the attacks of this destructive pest. What this varnish may be, I am at a loss to conjecture; I only hope that Mr Stevenson will shortly make his discovery known, and as publicly as possible, as he may be the means of saving the wood-work of our flood gates, timber bridges, chain piers, and docks from inevitable destruction.

At the chain pier at Southend, in Essex, the piles are daubed over with gas-tar; and from inquiries made on the spot from the workmen employed, I found that there exists a general belief that where common tar fails, gas tar succeeds, the insects, as the workmen assert, not liking its taste.

Both the varnish of Mr. Stevenson and the gas-tar may succeed for a time; abrasion, however, will at length remove them: would it not, therefore, be possible, by means of perforated iron pipes running through the centre of the piles, occasionally to supply liquidated tar, and so keep up this gaseous influence? The expense of the pipes would probably be too great. It is ascertained that the *Limnoriæ* attack neither the bottoms of ships nor fresh-tarred piles newly placed in the sea, partly, perhaps, as it requires time for abrasion to take place, and partly as the effect of the tar is not neutralized by salt water. Tar appears to be an antidote: gas-tar may be more efficacious; and as the oxidation of iron is effective for a certain period, probably by uniting two or more of these, we may preserve the piles for a longer period than has hitherto been done. In the sea I would form a bed of gas-lime, next add a thick stratum of gas-tar, and then drive the piles into it, coating them well over with gas-tar before-hand; by these means some good might be effected. By nailing also to the piles portions of honeycombed wrought-iron gas pipes (which might be purchased, I imagine, for a mere trifle) the gaseous taste might be kept up. Another remedy might be tried by saturating the piles with strong solutions of corrosive sublimate: moreover, should the spirit of caoutchouc (or India-rubber) be found eventually to be disliked by the *Limnoræ*, we shall then have a cheap and easy remedy.

So long as wood is used in the bedding of our marble public works, so long the annual loss must be great. As in 5 or 6 years the wooden piles become perforated and nearly useless, might it not be possible, by means of cast-iron hollow pipes filled with cement, and coated with a varnish externally, to make them last for 20 or 30 years? As this is a mere matter of calculation as to expense, I do not wish to enter upon it; any observations which may tend to keep the wood sound for a long period, is the present object of inquiry.

In concluding these observations, I have only now to add, that I think an inquiry on the subject of antidotes against the *Limnoria* is well worthy the attention of this Society: and I assure myself that the majority of its members unite with me, when I express a wish that as a body we may be equally distinguished for practical usefulness, as for entomological science. In short, if we can save the wood-work of chain-piers and docks from the destruction of the *Limnoria*, and diminish the ruinous expenditure they entail upon us, the Society will establish no small claim to the gratitude of the public.

Various suggestions were made by different members present at the reading of the preceding paper, for the institution of experiments to prevent the attacks of the *Limnoria;* and it was proposed by Mr. Yarrell (notwithstanding the statement made by Mr. Children, that insects immersed in a solution of corrosive sublimate will revive, after remaining immersed therein for at least twenty minutes), that the saturation of piles, &c., in such solution might, by the formation of a new compound formed by the action of the corrosive sublimate upon the wood, have the effect of preventing the attacks of insects, as well as the not less injurious attacks of the dry-rot and other vegetable causes of decay.—[Trans. Entomol. Society, vol. 1.] A. T.

*Phil. Trans., vol. cxiv., for 1824; [or, Phil. Mag., first series, vol. lxiv., p. 30, 233; vol. lxv., p. 203.—Edit.]

† [The negative results thus obtained by Mr. E. Davy, agree exactly with those of some trials which I have witnessed for protecting steel by this means.—E. W. B.]

Steam-Plough.—At a meeting of the Grantham Agricultural Association, Mr. Hanley stated that he had seen a steam-plough at work in Lancashire, which did its work remarkably well, and turned up an acre of wet land, at a depth of nine inches, in 1 hour and 50 minutes.—[London Mechanics' Mag.]

FROM FLORIDA there is nothing of interest by the Steamboat, although we have Charleston papers of last Saturday afternoon. Some extracts are annexed:

ST. AUGUSTINE, April 12.

From the Army.—An express arrived last night from Picolata, bringing intelligence of Gen. Eustis. He was encamped two miles west of Pilaklikaha on the 4th inst. An express from him arrived at Fort King, requesting information of Gen. Scott. Two or three Indians had been killed on their route. Their corn had become exhausted, and the guide was unacquainted with the country beyond Pilaklikaha. The army was in good health. Pilaklikaha is 75 miles south west of Volusia.

Capt. McLemore, with 75 men, and two flat boats laden with provisions, left Suwannee Old Town, west coast of Florida, April 9th, for the mouth of the Suwannee river, to proceed thence through Vacassassa Bay to the mouth of the Withlacoochee, and up that river to the battle ground, to join Gen. Scott.

[*From the St. Augustine Herald 8th inst.*]

We learn from a gentleman from the Suwannee Old Town, that it was reported in Alachua, that Major Reed, with 250 men from Tampa came upon the main body of Indians, as he supposed, on the Withlacoochee in the night, and surprised them.—He opened a sharp fire, and killed 30 of them, and wounded a great many. They fled precipitately. This report was generally credited there.

It was also reported that Col. Lindsay from Tampa Bay, had joined Gen. Scott somewhere at or near the Withlacoochee.

We learn by a letter received in this city from the St. John's, that a report prevailed at Mandarin last week, that an Indian trail of a considerable body of Indians had been recently observed, on the river opposite Picolata, supposed to be that of a party reconnoitring for the purpose of attacking any escort from Picolata of supplies for the forts in the interior.

[*From the New Orleans Advertiser, April 13.*]

TEXAS.—The gentleman from whom we have the following statement, (Capt. Horton,) and who left Goliad on the 19th ult., informs us that Colonel Fannin having taken up his line of march on that day, at the head of 306 men, was attacked by the Mexican army consisting of from 1500 to 2000, about nine miles from Goliad. Our informant commanded the advanced guard, consisting of only 25 men, which was cut off from the main army; they remained in view of the battle for about three-fourths of an hour, and in hearing of it about two hours. During the time they were in view the Mexican cavalry made two unsuccessful charges on Fannin's army: the Mexicans, he thinks, must have lost half their number in these charges.

The attack was made about 5 o'clock in the evening, and continued about two hours and a half.—He is unable to state particularly how the battle terminated; he encamped within six miles of the battle field that night and heard the firing of cannon next morning. Having remained ten days within about ninety miles of the place where the battle was fought, he was unable during the time to get any correct account of its result. Capt. H. had two skirmishes with the Mexicans, about 250 in number, the day previous to the attack on Col. Fannin. They could observe three of the Mexican horses going off unmounted. Capt. H's. force, in these skirmishes, consisted of about one to five.

He also informs us that Col. Ward was despatched on the 9th ult. with a mission, (only 99 men) about 30 miles from Goliad, to the relief of Capt. King, who had been taken prisoner by the Mexicans with 23 of his men (six being killed.) An engagement took place on the 11th. Col. W. was attacked within 23 miles of the mission by 1200 Mexicans; he retreated into the mission without the loss of a man; 62 of the Mexicans fell. He fought them from half past four P. M. till 9 of the same evening. Ward then retreated toward Copano. The latest accounts from him stated he was making his way into the settlements, between the San Antonio and Guadaloupe rivers, towards Copano. On the same night in the town of Waloope, three of our citizens were murdered by the Mexican citizens. Dr. Harrison, (son of Gen. W. H. Harrison of Ohio,) was among the number of these unfortunate victims.

MOBILE, *April* 14.—We have been favored with the perusal of a letter from Col. Samuel M. Williams, who recently left our city for Texas, which states that he had received a letter from Brazoria of the 1st April, which informed him of the retreat of Gen. Houston to the east side of the Brazos, it seems against the advice of his officers.

The Mobile Chronicle of the 16th inst. says:—On further conversation with some of the passengers by the Tensaw, we learn that the army of Gen. Houston was believed to be nearly equal in number to the Mexican force,—and was preparing for a general engagement. Reinforcements were expected, and daily arriving. 300 men under Col. Hustin, from Natchez, were on their way, and 1400 to 1500 from Kentucky and Tennessee, besides smaller parties from other places.

FIRE AT ALEXANDRIA.—On Monday night, a little after ten o'clock, a fire broke out in the second story of the large and extensive Cabinet Manufactory, at the corner of Prince and Fairfax streets, owned by Mr. James Green. The combustible nature of the materials within the building caused the fire to spread with great rapidity, and in a short time the Furniture Room and the whole of the Manufactory were enveloped in flames. The building was a large three story edifice, expressly fitted up for the business carried on in it, with a Steam Engine and new machinery. Its owner, after the misfortune of the great fire, in 1827, by which he lost all his property, had labored diligently to raise up this establishment, and, after years of labor and great expense, he at last succeeded. A night of disaster has defeated his exertions! There was not more than three thousand dollars insured on the property, and the loss sustained cannot be less than *twenty thousand dollars!*

The dwelling house and tailor's shop, owned and occupied by Mr. Robert Massey, on Prince street, next to the Manufactory, were entirely consumed; the three story brick dwelling adjoining the Manufactory, on Fairfax street, was partially consumed; and Mr. John Wood's dwelling house, and the house occupied by Mr. Z. Nicholas on Fairfax street, were much injured.

At one o'clock during the night it was feared that a considerable portion of the town would be destroyed. As many as ten or twelve houses were actually on fire at different times, and but for the vigilant watch kept, and the constant wetting of the roofs, there is no knowing what might have ensued.

The light of the burning buildings was seen in Washington, and many of the citizens of that place, with their engines, went down to the relief of their brethren in Alexandria.—[Nat. Intel.]

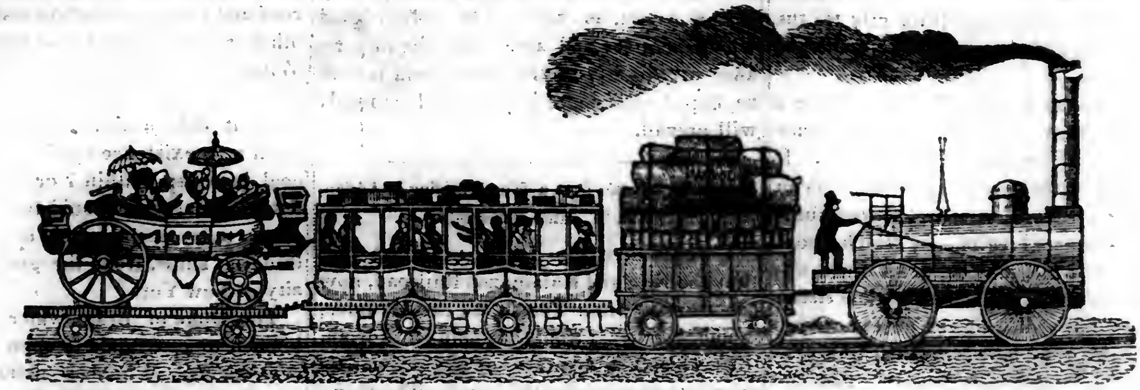
ROBBERY OF THE PEARL.—Extract from the protest of Capt. Blackmer, of brig Pearl, of Boston, made before the U. S. Consul at Villa da Praya, January 23.

"I sailed from Boston, Sept. 28, and on Oct. 27, lat 32, long 23 30, discovered a herm-brig to windward. She bore down under Spanish colors: was boarded by her first officer as supposed, who desired a few provisions; was furnished with all he required, when he returned to his vessel for the pay, but instead of coming back he hoisted in his boat, and soon after hailed in Spanish, saying if I wanted pay I must send for it, and bring a seven inch rope; informed him that we had not the article on board. He then ordered our main yard hove aback, and our boat hoisted out and sent alongside, or he would fire into us, at the same time tricing up his ports and loading his guns, accompanied with threats that he would sink me unless despatch was made. This being done, the men were ordered back for all the rigging on board; and this being fulfilled, they were ordered back again to bring all the leather, duck, canvas, chronometer, &c. and a hawser and stream anchor; and a third time demanded dry goods, the best on board, threatening to board with his crew, cut the throats of us all, take what they pleased and destroy the vessel, unless the articles specified were sent with all possible despatch.—There being no remedy for the salvation of the lives and property, goods were sent until the pirate said he was satisfied. He then gave us permission to depart, filled away himself, and fired a gun."

A list of the articles taken from the Pearl, has been received. The amount of loss in goods is estimated at between 4 and $5000. They consisted principally of American manufactured cotton goods (13 cases, 4 bales) and some foreign goods. No account is received of the description of the vessel, her force, destination, or whence she came.

At a time when the attention of the observers of nature is more than usually called to meteoric phenomena, the following account of an observation of shooting stars, made by Sir John Herschel, at the Cape of Good Hope, last November, is not without interest. It is taken from the London Atheneum of February 27th.—[Eve. Post.]

ANNUAL METEORIC PHENOMENON.—Our Transatlantic brethren have, for the last two or three years, indulged us with accounts of some most extraordinary meteoric appearances that have taken place in America about the middle of the month of November in each year, and generally on the same day. The phenomenon in question consists of a most brilliant display in the heavens of a great quantity of that class of meteors called *shooting stars*, which, during the whole of the night above alluded to, keep up a constant discharge, and illuminate the whole hemisphere. The most remarkable circumstance, however, attending this affair is, that the phenomenon always occurs on or about the same day of the month, (namely, the 14th,) and that the direction of the meteors is generally the same, which has induced many persons to imagine that it is connected with some extraneous body revolving round our globe. Mr. Baily, in the course of his correspondence with Sir John Herschel, noticed these remarkable statements, and requested Sir John to record any extraordinary appearance of this kind that might occur, during his residence at the Cape of Good Hope. The following is an extract of a letter which Mr. Bailey has just received from that distinguished philosopher:—"In all my sweeps in November I was on the look out for shooting stars, viz. on the 10th, 11th, 13th, 14th and 18th. On the 13th, and especially on the day mentioned in your letter, I told Stone (my assistant) to keep a sharp look out for them; his attention being disengaged whilst I was occupied at the telescope. He saw none. On the 14th, I still desired him to keep watch for them. The sweep commenced at 0h. sidereal time, and we went on till 4h. 8m. without his or my noticing any. At 4h. 8m. 19s. sidereal time, he called out, 'There goes the largest I ever saw.' It fell in azimuth north about half west perpendicularly. At 4h. 42m. 59s. he cried out again for another great one: this fell north, about two points east, not quite vertically, but rather inclining eastward. This was as large, he said, as Jupiter. At 4h. 46m. 39s. another great one falling east of Jupiter, and still more obliquely, elicited another call. At 4h. 53m. 59s. I absolutely started from the eye piece of the telescope, at the glare of a superb one, which fell about 20 deg. azimuth west of south, and obliquely. Stone thought that it lightened, though his back was to it, and it was hid from him by trees. It left a narrow, vivid and distinctly crooked train, which lasted 20 minutes, and admitted of being steadily contemplated. This meteor was equal to Venus, at her brightest *here*: and I ought to mention that Venus *here* casts a strong shadow, in which all the most minute parts of objects, as the leaves of trees, &c., are perfectly well distinguished, not only against the white wall of a house, but on the ground. You may be sure that I shall look out again next 13th and 14th of November, should I still be here; though I can hardly suppose the thing to be more than an accidental coincidence: however, I have seen no considerable meteor since."



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, EDITOR.] SATURDAY, APRIL 23, 1836. [VOLUME V.—No. 16.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 23, 1836.

ERRATA.—In the article on a "New Instrument for measuring distances," &c., for "reaching of the smaller parts" read "reading of the smaller parts," p. 295, line 29 from bottom; and again, for "reaching" read "reading," line 17 from bottom.

These, and several other instances, in which we have been made to utter nonsense, will be excused, when our readers are reminded that eight pages of the Journal were thrown into Pi, and all the labor expended upon them, lost.

LEAVENWORTH AND BLOOMINGTON RAILROAD.—The route of this road from Indianapolis, via. Martinsville, Bloomington, Bedford, Orleans, and Paola to Leavenworth, has been surveyed by E. N. Elliott of Indiana College.

He has found the route to be in general favorable, but advises that the charter be so amended as to leave out Bedford as a point in the line.

With one exception no grade over 50 feet per mile will be adopted. The entire route is 129,09 miles.

"The construction recommended is the flat bar with a flange on the inner edge, laid on white oak string pieces let into the transverse sleepers and secured by a dovetail wedge; the iron to be two inches wide and half an inch thick with a triangular flange of half an inch deep and half an inch in width, slopes off at an angle of 45°, so as to make the inner edge of the bar one inch thick. The string pieces of the best white oak five inches by nine, supported at intervals of five feet by transverse sills eight feet long and not less than twelve inches thick, imbedded in the ground, and on embankments on soft ground, supported by longitudinal sills.

The estimate per mile for this superstructure is	$2,067 72
The cost of grading, &c. per mile, exclusive of a tunnel at Leavenworth, is	3,968 98
The total, including tunnel, &c.	$913,622 59

An extension of the road to Lake Michigan is recommended as offering great advantages to the stockholders, and at the same time completing the line of communication through the State.

JACKSONVILLE AND MEREDOSIA ILLINOIS RAILROAD.—This Road is to extend from Jacksonville in Morgan County to Meredosia on the Illinois River, a distance of 26 miles. It passes, we are informed, through one of the most level, fertile and highly cultivated regions of the State. The capital is *one* hundred thousand, with the privilege of increasing it to *two* hundred thousand dollars. The company has four years to commence and eight years to complete the road. It is believed that the road will be ultimately continued across the State and connect with a road in Indiana, and finally reach the Lake or be connected with the New-York and Erie Railroad.

Any person owning lands in Morgan County may subscribe for stock, one share, at least, on every 40 acres, by giving a mortgage and paying 6 per cent. interest to the company, and the company may in turn raise money on these bonds and mortgages for the construction of the road.

From the uncommon favorable character of the county, it is believed that the entire work may be completed for $130,000.

The company is authorized to loan out any surplus money they may have at *twelve* per cent. interest, or any less rate as the Directors may determine.

RAILROADS LEADING FROM NEW-YORK.—We ask for the communications of "CLINTON," number 4 of which is published in this number, an attentive perusal. They are from the pen of a gentleman of intelligence and character; one who looks at the great subject of internal improvement with the eye of an AMERICAN—not as a man whose ideas extend only to the boundary of his immediate neighborhood, or State. He has studied the institutions of his country; understands well the character of the people, and the fertility of the soil of the vast region beyond the lakes, and equally well the present and *coming* wants of the citizens of this growing metropolis, the natural outlet for the rich fruits of the west, and would convince others, as he is convinced, of the importance of opening another avenue from this city to the interior of a rival State, an avenue which shall not only intercept a good share of the *Susquehannah* trade, but also pass through the Anthracite and near to the *bituminous*, coal region.

The preliminary surveys have been made for a road, or roads, from this city to the Susquehanna, and the route is by no means a difficult one.

No one can, as we should suppose, after a moment's reflection, doubt the importance of the road to the *city* of New-York. It will open a direct, easy, and—what is of more importance—uninterrupted communication with the coal region—by which a constant supply of fuel may be, at all times, obtained at fair prices, instead of *ten* and *eleven* dollars per ton, as during the past winter.

Should this road be constructed in a proper manner, with *twenty* first rate locomotive engines, *one thousand* tons of coal per day may be thrown into this market, should there *be*, or be a prospect of, a scarcity of fuel. This coal could be brought from the mines and delivered at the dwellings of the consumers, even in the winter, at not to exceed *seven*, and in summer at *six* dollars per ton—and it would always *ensure* a supply. Is it not, then, of immense importance to the city of New-York, as well as to New-Jersey, that this work should be made?

We have given the chief matter of interest, from the Report on the Eastern Railroad, by J. M. Fessenden, Esq.

We would direct attention to that gentleman's views as to the rail to be used, it being heavier, higher, and supported at greater intervals, than those generally in use.

Elizabethport and Somerville Railroad, N. J.—We learn that the first three miles of this road is under contract, and that the workmen commenced operations several days since at Elizabethport, and it is expected that cars will run from the landing to Elizabethtown by the 4th of July next. This road passes through a rich and fertile section of country, and will meet the Delaware river at Easton, Pa.

Mississippi Railroad.—This railroad, as we learn from a gentleman on the line, is to extend from Natchez, through Gallatin and Jackson, to Canton, in Madison county—its length will exceed 150 miles. So earnest are its friends and stockholders in pushing it forward, that 7 miles of it were put under contract two months before the charter was obtained.

Hartford and New-Haven Railroad.—The Commissioners of this Road have determined to adopt the route hitherto designated as the middle route through Meriden, Berlin, &c.

Olean Canal.—We have been informed that there is some doubt as to the passage of this bill—and further, that one of its determined opposers is an Honorable Senator from this city. We can hardly credit the report, as he must be indeed blind who cannot see and appreciate the importance to this city of that work, and it is to be hoped that more enlightened counsels will prevail.

Extract of a Letter from a friend residing at Adrian, M. T., dated March 8th.

I would take the liberty to inform you, that the Erie and Kalamazoo Railroad, now constructing from Toledo, on the Maumee, is under contract from that point to Adrian, (this place,) a distance of 32¾ miles—20 miles nearly ready for the irons. The Company expect to have the line completed to this place for business the ensuing fall. This, considering the newness of the country, (only six years since its first settlement,) I think is accomplishing a great deal. The prosecution of the work thus far, has had the effect to increase the price of property from 50 to 100 per cent.

I am, with due respect,

Yours truly,

A. J. C.

To D. K. Minor.

For the Railroad Journal.

Clinton No. IV.

In the three preceding numbers I wrought hard to compress much matter in a small compass, *multum in parvo*, I believe the Latinists have it. My purpose in this paper is to expatiate somewhat broadly and leisurely; that is to say, instead of travelling thirty miles an hour, whisked along at the rate Lord Brougham was when he rode from Manchester to Liverpool; or darting forward like the streak of lightning in chase of the Kentuckian's horse; I mean to travel as whim or pleasure shall prompt, stopping by the way-side to gather a flower or pick up a pebble, as shall suit my fancy.

The enterprise of Mr. Wurts and his company in purchasing coal lands on the Lackawana, where Carbondale is now situated, and expending two millions and an half in making a Canal and Railroad to their mines, was a bold one, and has resulted successfully. Unfortunately for them, I think, they are working rather too near the outer edge of the coal basin, to get at the purest of their coal. Were they to extend their Railroad a few miles lower into the Valley of the Lackawana, they would be amply compensated for the expense in the increased depth and purity of the veins of coal. As they go deeper into the earth, even now, where they are, the coal becomes more pure. How many ships sail from New-York annually for Europe? It is barely a guess with me, for I have no book of reference. Are there 300? Do their average burden exceed 400 tons? Say so: 300+400=120,000. A hundred and twenty thousand tons! A vast amount, truly. But the Hudson and Delaware Company have transported in one year on their Railroad and Canal, including coal, lumber and other articles, about that number of tons! Without bringing these two facts in juxtaposition, one would not readily have thought that a little village, which has risen into existence by the influence of its coal deposites, within 7 or 8 years from an entire wilderness, should have exported as many tons as the whole of the European trade in ships, from the great commercial city of New York.

The Duke of Bridgewater, half starved himself to save funds to open a canal to his coal mines. Whatever doubts or sneers may have arisen while he prosecuted the work, no one now questions his wisdom If, reader, you have, without trouble, an opportunity to do so, please to cast your eye over the pieces of Railroad and Canal stock in Great Britain, and see at what very great, in some cases, what amazing advance there is on those which lead from coal districts. Will it not be so in our own country? By the last paper I have seen Schuylkill stock was up more than 200 per cent above par, i. e. 153½ for 50 paid, owing to the coal trade. The Lehi was at 89 for 50. Could this company disembarrass itself of the reserved right of the State, to purchase its stock, at par, whenever she should think fit, the shares would run up to 200 per cent. advance.

The proposed Railroad which I would press upon your notice, from New York to Pittston, in Luzern county, the very heart of the Anthracite coal basin is, as I before stated, only 106 miles, in an air line from the City Hall. The road, it is believed, may be constructed to embrace a distance not exceeding 125 or 130 miles, perhaps less. A company exists, is organized, and stock enough taken to secure the charter, through New Jersey and is in good hands. In the official proceedings I see the names of G. D. Wall, Mr. Southard, and other distinguished personages. They, of course, mean no child's play, nor enter into it merely as matter of speculation. Now further, the line from the termination of the New-Jersey Road, through Pennsylvania to Pittston, is also authorised by law—a company formed, and the charter obtained. But the money is wanting. I will not deny, nor attempt to hide from you, that I am interested in this matter; otherwise I should hardly trouble myself to indite letter after letter, number after number, to you, in relation to it. But the interest that I have cannot affect the statements I make; "they will bear the test of scrutiny and of time." Examine them closely yourselves. Now, if the thing does most deeply concern the highest and best interests of your noble City, is it of any consequence who it is that calls your attention to the subject? The three great rival cities of Baltimore, Philadelphia, and New York, are in honorable competition for the North-Western trade. The facilities which New-York possess

for foreign commerce, should stimulate her to open every proper avenue into the country; for the foreign trade must depend on the interior business. Rhode-Island, as a mere port for shipping is not inferior to any in the Union. A great portion of the trade of Lake Erie and the upper inland seas—the new state of Michigan, as well as northern Ohio, the great territory of Wisconsin, and much from the Canada side may be secured to New York by the Railroad from Buffalo to the city.

Would it not then be wise, besides indvidual subscriptions, for the city corporation to take 500,000 dollars in the stock of the company; and should not an appeal be made to the State Legislature to take half a million or more? Would not, and should not New-Jersey, as a State, subscribe 3 or 400,000 dollars?

CLINTON.

We have for some time had on our desk, the very able report of Col. Long, on a Reconnoissance for a Railroad from the coast of Maine to Quebec.

The report is a voluminons one, as a general examination of the whole coast was necessary. Several routes are given in detail, but as the one from Belfast has been adopted, we have given that only.

Much of general interest as to the matter of construction and location is to be found in this report, and when space is found, we shall be pleased to make future use of the document.

We have received the Charter of the Belfast and Quebec Railroad, as formed recently by the Legislature of the State of Maine.

It may be well to remark in this place, that, this route is, in the opinion of those enabled by observation to judge, inferior to none of those communicating between the Atlantic and St. Lawrence, with the exception of the route of the Erie Canal.

ROUTE NO. 3. FROM BELFAST TO QUEBEC.

Length of the Maine Division, one hundred and thirty-three miles. Length of the Canal Division, ninety-four miles. Aggregate distance from Belfast to Quebec, two hundred and twenty-seven miles.

Sub-divison No. 1. Extending from Belfast to Sebasticook river, and embracing a distance of thirty-one miles.

The facilities afforded at Belfast, for a connexion between the Railroad, and the commercial and other business, likely to be done at the depot, where it terminates, are equally commodious with those presented at Wiscasset, while they are to be had on a much more extensive scale.

The estuary of Belfast or Pasagasawakeag river, extends inland about two miles from the head of Penobscot Bay, of which it is an arm, and is navigable for heavy shipping, about two thirds of a mile, for sloops as much farther, and for smaller craft nearly to the head of tide. This arm of the Bay varies in its width from one hundred and fifty yards to a mile or more. At the upper bridge which is about a mile above the site of the present town of Belfast, it is contracted to the width of about one hundred yards, below which, it gradually widens, till we arrive at the principal landing of the town, where it is more than a mile wide.

The mode of connexion had in view contemplates a branch of the Railroad, extending downward from the upper bridge, on each side of the arm or estuary above described; both of which branches may be extended to the distance of two or three miles each, and as much farther as may be desirable both sides of the estuary, and the shores of the Penobscot Bay, being favorable for such an extension.

The elevation at which the town of Belfast can be most conviently approached, by the Railroad, can only be determined by actual survey; which will probably show that an elevation between thirty and fifty feet above tide, will be most appropriate. At the narrows above mentioned, or at the site of the upper bridge, both having the same locality, the ground and shores are favorable for assuming the desired elevation, and the estuary may here be crossed by a bridge of the requisite height, and about one hundred and fifty yards long.

At the site just mentioned we shall commence the description of the route which proceeds thence northwardly as follows, viz: From the upper bridge it passes along the eastern shore of the estuary, about half a mile, on rough and broken ground, crossing several ravines, and perhaps the point of a cove, to the mouth of Wescott stream, whence it ascends in the valley of this stream nearly a mile on rough ground. It thence pursues the same valley, nearly to the source of Wescott stream, where it encounters a summit, elevated about thirty feet above the flats of the stream, and dividing between the waters of Belfast river, and Marsh stream, which enters the Penobscot river at Frankfort. This summit is situated in an extensive tract of swampy ground, through which the route passes, and afterwards enters the valley of marsh creek at the distance of twelve or thirteen miles from its mouth.

The distance from the upper bridge at Belfast to the valley of Marsh creek, is computed at ten miles, through which the route is somewhat serpentine, and near its entrance into the valley just mentioned, quite circuitous. Its curvatures however, may be limited to a radius of one thousand feet; and its gradations to thirty-five feet per mile. On ascending from the flats of Wescott stream to the summit a rise of thirty feet is incurred, in less than a quarter of a mile, the passage of which will require much embankment, and considerable cutting in rock. The flats at the summit present at extensive quag, upon which the road bed must be supported on piles or broad grillage, for the distance of half a mile or more. Materials of the best quality for construction are abundant and convenient.

From the point of entrance into the valley of Marsh Creek, the route proceeds upwards in this valley, and on broken ground, about a mile to Brooks village, and ascends thence two miles, in the same valley, and on favorable ground to Sawyer's mills, whence it ascends for about a mile at a gradation of sixty feet per mile, to flats situated near the head of the stream, where it passes a very low summit. The flats just mentioned embrace the sources of Haskell's and Half Moon stream, and present a favorable passage for the route leading through an extensive cedar swamp, to the valley of the latter, down which it proceeds to the junction of this stream with Sandy river. From this point the route pursues the valley of Sandy river, downward to the plains connected with the basin of Twenty-five Mile Pond, whence it traverses an extensive flat, in places low and marshy, but generally of a uniform and even aspect, quite to the Sebasticook, which it reaches at or near the place called the Pug Hole, about two miles below the mouth of Twenty-five Mile Creek, which flows from the Twenty-five Mile Pond.

The distance from the point of entrance into the valley of Marsh creek to the Sebasticook, is computed at twenty-one miles, viz: from that point to the summit, five and one half miles, thence to Unity village, three and one half miles, and thence to the Sebasticook seven miles.

With the exceptions already made, the gradations on this part of the route, will be easy, no where exceeding thirty-five feet per mile. The curvatures will be gentle, being limited to a radius of one thousand feet, in one instance only, viz: at Sawyer's mills. The road formation will be generally easy, except where bridges and embankment are wanted, several of which will probably be required on the streams along which the route passes, and a bridge of large size, at the crossing of the Sebasticook, probably one hundred and fifty yards long, and forty feet high.

The abrupt gradation of sixty feet per mile, included in this sub-division, may be avoided, and forty-feet per mile substituted, at the expense of considerable excavation, and embakment, at the place where it occurs. With this exception, the gradations in very few instances, will amount to thirty-five feet per mile, while the rout on much of the way will vary from a level but a very few feet in the mile.

Sub-division No. 2. Extending from the Sebasticook to Bingham, and embracing a distance of thirty-four miles.

From the crossing of Sebasticook river, the route traverses a level or slightly rolling surface, to the valley of Twelve Mile stream, and then ascends in this valley on favorable ground, quite to its source, when it crosses a lower summit, at the distance of five miles from the Sebasticook. At this summit the route enters an extensive flat stretching northwardly ten or twelve miles, and embracing Sibly's, Height's and Moose Ponds, the elevation of the flat above Kennebec river, being about one hundred feet. The route traverses this extensive swamp, passing in the vicinity of Sibly's and Height's Ponds, from the last of which the route passes over a very low summit, and enters the valley of Wesrunset near Athens village. The distance from the Sebasticook to Sibly Pond by the route above indicated, is computed at ten miles—a route quite as favorable and somewhat shorter, between the points just mentioned, is said to exist a little to the eastward of the route described. From Sibly Pond to the summit near Height's Pond, the distance is computed at 9 miles.

After passing this summit and entering the valley of Wesrunset, the route passes on uneven ground about one and a half miles, in the vicinity of Athens village, and ascends in the valley to Wentworth Pond, and after crossing a low summit, may descend by either of three routes to the immediate valley of the Kennebec, the distances being about equal on each. The routes from the summit downward are as follows, viz. one by the valley of Michael's stream; one by that of Fall Brook, both of which terminate at Curritunk Falls; and the third by the valley of a stream entering the Kennebec river, a little below the village of Bingham, near which this route approaches, and must cross the river, on a bridge about two hundred yards long. Although these several routes are about equal in respect to the facilities they afford for arriving at the

river, yet inasmuch as that last mentioned strikes the river about eight miles above the point at which the others reach it, the route leading through Bingham, and crossing the river at some point near the village, is regarded as fairly entitled to a preference. We shall accordingly consider the crossing of the river, at this place, as the end of this sub-division.

The distance from the summit near Height's Pond, to Bingham, is computed at fifteen miles. The road formations on this part of the route will require much cutting and filling, in order to pass numerous ravines, and other inequalities, which it must encounter.

The curvatures on this entire sub-division, may readily be limited to a radius of one thousand feet, and the gradations to thirty-five feet per mile. Extensive portions of the route may be kept free from curvatures, and nearly level. The country abounds in timber, and other materials well adapted to the purposes of construction.

In reference to this, and the preceding sub-division, it should be remembered, that instead of the route, leading from the confluence of Half Moon and Sandy streams, to the summit near Height's Pond, a different route may be substituted which may prove quite as favorable in all respects as that before described, and which ought to be carefully surveyed, before a decisive preference is given to either. The route alluded to, leaves the valley of Sandy river, near the point above indicated, passes near Twenty-five Mile Pond, probably on the east side of it, and proceeds thence to Peoltoma Point, in the township of Chandlerville. From this point it ascends in the valley of the Sebasticook, passes Moose and Height's Ponds, and unites with the other route at the summit, in its vicinity.

Sub-division No. 3, extending from Bingham to the mouth of Wilson's stream and embracing a distance of twenty-four miles.

This sub-division from a point opposite to Bingham, in the valley of the Kennebec, 8 miles above Curritunk Falls, is coincident with the 2d subdivision of Route No. 2, of th Wiscasset and Quebec Route, from th same point to the mouth of Wilson's stream in the valley of Dead River, one mile above its mouth. *Sub-divisions No. 4. No. 5 and No. 6, of this Route,* viz:—the Belfast and Quebec Route—are also coincident and identical with the same sub-divisions of Route No. 2, to which reference is respectfully made.

We shall conclude our description of this grand Route with a brief synopsis as before, exhibiting items of information, similar to those contained in the synopsis of Route No. 1, or in that o Route No. 2.

SYNOPSIS OF ROUTE NO. 3, OR THE BELFAST AND QUEBEC ROUTE.

GRAND DIVISION.	No. Sub-divisions.	LOCALITIES. Beginning at Belfast, and including the places designated.	Supposed distances under different gradations. 0 to 35 feet per mile.	35 to 60 feet per mile.	60 to 90 feet per mile.	Distances on each Sub-division.	Length of each Sub-division.	Distances and Lengths of Grand Divisions.	Probable cost of road formation. Average cost per mile.	Probable aggregate cost.
			Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Dolls.	Dolls.
MAIN DIVISION.	1	Bridge, &c. at Belfast,								10,000
	—	Marsh Creek,	10			10			8,000	80,000
	—	Unity Village,	13	1		14			7,000	98,000
	—	Sebasticook River,	7			7	31	31	6,000	42,000
	—	Extra for a Bridge, &c.								8,500
	2	Height's Pond summit,	19			19			6,000	1[illegible]4,000
	—	Bingham,	15			15	34	6	7,500	112,500
	—	Extra for a Bridge, &c.								10,000
	—	Mouth of Wilson stream,	24			24	24	89	7,500	180,000
	—	Extra for a Bridge, &c.								12,000
	4	Head of Parlin Pond,	4	3	7	14			9,000	126,000
	—	Holden's on Moose River,	16			16			6,000	96,000
	—	Extra for a Bridge, &c.								5,000
	—	Boundary summit,	11	1	2	14	44	133	8,000	118,000
		AGGREGATES.	119	5	9	133	133	133	7,564	1,006,000
CANADA DIVISION.	5	Mouth of the de Loup,	25	5		30	30	30	9,000	270,000
	—	Extra for Bridge, &c.								20,000
	6	St. Mary's,	40			40			7,000	280,000
	—	Extra for a Bridge, &c.								9,000
	—	St. Henry's,	11			11			4,500	49,500
	—	Extra for a Bridge, &c.								7,000
	—	Head of inclined plane,	10			10			4,000	40,000
	—	Point Levy,	1	1	1	3	64	94	10,000	30,000
	—	Extra for inclined plane,								10,000
		AGGREGATES.	87	6	1	94	94	94	7,612	715,500
		Aggregates for the entire Route.	206	11	10	227	227	227	7,584	1,721,500

The foregoing exhibit shows, that the entire length of Route No. 3, from Belfast to Quebec, is two hundred and twenty-seven miles; which is shorter by nineteen miles, than Route No. 2, from Wiscasset to Quebec, and fifty miles shorter than Route No. 1, from Portland to Quebec. Of the distance above stated (227 miles) two hundred and six miles are attended by gradations not exceeding thirty-five feet per mile; eleven miles by gradations varying from thirty-five to sixty feet per mile; and ten miles by gradations not exceeding ninety feet per mile. It also appears from the Synopsis, that the average cost per mile, for road formation, bridges, &c. included, is seven thousand five hundred and eighty-four dollars, and that the aggregate cost of this item, on the entire route from Belfast to Quebec, with a road surface twenty-five feet wide, is one million seven hundred and twenty-one thousand five hundred dollars.

To this amount, if we add as before, seven thousand dollars per mile for a single track, or thirteen thousand dollars per mile for a double track, we shall have for the aggregate cost of a double track Railroad from Belfast to Quebec, four millions six hundred and seventy-two thousand five hundred dollars.

It will be perceived that in the several tabular views, comprehended in this Report, no allowances have been made for surveys, superintendance or contingencies of any kind; we shall accordingly subjoin a brief general Synopsis of the Grand Routes, in which the allowances of this character, deemed requisite and proper, will be included, and with which we shall conclude our description of the several routes.

SYNOPSIS OF GRAND ROUTES FROM THE COAST OF MAINE TO QUEBEC.

GRAND ROUTES. Localities at the commencement and termination of each Route.	Length of each Grand Route.	Distances under different gradations. 0 to 35 feet per mile.	35 to 60 feet per mile.	60 to 90 feet per mile.	Probable cost of a Railroad on each Grand Route, all things included except the right of way. Cost of grading per mile.	Cost of grading and railing per mile.	Cost per mile including 5 per cent. for contingencies.	Aggregate cost of each Grand Route.
	Miles.	Miles.	Miles.	Miles.	Dolls.	Dolls.	Dolls.	Dolls.
No. 1. Portland to Quebec..	277	249	18	10	8,831	21,831	22,923	6,349,671
No. 2. Wiscasset to Quebec.	246	224	12	10	7,982	20,982	22,031	5,119,626
No. 3. Belfast to Quebec....	227	206	11	10	7,584	20,584	21,613	4,906,151

This Synopsis is intended to exhibit the extent of each grand route; the distances under different gradations, for each route; the average cost per mile for road formation, as derived from the foregoing tables; and for this item including the cost of railing for a double track; the average cost per mile of this last item, (grading and railing combined,) including an allowance of five psr cent. for contingencies, &c. right of way excepted; and the aggregate cost of each

entire route, with the exception just mentioned, all other expenses being included.

From this Synopsis it appears that the cost of a Railroad from Portland to Quebec, all things included except the right of way, amounts to about six millions three hundred and fifty thousand dollars, which gives for the average cost per mile, twenty-two thousand nine hundred and twenty-three dollars. That the cost of a railroad from Wiscasset to Quebec, amounts to about five millions four hundred and twenty thousand dollars, or to an average cost per mile of twenty-two thousand and thirty-one dollars. And That the cost of a railroad from Belfast to Quebec amounts to a little more than four millions nine hundred and six thousand dollars, which is equivalent to an average cost of twenty-one thousand six hundred and thirteen dollars per mile.

Hence it appears, also, that the aggregate cost of Route No. 3, is less than that of Route No. 2, by five hundred and thirteen thousand four hundred and seventy-five dollars; and that the average cost per mile of the former, is four hundred and eighteen dollars less than that of the latter. Moreover,

By a similar comparison with Route No. 1, the difference in favor of Route No. 3, amounts to one million four hundred and forty-three thousand five hundred and twenty dollars, in their aggregate cost, and to one thousand three hundred and ten dollars in their average cost per mile.

In view of what has been advanced in this paper, no doubt can remain as to the route entitled to the preference, not only on account of their relative distances, and the probable cost of a railroad on each, but on account of the comparative facilities for travel and transportation presented by them respectively. These, and a variety of other considerations, relating to the accommodation, welfare, and future prosperity of the State of Maine, as well as to those of Lower Canada, combine to render the route from Belfast to Quebec, more eligible and advisable than either of the other routes herein described.

☞With respect to the cost of the contemplated railroad, as herein computed, I am aware that is far less per mile, than has been incurred on the railroad from Baltimore to Washington from Philadelphia to Columbia, from Hollydaysburg to Johnstown across the Alleghany mountains, from Camden to Amboy, from Boston to Providence, Lowell and Worcester, and on various other railroads of the United States, now in successful operation; yet from a careful comparison of the facilities presented on the routes herein described, with those of the routes pursued by the railroads just alluded to, it is confidently believed that the prices annexed and the allowance made in the preceding tables, will prove adequate to the construction of the road in question, agreeably to the manner proposed.

REPORT ON THE SURVEYS AND DEFINITE LOCATION OF THE EASTERN RAILROAD. BY JOHN M. FESSENDEN, CIVIL ENGINEER.

To George Peabody, Esq., *Chairman, and the Members of the Committee for obtaining Surveys, Location, &c. for the route of the Eastern Railroad.*

Gentlemen,

I submit herewith a Report of the examinations, surveys, and location for the route of the Eastern Railroad, commencing at Boston, and terminating at the New-Hampshire State line, made agreeably to your request, together with the plans and profiles of said location.

By your directions my attention was first given to the Turnpike between Boston and Salem, for the purpose of ascertaining the facilities which the whole or any part of it would afford for the construction of that portion of the route; the results of the examinations and surveys for this purpose were reported to you immediately after their completion, and were to the effect that the great elevations to be overcome on the road near Salem, would make it necessary to resort to a rate of inclination inadmissible for locomotive engines, unless such an expenditure for grading should be made as even the free gift of the whole turnpike would by no means justify, and further, that no part of the turnpike could be used for the construction of the railroad, without much increasing the length of the route, and seriously injuring the turnpike for ordinary travel; and these evils would be encountered without any saving of expense in the construction as compared with the route finally selected.

[Mr. F. here states at length his reasons for adopting the entrance through East Boston. We omit them, as they are matters of local rather than general interest.]

In making the definite location for the whole track, while the convenience of the public travel and business generally, more than that of the towns or places, by or through which it was to pass, was aimed at, and this because a continuation of the railroad is anticipated which will make it one of the most important routes in the country; yet the location is such as will well accommodate most, if not all, of the towns; and if in one or two cases it does not come so near the business part as could be wished, I believe a proper feeling exists throughout the line, to sacrifice a little convenience for the general good of the whole road, and of those who use it.

The line, as located, commences in Boston, a short distance below Commercial Wharf, and with a ferry about 600 yards in length reaches East Boston; it then passes through the proposed depot to Decatur street, from this street it runs direct and nearly parallel to Chelsea street about one mile, and then curves lightly to the left to a point near the first bend in that street, then direct about two miles, crossing the westerly end of Belle Isle to station No. 29, on the hill east of Chelsea meeting-house, thence after curving to the left a short distance, the course is direct, crossing the marshes, Chelsea Creek and Saugus River, to its left bank, at a point about 300 yards from its mouth, thence after curving to the right a half mile to station 73 on the marsh near Breed's lumber yard, the course is direct through the village of Lynn to a meadow south of Rufus Parrott's house, from thence by light curves and direct lines for about three and a half miles, the route passes near the house of Pickering Dodge, crosses a low depression in the ridge which divides the waters running into Salem and Lynn harbors, then runs by the head of the swamp to near Castle Hill, crosses the mill-pond and passes near the lead factory to the hill north of Harbor street; from this point the line is direct, crossing the town of Salem to North River, where it curves to the right to near Northey street, thence direct crossing Bridge street, and thence by a curve and direct line to the left bank of North River in the town of Beverly, and at a point about 550 feet below Beverly bridge; thence, with the exception of two short curved lines, the course is direct for about five miles, crossing the road to Newburyport, near Dr. Kittredge's house, then running near the houses of William and Levi Dodge and the house of Daniel Rust, sr., thence the line is direct to G. and B. Appleton's house, and nearly so to G. Chapman's house in Ipswich, crossing in its course the Topsfield road, and then following down the left bank of Ipswich River; from Ipswich the line is nearly direct to a cross road a few rods beyond the Newburyport road, and from thence direct for about seven miles, crossing the meadows of Ipswich, Rowley, and Newbury, and Rowley, Parker and Little Rivers; thence, after a short curve, the line is direct, crossing the Newburyport turnpike and High street to the intersection of Court and Union streets, and from this intersection by a reversed curve to the bridge over the Merrimac River at the foot of Water street, thence after crossing over the bridge, the course is, with the exception of three very light curves, direct to the New-Hampshire State line.

The location as thus described, is unusually favorable both as to grade and alignment, I believe the most so of any in the country. The whole distance from Decatur street, East Boston, to the proposed depot, beyond High street in Newburyport, is 33 miles, 4,123 feet, of which distance 27 miles, 2,987 feet is straight, and the remaining 6 miles, 1,136 feet, with the exception of 3,225 feet, is curved on radii of from about one to three miles in length; the distance of 3,225 feet is on radii of about one fourth of a mile, and is mostly on the sites of proposed depots, where the usual speed will not be required.

The grade or inclination of the line from East Boston to the proposed depot in Newburyport, is as follows:

7 miles,	0411 feet	descending		from $7\frac{1}{2}$ to 20 feet per mile,
18 "	3303 "	level,		
2 "	3842 "	ascending		from $4\frac{1}{2}$ to 10 feet per mile.
4 "	2027 "	"		from 10 to 20 feet per mile,
0 "	5100 "	"		30 ft. per mile
33 miles,	4123 feet.			

The total ascent to Newburyport is 130 feet, or less than 4 feet per mile for the whole distance.

The grade of the line from Newburyport to Boston is as follows:

				feet per mile.
8 miles,	0409 feet	descending from		$4\frac{1}{2}$ to 30
18 "	3303 "	level,		
3 "	4486 "	ascending from		$7\frac{1}{4}$ to 10
3 "	1205 "	"	"	10 to 20

33 miles, 4123 feet.

The whole ascent to Boston is 96 feet, or less than 3 feet per mile for the whole distance.

There is no greater inclination than 20 feet to the mile between Boston and Newburyport, except near the proposed depot at the latter place, where there is a short plane (5,100 feet) at 30 feet per mile.

The distance from Newburyport to the State line is 3 miles, 2,943 feet; of this,

			feet per mile.
0 miles,	5243 feet is	descending,	30 to 35
0 "	2820 "	level,	
0 "	2390 "	ascending,	32
1 "	3050 "	"	6

3 miles, 2943 feet.

In crossing the Merrimac River, it is proposed to make use of the abutments and piers of the chain bridge, and to construct a double road in such a manner, as will allow the ordinary travel to pass over in the same way that it does now, and the railroad travel directly above; such a construction would be better and more firm than the present one, or than a construction which permitted the two roads to pass, the one by the side of the other.

On reference to the profiles on the accompanying plans, it will be seen that the grade of the railroad in nearly every case, will be such at the different points where it is crossed by the most important town or county roads, as to permit their being passed either above or below the railroad, at a small expense beyond the cost of the abutments and bridges. The grade of the road is in no place lower than five feet above high tides.

The estimates for the grading, masonry and bridging of the road, are calculated for a width of twenty-six feet for the embankments, and twenty-eight feet for the excavations.

[We omit the details of the estimate. The sum total is $616,998 11.]

In the estimates for the railway construction, I have provided for a chair which will support the rail at a much greater elevation from the bed than any that have heretofore been used; experience has shown the great advantages which may be derived from this elevation, especially with regard to snow, as it will but very rarely fall in sufficient quantities to seriously obstruct a track thus raised. In the form and dimensions of this chair, I have obtained the requisites of sufficient strength and height, without very much increasing its weight over those in general use; I have provided also for a rail heavy enough to permit the chairs to be placed 3 feet 9 inches apart, or 4 to each rail, instead of five as generally placed; by this arrangement there will be a saving of chairs, sleepers, and expense of construction more than equal to the cost of the extra weight of the rail, and the advantages will be obtained of a less deflection in case of the derangement of a sleeper, less amount of perishable material, as the number of wooden sleepers will be less, and the road will be more easily kept free from obstructions.

The plan of construction which I propose, is to use the above rail and chair, with large sized cedar sleepers to be covered with gravel deep enough to ensure great durability; these sleepers to rest on rough five inch plank, and where the frost penetrates to a greater depth than this, stone will be placed under the plank, this will be necessary, however, only for a small part of the route. The disposition of the plank as above will unite several sleepers and completely prevent abrupt deviations in the road. I consider a wooden sleeper thus laid and protected, as far superior to one of stone, on account of the elasticity it gives to the track, saving much wear and tear of machinery and making an easier road for the traveller, to say nothing of the very great saving of expense under every view. The rails are to be fastened in the chairs with well seasoned wooden keys, which, from the subsequent expansion of the parts without the chair will be much less liable to drop out or become loose than iron keys; wooden keys have been tested on roads both in this country and in Europe.

ESTIMATE FOR MATERIALS AND LAYING OF ONE MILE OF RAILWAY.

110 tons of rails, chairs, and spikes, average cost delivered, $50 per ton	5,500 00
1410 cedar sleepers at 40 cts.	564 00
2820 wooden keys	50 00
Materials for foundation, whether of wood, or of wood and stone, average	850 00
Laying foundation, dressing and laying sleepers, laying rails, filling in track, &c. &c.	1,536 00
Total,	$8,500 00
For 37 miles 1786 ft. at $8,500 per mile	317,375 19
2 miles for turnouts and depot tracks	17,000 00
Total for Railway	$334,375 19

Aggregate cost of the whole route for one track with turnouts and the necessary depots, buildings, machinery, and fixtures:

Grading, masonry, and bridging	616,998 11
Railway, turnouts, and depot tracks	334,375 19
Depot buildings and fixtures	68,000 00
8 Locomotive engines and tenders, 25 passenger and 100 merchandize cars	100,000 00
Land damages and fencing	60,000 00
Depot wharf, East Boston	50,000 00
Ferry arrangements	60,000 00
Depot landing, &c. Boston	50,000 00
Engineer Department and other expenses, say	35,626 70
	1,375,000 00
Deduct cost of constructing the Railroad from the centre of Merrimac River to the State line	75,000 00
Total,	$1,300,000 00

In making the foregoing estimates, having in view the vast importance of the road, indicated by a very large and increasing amount of travel and transportation, which it is well known will be brought upon it, I have not in the least degree hesitated at meeting and providing for the cost of the best materials, mode of construction and accommodaitons throughout; I do not know of any improvement within the bounds of reason, especially with regard to the Railway, that a greater expenditure of money would secure. The amount of rail iron per mile, is greater than is used upon any road in this country, and equal to that on any in Europe, and it is required to secure the benefits which I have before named, and in fact to furnish a road with all the facilities and advantages requisite to insure as nearly as possible, its free use at all seasons, in this section of the country. The work and materials estimated for and their cost, I have endeavored to put down in this report equal to what they will actually amount; still I must add that I have expectation that the work will be executed for something less than the sums I have named; should this be the case, the difference, together with the means that might be in the possession of the company, it is probable would enable them, when it should be thought best to lay a second track on the road from Boston to Salem, to do so, without a further call upon the stockholders. The length of this second track will be $13\frac{1}{2}$ miles, and the cost of laying it down 8,500 dollars per mile, or about 112,000 dollars for the whole distance.

The annual expenses of the road when in full operation, allowing as I have done in the estimates for machinery, accommodations, &c., for a much larger amount of travel and transportation than that which at present passes over the route, will not differ much from 1,750 dollars per mile, or 60,000 dollars, which sum will meet the salaries of a Superintendant and 44 others, to wit: assistants, machinist, clerks, engine and firemen, depot and brake-men. Fuel for from 6 to 12 trains yer day. Repairs and depreciation of engines and cars at 18 per cent. per annum, and full repairs of the road.

The grade of the road is so favorable that the accommodations and annual expenses estimated for, would enable the company to transport per year, more than 35,000 tons of merchandize and 175,000 passengers, supposing no more than two thirds of the engines to be always ready for use, and only three-fourths of the passenger, and one half of the merchandize cars to be in requisition on any one day.

As to the amount of business which it would be safe to calculate upon for the revenue of the road at the commencement of its opetations, I have no means of judging, except from the reports heretofore made to the Legislature, and from the business done on other roads in the vicinity; the

latter showing only the disposition of the public to avail themselves of the advantages which Railroads offer; from these data it would be quite safe to expect it to equal per year.

110,000 passengers carried over the whole route at 1,33 cts.	146,300 00
18,000 tons of merchandize at 2,50 per ton	45,000 00
	191,300 00
Deduct annual expenses	60,000 00
and there remains a nett income of	$131,300 00

or more than 10 per cent. on the cost of the road. If this estimate should appear to some to be too large, the knowledge of the fact that the business, I believe, on every Railraad route known, has increased from 100 to 700 per eent. in consequence of the facilities which they offered, and will lead them to acknowledge that the amount stated above, if not at once, would in a very short time be more than realized. The rate of 1,33 cts. for each passenger, together with that of 2,50 per ton of 2,000 lbs. of merchandize, is much lower in proportion to the length of the road than the average of the rates charged on the Railroads in this vicinity. The rate which I have assumed for the whole route, gives for that of the part from Boston to Salem 50 cts. for each passenger.

In making the surveys and location of this route, a great portion of the field duty fell upon my chief assistant, William Parker, Esq., who, with the assistants attached to him, Messrs. H. Stebbins and J. Adams, are entitled to much praise for obtaining so favorable results. The topography and drawing are the very creditable labors of Messrs. W. D. Wallack and S. Ashburner.

I am, Gentlemen, very respectfully
your obedient servant,
JNO. M. FESSENDEN, *Engineer.*

RAILROAD AND CANAL INTELLIGENCE.

From the Ashtabula Sentinel.

ASHTABULA, WARREN AND LIVERPOOL RAILROAD.

It will be seen by the notice in our columns to-day, that a meeting of the Stockholders is to be held at Warren on the 28th day of June next, for the purpose of organizing under the charter. The amount subscribed along the route, we understand, is rising of one hundred thousand dollars. A much larger amount than this, can and should be subscribed on the line of the road, and we believe will be. We ought not to depend upon foreign capitalists to take up the stock. The people along the line have the means within themselves to construct the road, and it is for their interest to do so. The rise of property within a few miles of the line of the road, occasioned by its construction, will be more than sufficient to build it; and possessing advantages not equalled by any other route between the Lake and the Ohio river, the stock will undoubtedly yield a handsome profit to the holders. Under these circumstances, we appeal to the land holders—to our citizens who are directly and deeply interested in the speedy completion of this important work, to come forward immediately and take up the stock, and keep the controlling power within themselves, and not suffer it to fall into the hands of foreign capitalists. We have not yet received the Report of the Engineer who has recently surveyed the route, but understand that he found it more favorable than had been expected.

MONROEVILLE AND SANDUSKY RAILROAD

When the charter of this company was obtained, we had little expectation that the road would be made, but we judged of men and things as in olden times. We begin to find that calculations which would have been rational enough ten or twelve years ago, are entirely unsuitable to the spirit of the present times. Instead of lingering as such a work (or even one of much less magnitude) would then have done, a sufficient portion of the stock was promptly taken, by citizens interested in the route, to encourage the company to make an immediate commencement. The whole route was therefore put under contract, and the work is now progressing.

The zeal manifested by this company has had a happy influence on the people of the south, who have obtained charters for different companies, so as to make a continuous line from the termination of this road, at Monroeville, to Newark, where it will meet the Ohio Canal. If the citizens who have obtained those charters, act with as much promptitude, as the Monroeville and Sandusky Railroad Company have done, we may safely look for the completion of the whole line in two or three years. It runs through a part of the State where such an improvement is much needed, and which has not been at all benefited, except at its southern termination, by the improvements which the State has made at so heavy an expense, and at so great a sacrafice of the rights and interests of the people.—[Sandusky Clarion.]

AKRON AND PERRYSBURG RAILROAD.—The commissioners for organizing the Akron and Perrysburg Railroad company met at Norwalk, on the 25th ult., and resolved that books for subscription to the stock of said company, opened at Perrysburg, Lower Sandusky, Norwalk, Wellington, Medina and Akron, on the 25th inst.: and that Uriah H. Peak and James Justice be appointed to employ an engineer, and to obtain releases of persons owning lands along the route.

SANDWICH AND FORT ERIE RAILROAD.—There remains no doubt but that the bill authorizing the construction of this important work through Upper Canada, has become a law. Our citizens cannot be unmindful of the important bearing which it will have upon the interest of this place. We think that in accordance to the custom which every where prevails on such occasions, our citizens should make some suitable public demonstrations of the lively interest which they take in this important work. We shall publish the bill as soon as we can get a copy.—[Detroit Journal.]

We are authorized to state that the entire stock of the Detroit and Maumee Railroad has been taken up by the citizens of this place. Capitol, $500,000.—[Ib.]

From the Journal of the Franklin Institute.

COMMITTEE ON SCIENCE AND THE ARTS.

Report on Mr. A. C. Jones' Spark Arrester.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, an apparatus for stopping the sparks from the flues of locomotive engines, invented by Mr. Alfred C. Jones, of Portsmouth, Virginia. Report:—

That it has for some time been considered a desideratum to devise a plan by which the sparks escaping from the chimney, or smoke pipe, of a locomotive engine, may be arrested, so as to ensure both the comfort of passengers, and the safety of goods, transported on Railroads. The rapid extension of this mode of conveyance, is every day rendering this object of increased importance. Judging from the certificates of engineers and others, exhibited by Mr. Jones, it may be inferred that he has been more successful in relation to it, than preceding inventors.

The principal peculiarities of Mr. Jones' invention, are the following.

1. A projection, and funnel shaped opening, in the front part of the wire gauze, which surmounts the smoke pipe. This opening is for the purpose of admitting the external air to mix with the escaping smoke and steam, and is supposed to have the double effect of cooling and condensing the smoke and steam, so that it will not burn and destroy the wire gauze, and of producing a horizontal, or backward, current of air, which throws the sparks into the receptacle hereafter described.

2. A peculiar shape in the wire gauze cap, extending a considerable distance backward, over or beyond the back of the top of the smoke pipe, which affords a space for the sparks to be thrown down into the receptacle hereafter described, the shape of the back part of the cap, or wire gauze, being such that the sparks do not strike it perpendicularly, but obliquely to its surface, and thus are thrown down, instead of passing through the apertures.

3. A receptacle for sparks, back of the top of the smoke pipe, and under the back part of the gauze cap, at the lower part of which receptacle is a pipe, extending downward into the smoke chamber at the end of the boiler, and below the part immediately connected with the boiler. Through this pipe, the sparks pass, and fall into the bottom of the smoke chamber. It is supposed by Mr. Jones, that the impetus of the steam, escaping from the engine, through the smoke pipe, produces a partial vacuum in the bottom of the smoke chamber, and causes a portion of air to rush down the said pipe, which makes the sparks more readily descend, to a place where they are beyond the influence of the escaping current of smoke and steam, there to be consumed.

[4. The gauze cap is made with hinge joints, so as to be thrown over backward, when the engine is not under way. This contrivance serves the double purpose of preventing the gauze from being clogged with lampblack, by the thick smoke escaping before the starting of the engine, and of facilitating the cleansing of the gauze, by a brush applied to its inner surface, where the smoke and lampblack condenses.

It is the opinion of the committee, that each of the foregoing features is productive of advantage. Hence, they are of opinion, that Mr. Jones' apparatus is among the best that has been devised; an opinion which is

confirmed by the respectable testimony which has been adduced.

There is a suitable apparatus for arresting the sparks when the engine is going backward, which it is deemed unnecessary here to describe.

By order of the Committee.

WILLIAM HAMILTON, *Actuary.*

January 14, 1836.

From the Journal of the Franklin Institute.

SPECIFICATION OF A PATENT FOR AN IMPROVEMENT IN THE MODE OF TURNING SHORT CURVES UPON RAILROADS, WITH RAILROAD CARRIAGES, PARTICULARLY THOSE ROUND THE CORNERS OF STREETS, WHARVEE, ETC. GRANTED TO JAMES STIMPSON, CIVIL ENGINEER, BALTIMORE, MARYLAND, AUGUST, 23D, 1831. PATENT SURRENDERED AND REISSUED ON AN AMENDED SPECIFICATION, SEPTEMBER 26, 1835.

I use or apply the common peripheries of the flanches of the wheels, for the aforesaid purpose, in the following manner.

I lay a flat rail, which, however may be grooved, if preferred, at the commencement of the curvature, and in a position to be centrally under the flanches of the wheels upon the outer track of the circle, so that no other part of the wheels which run upon the outer circle of the track rails, shall touch, or bear upon, the rails, but the peripheries of the flanches, they bearing the whole weight of the load and carriage; while the opposite wheels which run upon the inner track of the circle, are to run and bear upon their treads, in the usual way, and their flanches run freely in a groove, or channel; which treads are, ordinarily, about three inches in diameter, less than the peripheries of the flanches. Were the bearing surfaces of the wheels, which are in contact with the rails, while thus turning the curve, to be connected by straight lines from every point, there would thus be formed the frustrums of two cones, if there be four wheels and two axles to the carriage; or, if but one axle and two wheels, then but one cone; which frustrums for the wheels representing their extremities, will, if the wheels are thirty inches in diameter, and are coupled about three feet six inches apart, turn a curve of about sixty feet radius of the inner track rail. The difference in diameter between the flanches and treads, before stated, the tracks of the usual width, and the wheels coupled, as stated, would turn a curve of a somewhat smaller radius if the axles were not confined to the carriage in a parallel position with each other; but this being generally deemed necessary, the wheels run upon lines of tangents, and those upon the inner track being as wide apart in the coupling as the outer ones, keep constantly inclining the carriage outwards, and thus cause the carriage to tend to run upon a larger circle than the difference in diameters of the treads and flanches would otherwise give; but the depth of the flanches, and the couplings, may be so varied as to turn any other radius of a circle desired.

What I claim as my invention, or improvement, is the application of the flanches of the wheels on one side of Railroad carriages, and of the treads of the wheels on the other sides to turn curves upon Railways, particularly such as turning the corners of streets, whaves, &c., in cities and elsewhere, operating upon the principles herein set forth.

JAMES STIMPSON.

From the Journal of the Franklin Institute.

PRESERVATION OF WOOD FROM DRY ROT.

It is stated as the result of observations made in the German mines, that pine wood which has been exposed to the action of water under pressure, is not subject to the dry rot. A stick of pine wood, placed in water in an iron pipe, absorbed in thirty-six days, 27 per cent. of water. Subsequent exposure for thirteen days, in a warm room, evaparated 15½ parts of the water.

A similar stick of wood, exposed for the same time, but pressed at intervals, by a force of nearly fifty atmospheres, absorbed 118 per cent. of water. Of this, when the wood was exposed as above stated for the other piece of timber, there evaporated 21 parts.

The wood was not sensibly increased in bulk by the absorption of the water. The bulk of water absorbed in the second experiment having been nearly one thirty-ninth that of the wood.—[Annales des Mines, vol. vii.

From the Journal of the Franklin Institute.

SPECIFICATION OF A PATENT FOR IMPROVEMENTS IN THE PROCESS OF, AND APPARATUS FOR, DISTILLING SPIRITS OF TURPENTINE AND OTHER ARTICLES. GRANTED TO ISAIAH JENNINGS, CITY OF NEW YORK, AUGUST 27, 1835.

My improvement in the process when turpentine is to be distilled, consists in the addition of a portion of spirits of turpentine to the crude turpentine from which the distillation is to be made; the addition being made in such proportion as shall bring the turpentine into such a state of fluidity as shall admit of the subsidence of all the foreign matter contained therein as may be sufficiently heavy to fall to the bottom, and of the rising of chips, and other light materials to the surface, whence they may be readily removed, and the clear turpentine poured off from the sediment. The quantity of spirits of turpentine to be added will depend, in part, upon the warmth of the weather, or of the place in which the mixture is made; and also upon the thickness of the turpentine to be operated upon, and the impurities which it may contain. The mixture and separation of the impurities may be promoted by artificial heat, care being taken that the temperature is not such as shall occasion a waste of the spirit by evaporation.

The apparatus which I employ consists of two vessels within each of which a still worm of the usual construction is to be contained; or instead of the worm any kind of heater, or refrigerator, by which analogous effects are produced, may be employed; these vessels are to be connected together in a way to be presently described, and one of them is to answer the purpose of a still, whilst the other is to operate as a refrigerator, or condenser. The prepared turpentine is to be contained in any convenient reservoir whence it may descend through a tube into the worm which is to operate as a distillatory, its flow being regulated by a stop-cock. The vessel containing this worm is to be closed at top, and the worm is to be heated by the introduction of steam, heated air, water, or other fluid; steam, however, being preferred; a sufficient degree of heat may be thus applied to separate the spirit from the rosin as the material descends from the top to the bottom of the worm. The lower end of this worm passes through the vessels, and into a large vertical tube which is placed between it and the refrigerator or condenser. This vertical tube rises as high as the top of the condenser, and descends several inches below the point at which the first named worm enters it, having below this point a tube for the discharge of the rosin, which, not being volatile, will descend and run out by its own gravity. Its flow may be regulated by a stop-cock, and may be promoted, if necessary, by the application of heat to the bottom of the tube.

The vapor of the spirit will rise towards the upper end of the tube, whence it will pass into the refrigerating worm contained in the condensing tube, down which it will pass, and be condensed in the usual way.

I intend to apply the same apparatus to the distillation of common tar, coal tar, and other analogous articles, diluting them also, with a portion of their own spirit, or with any other which will produce a like effect.

What I claim as my invention, is the preparing the turpentine for distillation by diluting it with distilled spirit, and separating by this means, the foreign matter therefrom, thereby producing a bright clear rosin, and an improved spirit. I also claim the employment of the worm, or other analogous apparatus, to be heated in the way described, and arranged and connected in the manner, or upon the principle herein set forth, so that it may answer the purposes for which it is ordinarily employed. I also claim the preparing and distilling of common tar, coal tar, and other analogous articles by dilution, and subsequent distillation in the same apparatus.

ISAIAH JENNINGS.

From the Journal of the Franklin Institute.

SPECIFICATION OF A PATENT FOR A MACHINE FOR SPREADING INDIA RUBBER UPON CLOTH.—GRANTED TO WILLIAM ATKINSON, LOWELL, MASSACAUSETTS, ATGUST 15, 1835.

The cloth to be coated with India rubber is to be made into an endless web, by sewing its two ends together; and other articles, such as skins of leather, may be coated therewith by spreading them on, and affixing them to, an endless web so made. This web is passed around cylinders which are made to revolve, and the dissolved caoutchouc or India rubber, is spread upon the endless web by the aid of a third cylinder, placed parallel to, and nearly in contact with, one of the cylinders around which the endless web passes.

The dimensions of the machine may, of course, vary, according to the width and length of the material to be coated or covered. In designating certain sizes and proportions of the respective parts, therefore, I do so only for the purpose of facility in description, and of indicating what has been found to answer well in practice.

I make a frame of wood, which may be sixteen feet long, and three feet six inches wide, the bottom timbers being sufficiently stout to support the carriage, and other parts, to be presently described. Into the ground sills, or lower part of this frame, uprights are mortised, which serve to support a rail on each side, which may be three feet four inches from the floor, leaving, however, the sills sufficiently clear within the uprights to form a railway upon which the rollers of a carriage may traverse back and forth.

Upon suitable supports, at one end of this frame, there are placed two cylinders of metal, usually of cast-iron, each of them one foot in diameter, and two feet nine inches long. The axes of these cylinders are in the same horizontal plane, and parallel to each other; around the inner cylinder the web to be coated passes; and the outer cylinder is made adjustable by means of screws, or otherwise, so that it may be brought into contact with, or removed to any required distance from, the web, or cloth. These cylinders are geared together by means of toothed wheels upon their shafts, cut sufficiently deep to admit of the requisite adjustment. The shaft of a pinion by which they are driven has on it a fast and a loose pully; when revolving they turn inwards.

The second, or carriage cylinder around which the endless web passes, is supported upon a carriage, furnished with wheels, or rollers, which run upon the lower rails, or sills. This cylinder is also to be made of metal, and when used as a drying cylinder, it should be large in diameter, say three feet. A windlass is placed at the back end of the frame, from which ropes pass to the cylinder carriage, serving, by means of a wince, to draw the carriage, so as to render the cloth taut. Steam is to be admitted into the cylinder through a hollow gudgeon. For this purpose a steam tube is attached to the gudgeon, its other end passing through a stuffing box in a larger tube, attached to a boiler, thus admitting of the requisite motion of the carriage.

In order to apply the solution of India rubber to the cloth, &c., and to confine it to the proper width, we fit two cheeks, or pieces of wood or metal, so as to rest upon the two contiguous rollers, one at or near each of their ends, and these, when in their places, convert the rollers into a trough, or hopper, for containing the solution. The distance of these pieces from each other is regulated by attaching them together by means of a frame, or rod, at their upper sides, so that they may slide, and be affixed in their places by thumb screws, or otherwise.

When spreading the rubber on the cloth it is necessary to prevent its adhering to the outer roller, and this, among other methods, may be effected, by means of wet sponges, or brushes, laid along it, or by keeping it wet in any other way.

I intend sometimes to use the drying and the spreading apparatus detached from each other, in which case but two rollers, of any convenient size, will be employed in the drying process, and steam may then be introduced into each of them. I intend also, sometimes, instead of the large drying cylinder above described, to cause the cloth to pass over a stationary metallic box, or steam case, in its passage from the spreading to the straining or carriage roller, making the upper surface of this case convex, that the cloth may be kept in close contact with it; the space between the two sides of such box, or case, need not be more than from one to two inches.

What I claim as my invention, and for which I ask letters patent, in the above described apparatus, is a machine for spreading India rubber upon cloth constructed, and operating, substantially, in the manner of that herein set forth. I do not claim the mere spreading of the substance by means of cylinders, this having been previously done, but we do claim the employment of two cylinders for the purpose, connected together, and made to concur, in producing this effect, acting upon the principles described. I also claim the general arrangement and application of the apparatus, for the drying of the solution by means of steam, either in combination with, or separate from, the spreading appparatus, as I contemplate the using of them either conjointly or separately, as hereinbefore set forth. I do not claim drying cylinders, or boxes, heated by steam, as my invention or discovery, but the combination and application thereof in the way, and for the purpose by me herein fully made known.

From the Journal of the Franklin Institute.

SPECIFICATION OF A PATENT FOR A MODE OF DESTROYING WEEVILS, IN GRAIN; TO EXPEL MOISTURE FROM GRAIN, MEAL, MANUFACTURED FLOUR, AND FOR DRYING MALT.—GRANTED TO JAMES A. LEE, ADMINISTRATOR OF JAMES LEE, DECEASED, MAYSVILLE, MASON COUNTY, KENTTCKY, AUGUST 17TH, 1835.

This improvement consists of one, or more, hollow cylinders, or prisms, made of sheet iron, or other metal, of any required dimensions in diameter or length. Fixed on an angle in an inclining position, in the manner of a bolting-reel as is used in mills for bolting flour; it is enclosed in an oven or arched room, made of brick, stone, or other material, sufficiently wide to contain one or more cylinders, or prisms, aside of each other, and of height sufficient to admit of one or more stoves, or flues, calculated to communicate to the cylinders, or prisms, the quantity of heat required for destroying the living insects and their eggs in the grain, and for thoroughly expelling the moisture from the grain, malt, meal, or manufactured flour; the cylinders, or prisms can be moved either by hand, or machinery; the grain, malt, meal, or flour, is introduced through a hopper at the upper end of the cylinder, or prism, and by its inclining position and revolutions it is carried to the lower end, where it is discharged; in its passage down, the grain and malt is kept rolling, the meal and flour is constantly kept in a floating, pulverized state, not subject to concretion, or coagulation, and to prevent the meal, &c. from adhering to the cylinder, or prism, and being subject to be burnt, I fix several combs on the surface of the cylinder, to raise strikers of sufficient weight or force, to jar the cylinder, so as to disengage the meal, or flour, that may adhere to it.

By the process in this improvement the living weevils, or other insects, will be killed, and their eggs destroyed; the moisture in the grain, malt, or manufactured flour, and meal, will be effectually expelled, so that when repacked into seasoned barrels, and stored in dry places, the grain, meal, or flour, may be kept sweet for years in the warmest climates, free from fermentation or putrefaction and the ravages of insects, and the malt dried as may be required, at the same time the germinated parts of the malted grain will be broken off by the revolutions of the cylinder, or prisms. It is not necessary that the meal or flour, should be cooled before repacking; the moisture being driven out, it cannot spoil, and may be suffered to cool in the barrels.

Now what I claim as new and as the invention of the said James Lee, deceased, for which I solicit letters patent, is the use of the hollow, inclined cylinder, cylinders, or prisms; and strikers, in connection with a chamber, or oven, heated by means of stoves, or flues, operating in the manner and for the purposes herein set forth and described.

In testimony that the foregoing is a true specification of my late father's invention, or improvement, I have hereunto set my hand at the city of Washington, in the District of Columbia, this 3d day of August, 1835.

JAMES A. LEE, Administrator.

From the American Journal of Science and the Arts.

MISCELLANIES—FOREIGN AND DOMESTIC.

1. ALUM may be used for ornaments, like alabaster. When of a proper degree of solidity, it may be wrought with tools, polished, &c. When melted by heat, it may be cast into pasteboard moulds, and then polished or wrought. While in a melted state, it may be colored to suit the fancy. If rubbed with an excaustic of yellow wax, the appearance of marble or alabaster may be given to it. (J. G.)

2. CEMENT. (J. G.)—Calcined and pulverised shells, mixed into a paste with coarse or refuse oil, makes a cement, used in India for stopping the joints of boats, &c.

3. A HEATER OR CALORIFACTOR, for preserving the heat of the body in attacks of cholera, or severe and protracted chills, is made with advantage, by forming a semi-cylindrical case of tin, which will cover the body when in bed, leaving an opening at one end for the neck, so that the head may protrude. This case is made double, with a space of four inches between the inner and outer sheet. One opening is left at the top, for the insertion of a funnel, through which hot water is to be poured, and another small opening for the escape of air. This case is to be pressed down, over the patient, when in bed, and the clothes packed round it. If covered with a blanket, it will, when charged with hot water, retain the heat a great while. It need not be *filled* with hot water. The steam which rises, keeps the upper part hot. The two sides should be connected by a tube, to equalize the flow of the water. In fifteen minutes the pulse has been raised from sixty-one to eighty-seven per minute. In rheumatism, and all cases in which sweting is indicated, this instrument may be effectually used. The water is drawn off by a stop cock at the bottom. (J. G.)

4 FREEZING MIXTURE. (J. G.)—Four pounds of pulverized sulphate of soda, (not efflorescent,) and three pounds of cold dilute sulphuric acid, (seven pounds strong acid and five pounds of water, mixed the day before using.) I have prepared by this process more than three hundred pounds of artificial ice.—BOUTIGNY. *D'Evreux.*

5. A good *Safe*, or victual preserver, is prepared, by making it of a double case of wire gauze, and filling the interval with fresh charcoal, in fine pieces. Fresh meat, when suspended by hooks from the top, will keep good and sweet for a week in this safe, in the hotest weather.—(J. G.)

6. Cure for Cramp. (J. G.)—A bar of iron, placed across the bed on which the person sleeps, under the mattrass, about as high from the foot as the calf of the leg, is said to be an effectual perventive. The bar may be an inch square. In defect of a bar, a poker or other iron will answer temporarily. If there be two mattrasses, it may be placed between them. This remedy was strongly recommended by Dr. Chretienne, of Montpelier, and has proved availing in a vast number of cases.

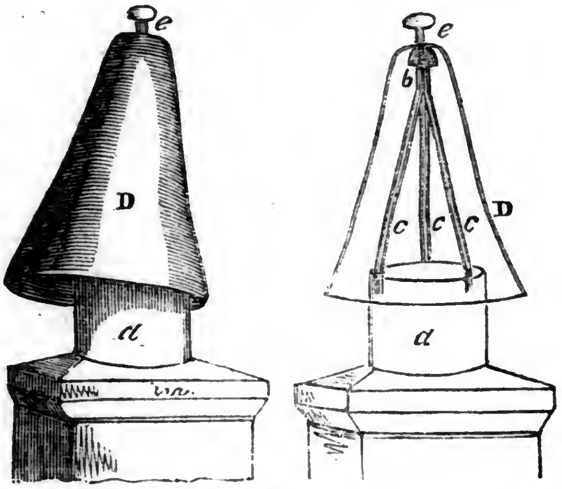
7. Excellent ink, and easily made. (J. G.)—Into a ten gallon keg, put three pounds of copperas, well pulverized. Take three pounds of logwood, and boil it in six or seven gallons of rain or pure river water, and when it has boiled half an hour add four pounds of nut galls, broken up, and a quarter of a pound of alum. After another half hour's boiling, pour the whole of the materials into the keg, stir the contents well together, and let it remain a week, stirring the whole several times a day. Then put into the keg half a pound of gum arabic, in powder, and one pound and a half of sugar candy. Leave the mixture a week longer, stirring frequently. After three weeks' rest and settling, the ink may be used at pleasure, growing better with age.

To keep it from moulding add a dram of cloves and cinnamon, in powder, with an ounce of anise seed.

To render the ink of a beautiful blue black, add to the above contents a quart of sulphate of indigo. The latter is prepared by taking a quarter of a pound of indigo, reducing it to small pieces, sprinkling a little water on it, and the next day add to it two pounds of sulphuric acid, and leave it to digest in a warm place.

8. To silver iron. (J. G.)—Add to a solution of silver in nitric acid, a portion of common salt. Wash the precipitate thoroughly on a filter, and let it dry. By rubbing this powder on the iron or steel, (previously coppered, by plunging it, with a clean surface, into a warm solution of sulphate of copper, and rubbing it with a polisher,) with a little cream of tartar, a coating of silver may be established, which admits of a fine polish.

9. Movable hood, for smoky chimnies. (J. G.)—The following is desctibed as a simple and effectual cure for smokey chimnies.



The flue of the chimney terminates in a cylinder of cast of strong sheet iron, (*a*,) one foot in diameter, firmly set in the top of the masonry. Three light iron rods, (*c*, *c*, *c*,) rivited to the cylinder *a*, rise about two feet above it, and unite in a piece of iron, (*b*,) of a triangular shape, and three or four inches long, and having a hemispherical termination. The half ball has a hole bored in its upper part, at least an inch deep and one fourth of an inch in diameter, and well tapered to receive the screw *e*, which is provided with a good thumb piece. This screw holds the hood *b* in its place, and serves as its axis of motion.

The cono D is of sheet iron, two feet long and two feet in diameter. When at rest, its base is horizontal. It has a truncation or flatening at the top, four inches at least in diameter, with a hole for receiving the screw. It is made somewhat concave, and the hood must be so adjusted as to turn freely on its axis.

When the wind blows strongly, the hood is pressed against the chimney on the windward side, and the smoke freely escapes on the opposite side.

When the chimney is to be swept, the hood is unscrewed and removed for the purpose, if necessary.

When the wind is variable, the hood is liable to rattle against the cylinder, and occasion an unpleasant noise. This may be prevented, by punching holes round the cylinder, and attaching to it, by means of wire, a band of thick list or double piece of cloth. The hood must extend at least an inch below the top of the cylinder.

10. Method of coating Busts and Plaster Casts, so as to give them the appearance of marble; by M. Pleuvarre. (J. G.)—Into a wooden tub or trough, put a strong and warm solution of alum. Into this plunge the bust or plaster cast, previously made perfectly dry, and let it remain therein from fifteen to thirty minutes; then suspend it over the solution, that the superfluous portions may drain off, and when it is cold, pour over it a fresh portion of the solution, and apply it evenly by a sponge or cloth. Continue this operation until the alum has formed a crystallized coating over the whole surface. Put it aside, and when perfectly dry, polish it with fine sand paper, or glass paper, and complete the polish with a cloth slightly moistened with pure water.

A wooden vessel is best for the solution, warmed by steam from a boiler, because metals are apt to color the solution. This coating gives greater solidity to the substance, and possesses the whiteness and transparency of the finest marble. It stands the attacks of moisture in any apartment,—is less subject to become soiled, and is as easily cleaned as marble.

In this manner, excellent copies may be obtained of antiques, as well as moderns, at a price little exceeding common plaster casts.

11. Iron Cement. (J. G.)—The Fountaineers of Paris, make use of an iron cement, for uniting the stones which form their fountains. It is very strong, and may be employed in a variety of occasions.

Take one part of vinegar, and four parts of pure iron filings, stir them well together every hour for six hours, or until the mixture begins to form a good paste. To unite stones by this cement, clamps are to be first attached to the stones, which are to be very dry. The surfaces (of the stones,) to be united, need not be more than two lines (at farthest,) apart at the top, and to terminate below at the depth of five or six lines, at the distance of one line. The mastic once introduced into this space, the stones are to be pressed together, and the cement allowed to set. In a few hours, the surface may be polished, and the joint becomes as firm, as the stone itself.

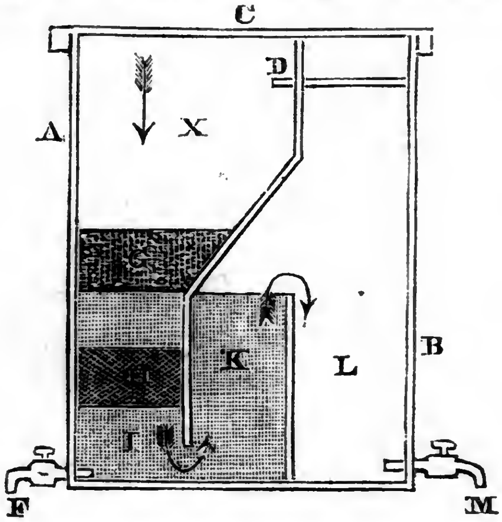
12. Filtration of Water for Domestic purposes. (J. G.)—Many families and individuals are subjected to great inconvenience and often to the injury of health by the use of impure water. The water of wells and springs, is very frequently impure, not only from the ingredients which it holds in solution, but from earthy and foreign matters suspended in it. From the former, that is, the saline and calcareous matters which are completely dissolved in it, and which render it hard and unsavory, it cannot be deprived by filtration merely, but from those foreign substances, which destroy its transparency and make it turbid and unpleasant, the filter is an effectual remedy. Besides, there are few dwellings, whether in situations where the well water is naturally hard and injurious, to those who drink freely of it, or otherwise defective, from which, with a little attention, rain water may not be caught in sufficient quantity to answer for cooking and drinking, and this when passed through the filter we are about to describe, is perfectly fit for these uses.

The cheapest kind of filter, and at the same time, one of the best ever used, is the following.

A B, is a wooden box made of pine plank, which should be previously boiled several times in water, to remove all the resinous, or soluble parts which give taste to the water. C is a cover with a rim, and D is a sliding board, to keep the filtered water from dust. X receives the water to be filtered, which first passes through a bed of coarse gravel G, terminating in fine sand, and then through a bed of charcoal H, coarsely pounded, and again through sand, resting on fine gravel I. From this, the water passes through an opening one and a half inches high, at the bottom of the partition, into the compartment K, which contains only fine sand. The compartment L, receives the filtered water, which is drawn off through the stop cock M. F, is a cock for emptying the machine when necessary for cleaning.

The sand and gravel must be carefully

washed before using, and the charcoal carefully selected and free from taste. If this box be nine inches square at the bottom, and thirteen inches high, it will be sufficient for an individual. Larger dimensions may adapt it to family use, and if made higher in proportion to its breadth than the above ratio, the filtration would be more thorough. The materials should be renewed once in five or six months, or oftner, if necessary.



13. To render Oil casks impermeable. (J. G.)—When the cask is new and ready to receive the oil, pour into it a concentrated and hot solution of sulphate of soda, (Glauber's salt,) spread it well over the whole interior surface by a sponge, cloth or broom, so that the wood may become thoroughly impregnated with the liquor. When it begins to grow cold, withdraw it, heat it again to boiling and renew the operation three or four times. Wipe off the superfluous salt with a coarse cloth, let it dry a few hours, replace the head, (the inside surface of which should have been treated in the same manner,) and it will be found that the pores have been effectually stopt by the salt, so that the oil may be safely introduced.

14. To purify cold short iron, a very simple process is practised in some bloomeries, which consists in throwing on the loupe at the moment when it is formed, half a shovel full of powdered flux, and keeping it afterwards exposed to the air of the bellows for a few moments, before it is carried to the hammer. The flux thus employed, is a limestone, which yields lime of good quality. Its effects on the loupe, are very prompt, depriving the iron of the siderite or phosphate of iron, which as is well known, renders the iron brittle when cold.—(J. G.)

15. Method of Bronzing Iron and Gun barrels. (J. G.)—Gun barrels when damasked, are less liable to rust, and any of them, of whatever price, may be treated by a very simple method, which will diminish their readiness to oxydize. When the iron is well scraped and cleaned, cover its surface with a coating of butter of antimony. If one is not sufficient, two or three coatings may be given. The iron thus acquires a horny reddish brown color, which is not unhandsome, and which preserves it from rust. When the iron has acquired the desired tint, wipe it carefully, warm it a little and then rub it with white wax, until there remains no longer any visible traces of the wax. This renders its preservation complete.

18. Introduction of Burden's Boat into France. (O. P. H.)—Baron *Seguier*, member of the Institute, has constructed a boat after the plan of Burden's, of two double cones, one hundred feet long, with the engine between them, which with the boiler presents some improvements.

M. *Cave*, a mechanical engineer, has also constructed a double boat, for the navigation of the canal of Somme. It differs from the preceding in being open at the surface covered with a flooring and has two keels and two helms.

A similar boat has been constructed for the navigation of the Loire, between Nantes and Angers.—[Bul. Soc. Enc. l'Ind. Nat.]

Report on Cotton.—A very valuable report has been made by the Secretary of the Treasury on the cultivation, manufacture, and foreign trade of Cotton, which comprises a mass of information which is not less interesting than valuable. From a table in this report we learn that in 1791 the capital employed in connexion with the growing of cotton in the United States, was $3\frac{1}{2}$ millions of dollars; in Brazil, 33 millions. Ten years after, the capital employed in the United States, was 80 millions; in Brazil, 50 millions. In 1811, capital employed in the United States, 134 millions; Brazil 58 millions. In 1821, capital employed, United States, 300 millions; Brazil, 83 millions. In 1831, capital employed, United States, 650 millions; Brazil, 58 millions. In 1835, capital employed, United States, 800 millions; Brazil 50 million.

The following table, which we extract from the report, shows the items which make up the capital employed:—

1st. The capital invested in cotton lands under cultivation, at two million acres, and worth, cleared, on an average, $20 per acre, is	$40,000,000
The capital in field hands, and in other lands, stock, labor, &c., to feed and clothe them, at $100 per year, on 340,000 in number, would require the interest or income of a capital, at six per cent., of	544,000,000
The maintenance of 340,000 more assistants, &c., at $30 each per year, would require the income of a capital, at six per cent., of	167,000,000
The capital to supply enough interest or income to pay for tools, horses for ploughing, cotton, taxes, medicines, overseers, &c., at $30, for the first 340,000, would be	167,000,000
Making in all a permanent capital, if so used, equal to	$918,000,000

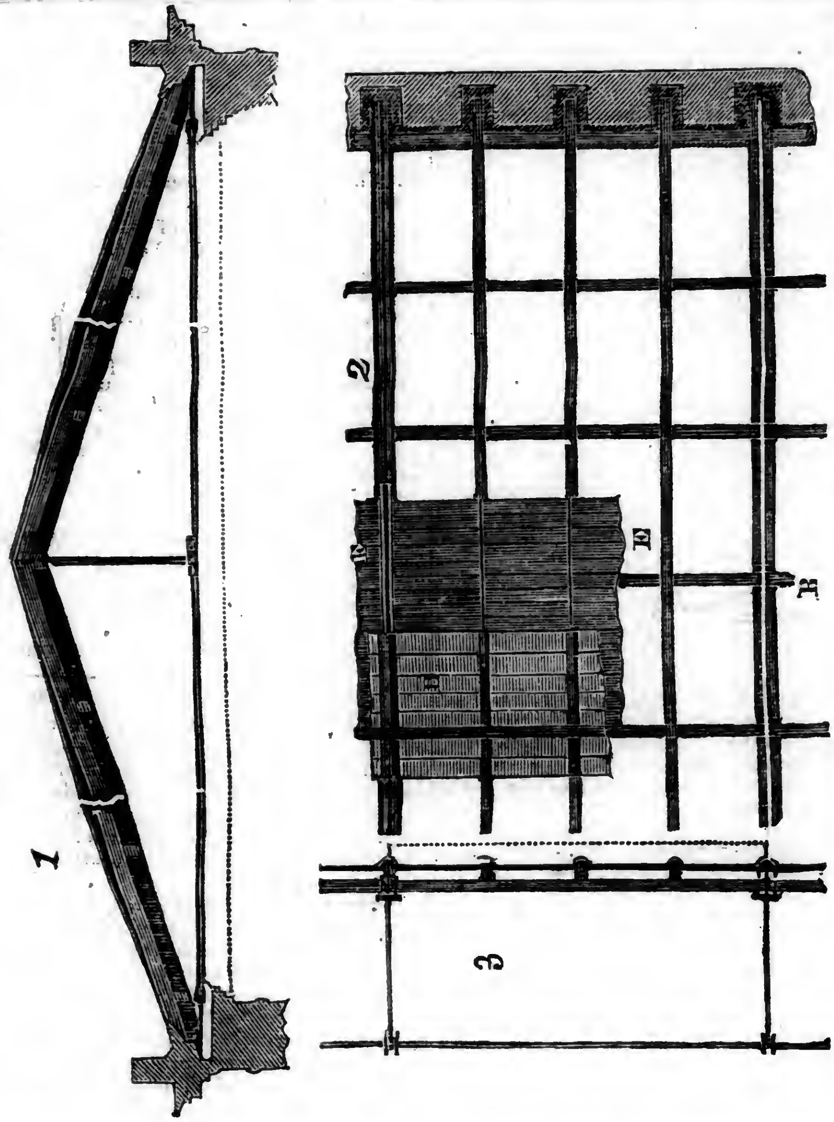
2d. The capital in cotton lands, as stated above,	$40,000,000
Capital in the purchase of 340,000 field hands, at $800 each, on an average,	272,000,000
Capital in the other 340,000 to aid, and to raise food, clothing, &c., at half price,	136,000,000
Capital in horses, cattle, sheep, utensils, &c., for plantation about $30 to each person, to aid in making food and clothing, &c.,	20,400,000
Capital in other lands to support stock, raise corn, &c., at 20 acres to each of the 680,000, worth $20 per acre, cleared,	272,000,000
Capital, temporary, or floating, to buy clothing not made on plantation, pay taxes, overseers, freight, tools for cotton, &c., $45 each, to	30,600,000
	$771,000,000

4. The number of persons is computed on similar data and principles to those suggested in the first mode of estimating the capital. Some allowances are made in certain cases, but for comparison there have been preserved similar proportions in all the years for which the computation is carried out in the table.

Thus, two millions of acres, at one field hand to every six acres, would require about 340,000 laborers; but many compute that the number in the United States is over 550,000, who are chiefly, though not entirely, engaged in field labor. Suppose the whole number to be double the field hands, as above computed, or 680,000, who are engaged in field labor, picking and otherwise assisting in the cultivation of cotton and corn, and the estimate of laborers is complete at about 680,000. But allowing that a number more should be added, who are connected with the cultivators, as infirm women, very young children, and too aged persons, &c. unable to labor in the field, besides overseers, owners and their respective families, dependent on the cotton crop, and it is presumed that then a million of persons would be considered as now engaged in the United States, directly and indirectly, in the growing of cotton; but the actual laborers are only about two thirds of that number.

Gold Mines in the United States.—In the ten years between 1824 and 1833, the income from the North Carolina mines increased from four thousand dollars a year to four hundred and seventy five thousand. Since 1833, the income from that State has slightly diminished. The territory in North Carolina in which gold is found, is of small extent, and it is said that the deposit mines of Virginia, North Garolina and Georgia, will be exhausted in a few years.

During the months of December and January last, the average number of persons who passed from Brussels to Malines, by the Railroad, was never under 800 every day. The total number of passengers in December was more than 28,000, in January more than 29,000; this will probably be surpassed in the present month.



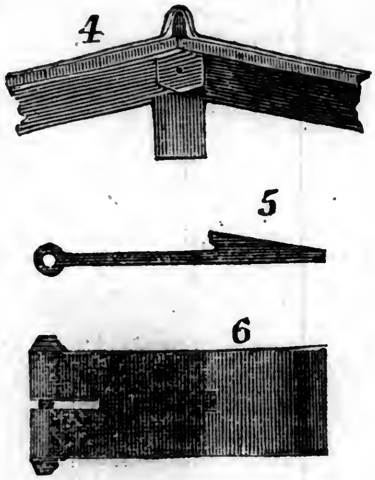
HUTCHINSON'S IRON-TRUSSED ROOF.

DESCRIPTION OF AN IRON-TRUSSED ROOF, CONSTUCTED OVER THE BORING-ROOM OF THE NEW GUN-FOUNDRY AT COSSIPORE, BY MAJOR G. HUTCHINSON, ENGINEERS, F. R. S., SUPERINTENDENT AND DIRECTOR OF THE FOUNDRY.

We extract the following description of this remarkable roof from the last volume of the *Journal of the Asiatic Society*, at the suggestion of an esteemed correspondent, to whom we feel much obliged for directing our attention to an article fraught with so much interest to our mechanical readers. Both the design of the roof, and the manner of carrying it into execution, do infinite credit to Major Hutchinson, in whom English science, and English mechanical skill, have found in India a most fit representative :—[London Mechanics' Magazine.]

"We have requested Major Hutchinson, of the Engineers, the architect of this elegant structure, to favor us with drawings of its various details, that we may make known as far as the circulation of our Journal permits, his very successful combination of the cast iron trust with a wrought iron tie to roofs of large span in this country. We are so little accustomed to see any thing else in India but the heavy flat roof with its massy timbers groaning under an inordinate load of terrace-work heaped up most disadvantageously in the center to allow a slope for the water to run off, while the invisible white ant is cooping out the solidity of the timber, and the dry rot is corroding the ends that support the whole on the wall,—that the eye rests with quite a pleasurable sensation on the view of a light, airy framework, like that before us, composed of materials indestructible, wherein the strains and pressures are counterpoised, the load lightened, the liability to crack and leak lessened, and the repair of every part rendered easy and entirely independent of the rest.

"The progress of improvement is notoriously slower in Government operations than in private works. When cast iron beams were first brought to India on private speculation, and were offered to Government by a mercantile house in this town, they were rejected. The roof of a large private go-down was soon after constructed with them and their efficacy thus proved; then immediately a re-action took place, and a large quantity was indented for by Government. The Hon. Court sent them out, and they have remained until now totally unemployed, although numerous public buildings have been erected since they arrived.



"It was, we know, a subject of lengthened debate what sort of roof should be given to the foundry. A timber trussed roof had been sanctioned at 15,000 rupees, and we may, perhaps, rather attribute the substitution of the present one to the numerical reduction of the pecuniary estimate, than to any actual conviction of its superiority in other respects, for the beams being already provided, the whole cost of the present roof, exclusive of them, has been only rupees 11,000.

"The new foundry, or rather the room in which the cannon are turned and bored, is a spacious hall, of 169¼ feet long by 50 feet clear span in breadth, and 40 feet in height from the floor to the vertex of the roof; entirely open from end to end, lighted by a range of upper windows, and surrounded by a suite of apartments of half elevation. The steam machinery of the several borers and lathes is arranged along one side of this room, in a compact and exceedingly neat manner. It is impossible to attempt its description; those who are fond of mechanical inventions, will be amply gratified by an inspection of the whole, especially by the ingenious contrivance for adjusting the angle of the slide rests and cutters, for the exterior bevil of the gun:—the circular revolving tools for turning the trunnions;—the crane carriage for the guns, &c.

"The self-acting principle by which the exterior of the gun is turned, while the interior is bored, so as to save one-half of the time, while it insures perfect concentricity of the outer and inner circles, is, we believe, an invention of Major Hutchinson's, who took the opportunity when on furlough, of visiting some of the principal foundries in Europe, and studied to adopt every improvement suggested by their inspection.

"The whole apparatus is driven by two small engines of 10 horse power, which also work a circular, and reciprocating, saw, and a loam-mill for the casting moulds of the foundry, &c.

"The superficial area of the hall is 8,462 square feet; to form an idea of this magnitude, it may be mentioned that the

noble edifice of the new town hall in Birmingham, is said to contain a larger space than any room in Europe, and will accommodate between three and four thousand persons sitting or ten thousand standing; that room is 140 feet long, by 65 feet broad, making a superficial area of 9,100 feet, which is only 638 feet more than the Kasipur apartment.

"The roof consists of 10 trusses, each composed of a pair of cast iron beams pitched at an elevation of 6 feet in the vertex, and tied together at foot by a horizontal chain supported in the centre by a vertical rod suspended from the angle. The truss-frames are 15 feet 4·6 inches apart: they support light cross-beams and rafters of wood, upon which the planking of the roof is nailed. The weight of one truss with its entire load and chain is equal to about five and half tons, diffused over the two iron beams.

"The chain is 3 inches deep by 1 inch thick, = 3 inches in section, consequently the applicable force of tension of the chain is $3 \times 9 = 27$ tons, and the ultimate strength of it $3 \times 27 = 81$ tons. The above weight of five and half tons diffused over the two beams=$2\frac{3}{4}$ tons on each beam, gives, according to the sine of the angle of elevation, a tension on the chains of about five and a half tons, or only one-fifth the stretching weight, or one-fifteenth of the ultimate strength of the chains.

"The iron beams and chains were all proved before they were put up, by suspending for several days without effecting the slightest apparent alteration, a weight of six tons from the vertex, producing a trial tension of about 12 tons, which is more than twice the actual tension.

"Each extremity of the tie-rods is bolted to a kind of shoe, resting upon a stone slab on the wall, into which the lower end on the iron beam abuts.

"The longitudinal tie-rods are united by a bolt, having two right-hand screws, passing through the central coupling plates of the chains, and the eye of the suspension vertex rod. This rod being firmly attached by two bolts through the beams at the vertex, any derangement whatever of the roof, either vertically or horizontally, is effectually prevented. At each end of the roof the longitudinal rods pass through the walls, to which they are firmly fixed.

"The horizontal overlaps of the copper sheathing are cemented with white lead, and the copper passes over the wooden battens fixed on the planks, to which only the copper is fastened by copper rivets; a copper cap or ridge-tile lies over the whole length, to prevent the insinuation of water at the fold; it answers this purpose so effectually, that the roof was every where found perfectly water-tight, during the late heavy season of rain, the first it had experienced.

"The Kasipur roof was set up without the assistance of any scaffolding from below. An experimental truss of timber supported on chains, having been previously made to show the advantageous application of iron chains instead of tie-beams of timber to rods of so large a span, it was converted into a platform, moveable upon wheels along the top of the walls, upon which, by means of a crane fixed at one end of the frame, the iron beams and every thing else was easily and expeditiously raised and fixed; the beams, &c. for the opposite side of the roof being passed upon wheels across the platform. The whole frame-work was put up in twenty days.

"Before closing our short account of the Kasipur roof, we must notice a curious optical deception, for which we are somewhat at a loss for a correct explanation. On entering the room and looking up at the roof, it strikes every beholder that the roof has somewhat sunk, and the horizontal tie-rod is about five or six inches lower in the centre than near the walls. So firmly impressed were we of this being the case, that standing at one end of the room, and holding two flat brass rulers, overlapping one another, before the eye, we could readily measure the apparent angle of the tie-rod, by raising the ends of the rulers so as to coincide with the two halves of tie-rods. On mounting the roof and looking in at the upper window of either end, the same effect was still visible, though in a diminished degree, and we were not convinced that it was a deception, until Major Hutchinson, at our request, caused an actual measurement to be made by a perpendicular wooden batten, from an accurately adjusted level on the stone floor. It was then proved that there did not exist a difference of level even to the amount of a tenth of an inch. Whence arises the illusion? Is it that the eye, judging of directions by comparison with other objects, and having the numerous lines of the pent roof inclined in opposite directions to each half of the horizontal rods, is thus perplexed in its estimate; the ruler experiment is opposed to such an explanation. It may, perhaps, be owing to the effect of light from the upper windows, which frequently gives a curved appearance to wooden beams from the decrease of illumination from side to centre. If the phenomenon resemble the effect of the eyes in a portrait always looking the same whencesoever viewed, or the curves formed by spokes of a wheel passing a railing, as has been suggested, the effect should admit of a rigid explanation, and we may hope to obtain it from some one of our readers who may have time to investigate this singular deception."

Description of the Engravings.

Fig. 1, is a section of the roof. Fig. 2, a plan. Fig. 3, a longitudinal section through the vertex A B of fig. 2. Fig. 4, a transverse section through B C of fig. 2. Figs. 5 and 6, section and plan of the ron shoe. D, in fig. 2, is the copper heathing; and E E, the planks.

The following arrangement, if carried into effect, will certainly exhibit "reform" in the Post-Office Department.

From the Baltimore Gazette.

We are gratified to learn that an arrangement has been made by the Post-Master General for conveying the mail between Washington and Baltimore on the Railroad, and that further arrangements have been made for the transportations of the mails both southerly and easterly from Washington which includes the whole distance between New York and New Orleans, as stated in the following schedules.

GOING SOUTH.

Leave Washington	at	3	A.M.		
Arr. at Richmond	by	7 1-2	P.M.	16 1-2	hrs.
" Halifax	by	12	noon	16 1-2	do
" Fayetteville	by	10 1-2	P.M.	34 1-2	do
" Cheraw	by	3 1-2	P.M.	17	do
" Columbia	by	4 1-2	P.M.	21	do
" Augusta	by	6 1-2	A.M.	18	do
" Milledgeville	by	5	A.M.	22 1-2	do
" Columbus, Ga.	by	2	P.M.	33	do
" Montgomery	by	1	P.M.	23	do
" Mobile	by	9	P.M.	56	do
and at New Orleans	by	10	P.M.	25	do

Time from Washington to N. Orleans 283 hours, or 11 days and 19 hours.

RETURNING.

Leave New Orleans	at	10	A.M.		
Arr. at Mobile	by	11	A.M.	25	hrs.
" Montgomery	by	5	P.M.	54	do
" Columbus	by	2 1-2	P.M.	21 1-2	do
" Milledgeville	by	11	P.M.	32 1-2	do
" Augusta	by	8	P.M.	21	do
" Columbia	by	2 1-2	P.M.	18 1-2	do
" Cheraw	by	12	noon	21 1-2	do
" Fayetteville	by	3	A.M.	15	do
" Halifax	by	1 1-2	P.M.	34 1-2	do
" Richmond	by	5	A.M.	15 1-2	do
and at Washington	by	10	P.M.	17	do

Time from N. Orleans to Washington 276 hours, or 11 days and 12 hours.

Going north-east from Washington the mail will leave that city at three o'clock, A. M. by Railroad; it will leave Baltimore at half past six, A. M. by Steamboat; it will leave Philadelphia at four, P. M. by the Camden and Amboy Railroad, and arrive at New-York at eleven the same night.—Travellers can thus pass from Richmond to New-York in 42 hours, and from Baltimore to New-York in $16\frac{1}{2}$ hours.

SOWING CLOVER SEED.

Extract of a letter from a subscriber at Cayuga: "As the time for sowing clover seed is approaching, some note in your paper of practical farmers on that subject may be of some service, and save some the trouble of complaining of the loss or failure of their expected crop of clover. For several years past I have practised sowing my seed the last of March or 1st April, when we have frosty nights and thawing days. The mornings then are generally still—the surface of the ground is raised by the spars of ice formed during the night—and if the seed is cast on the ground such mornings, it finds its way through the crevices occasioned by the ice beneath the surface of the earth sufficiently deep to protect the young plant from the drouths of April or May, by which our clover crop is frequently destroyed, if the seed is sown when the surface of the earth is compact. Since I have practised in this way, I have not failed in a single instance of having a full crop of clover."—[Genesee Farmer.]

The schooner Indiana, which was prevented by the ice from getting into the Detroit River last fall arrived yesterday, freighted with a large quantity of merchandize for merchants in Detroit and in the country. The Sandusky, also arrived from Sandusky, freighted with pork, lard, butter &c., &c., consigned to Brewster, Smart & Co. and the owners on board.—[Detroit Journal.]

Rapid Travelling.—A train of 6 carriages was lately conveyed on the Greenwich Railroad in England, sixty miles in one hour—or at the rate of a mile a minute.

THE HORRORS OF CIVIL WAR.

The following sanguinary incidents of the horrible warfare between the present Government of Spain and the followers of Don Carlos, under their celebrated leader Zumalacarregui, are extracted from a work recently published by an officer (Captain Henningsen) who served in the Carlist army, under their inexorable leader:

'I will give an example of cruelty exercised against Zavala, beyond what Europe would believe, of the modern ages and of the party who profess to desire nothing but the improvement of Spain. Having, when pursued, sometimes obstinately defended himself, his two daughters, who had fallen into the hands of the Christinos, were dragged about, and always carried forward with the trailleurs in every encounter by the garrison of Bilboa, which had daily skirmishes with him. Zavala, fearful of injuring his own children, was obliged to prevent his partisans from returning the enemy's fire, and precipitately to retreat. At length, driven almost to desperation between the reproaches of his party and his paternal feelings, he sacrificed the latter to his duty; and having harangued his followers, placed them in ambush near a little village between Guernica and the sea. The enemy being informed of this circumstance, advanced along the road, leading forward as usual his two daughters Zavala, in a firm voice, but with tears in his eyes, ordered his men to open their fire; and instantly rushing on with the bayonet, was fortunate enough to recover his children unhurt; they had, however, narrowly escaped, two of those who held them being killed by the first discharge. His devotion was rewarded with victory; the enemy was dispersed and routed.'

Captain Henningsen has a striking description of the battle, or series of skirmishes, in which Quesada was finally discomfited. The Queen's general owed his own escape solely to the gallant devotion of Colonel Leopold O'Donnel, Conde de Labispal, a nobleman of Irish extraction, who *happening* to fall in with the army when travelling to Pampeluna, where a young and beautiful heiress was waiting to become his wife, had volunteered his services for the day, and headed a company of huzzars of the Guard. O'Donnell was one of the many who fell into the hands of the Carlists.

Last but not least of the prisoners taken was the Count Labispal—gallantly but vainly struggling to rally his men, he was surrounded by the Navarrese. Hitherto the Carlist prisoners had been shot as rebels, and the Christinos had suffered death by way of reprisal. Zumalacarregui, anxious to put an end to this dreadful state of things, set at liberty, and caused to be escorted as far as Echaori, five miles from Pampeluna, two soldiers who, unable from fatigue to follow the march, had been taken from Quesada's column. The next time Quesada sallied from Pampeluna, he requited the mercy of the Carlist general by shooting in Huarte d' Arquil a wounded volunteer, and putting afterwards to death the alcalde of Atoun, who was suspected of Carlism, as well as several other individuals. Zumalacarregui now wrote to the General Count Armilde de Toledo, to state 'that since the chiefs appointed by the usurping government were unwilling to make any arrangement for the preservation of the lives of their respective followers—although he had several times set them the example of clemency—the blood of those that perished must be now on their own heads.'

'He kept his word: of all the prisoners who were executed, perhaps the fate of Leopold O'Donnell was the most melancholy. He perished through that valor which seems an heir loom in his family, and sacrificed himself to save Quesada and his staff. He offered, if Zumalacarregui would spare his life, to pay a ransom that would equip all the battalions of Navarre; but knowing the necessity for making the example, the chief remained inexorable. He died with his brother officers of the Guards, in a manner which added another example to the many, that often those who have enjoyed a life of luxury and pleasure, and to whom it still holds forth bright prospects, can relinquish it with the least regret. His father, the Count of Labispal, celebrated both during the triumphs of Wellington and the revolution of 1823, callous and heartless as he had been throughout his political career, was doomed to prove, on hearing the death of his son, that there was still one point where his sensibility was vulnerable. He died of a broken heart at Montpelier, where he had been long residing. In his changes of principle, this elder Labispal had been the Talleyrand of Spain.'

We must next extract part of our author's chapter of the battle fought between Zumalacarregui and O'Doyle, nearly on the ground of the Duke of Wellington's illustrious triumph at Vittoria.

'It was now destined to become the scene of a signal overthrow of a division of the regular army of Spain by a handful of enthusiastic mountaineers. At Zuniga, accounts of the last devastations of Rodil, the burning of villages and cottages, and the massacre of the wounded Carlists, had reached our army, and had worked them up to a degree of excitement which accounts for their impetuosity.—The great difficulty was to keep them in something like order. Their loud cries of *Aellos! Muera la Reina!* were vigorously answered by the enemy, as well as their fire; but as they advanced in spite of the volleys of musketry which the whole line of the Liberal army were pouring in, their replies waxed fainter. The order which the Carlists preserved, with their impetuosity, their martial bearing, their wild shouts, and the black flags with a death's head and cross bones, seemed to have had an appalling effect. * * *

'The slaughter continued till nightfall, the enraged Royalists giving no quarter—and the night coming on alone saved the miserable remains of O'Doyle's army. About four hundred made their way to the village of Arieta, where they shut themselves up in the houses. About a thousand were killed, the field for two miles being covered with their dead bodies—the miserable wretches being dragged from the woods and thickets, in which they attempted to conceal themselves, and slaughtered by their angry opponents. I remember seeing twelve dead bodies lying together at a ford of the rivulet between the field and the road.

* * * * *

'The pursuit had continued so late that the greater part of our army was obliged to sleep on the field, and we bivouacked amongst the dead. In the meanwhile, a part of the third battalion of Navarre was detached to attack those who were in the village, where they had barricadoed the houses. After firing all night, the Christinos not choosing to surrender, a quantity of combustibles were collected, and placed against the houses. In the morning, the Christinos sent a flag of truce to the captain who was charged with his company to set fire to the piles, and stated that they had got the curate, the regidor, and a number of the principal inhabitants, with their wives and children; and that if the Carlists attempted to burn them out, they would commence by putting all these to death. The captain, who was a Frenchman, by the name of Sabatier, sent to Zumalacarregui to know how to proceed. The Carlist general determined to blockade them the next day; as they were entirely without provisions, he knew that hunger would force them to surrender. Eighty-four prisoners were brought in which the soldiers had made when tired of killing, for excepting these few cases no quarter was given; even two chaplains of the queen's army had been slain on the field. It was supposed that, according to the existing regulation, they would all suffer death; they were, however, remanded, and next day pardoned. O'Doyle, the general of the division, his brother, a captain, and several officers, were, however, shot. Zumalacarregui was inclined to have pardoned him; but amongst the despatches intercepted a few days previous were the minutes of a court martial held at Vittoria, in which O'Doyle had given orders for shooting the wounded prisoners. These papers had not yet been destroyed, and the circumstance of the part O'Doyle had taken in this transaction was mentioned to Zumalacarregui: this sealed his fate.

'O'Doyle behaved like a brave man on the field, but with less firmness afterwards. As he was being led up as a prisoner, a Carlist officer was mean enough to make some insulting observation. O'Doyle replied, "You are bearing arms, but you have never been a soldier, or you would know that a real soldier obeys his orders if they come from Hell itself." The officer was more severely reprimanded by the murmurs of the bystanders. O'Doyle, the next morning, begged to see the general, and when admitted to an interview, said he was a soldier who fought for those who paid him; that the fate of war had thrown him into the hands of the Royalists; and that he would serve them, if admitted to that honor, as faithfully as he had served the Queen. Zumalacarregui answered him briefly, that it was out of his power to spare his life.—He then began to implore with clasped hands, "*la vida, por Dios! por Dios!*" Zumalacarregui turned his head away in disgust, and said, "*A confesar leugo!*" and the wretched man was led out, and, after being half an hour with his confessor, shot; as well as his brother and other officers. His execution took place on the very spot where he had been defeated; his fortune and his life both taking wing on the same spot. Poor O'Doyle's was a melancholy fate, but it is impossible to deny the singular retribution of his punishment.'

Perhaps the next anecdote, which is so characteristic, in all respects, of the man and the country, that we could not omit it, leaves a more painful impression than any other one page in the book.—Count Via Manuel, a Spanish grandee, holding high rank in the Queen's army, fell into Zumalacarregui's hands at the close of one of those bloody battles among the woods of the Navarre. The frank and open manners of this nobleman confirmed the favorable impression which Zumalacarregui had received from witnessing his conduct in the field. He was in truth a rare example in his order, of high minded courage, and he had never been suspected of being biased by any unworthy motive in the choice of his paty. The Carlist General had lost the day before a favorite officer of his staff, and two or three volunteers besides. He proposed to write to Rodil, offering the captive grandee in exchange for these prisoners: in the meantime he invited Via Manuel to dine daily at his own table at head quarters—took him out with him on horseback—in short lived with him as a friendly guest; a week elapsed———

'They were at dinner at Lecumberri when Rodil's answer was brought in to Zumalacarregui; that note contained only the following sentence:—"The rebels taken have suffered death already." This was clearly the sentence of the prisoner. Zumalacarregui handed it over to him with the same sang froid with which he probably would have received it, had it been the messenger of his own fate. Via Manuel changed color. His host politely but firmly expressed his regret at being obliged to perform so unpleasant a duty, but informed him that he might be with his confessor till sunrise. His life had been spared so long, that this intelligence came like a thunderstroke on the unhappy grandee. At his request, Zumalacarregui consented to delay his execution, while he sent a messenger to the King entreating his clemency. He returned with the answer, that when soldiers and officers of inferior rank, taken with arms in their hands, had suffered death, it was impossible to pardon a Spanish Grandee. Via Manuel was shot at Lecumberri, but did not die so well as his deportment at first announced; probably it was the shock of the sudden disappointment, after he had so long entertained hopes of life, which had unnerved him.'

'I must not omit to mention a singular instance of fidelity. Shortly after his death, a sergeant, as he stated himself to be, and his galons indicated, deserted over to us, and was placed in a company of *guides;* he afterwards surprised and stabbed a sentinel and disappeared. We were informed by other deserters afterwards, that this very individual was a servant of Via Manuel's who took this mode of communicating with his master—but arrived a day too late; and, having acquired the certainty of his execution, on the first opportunity carried back the news of it, and some relics of his lord, which he had bought from the soldiers who had shot him.'

Surely, in spite of all Rodil's cruelty, and the cold bloodedness of its announcement, Via Manuel had tasted the salt of his captor; and even an Arab robber under such circumstances would have considered the sacred law of hospitality as infrangible. If, however, Don Carlos was exactly aware of the reception which his general had given to the Christino grandee, his royal highness's answer to Zumalacarregui's appeal is still more painful to think of than the *hesitation* which prompted that appeal.

We have 'supped full with horrors'; but still there is one scene of considerable extent which must be given before our reader can have completed his notion of these barbarous people. In a village just within the border of Navarre, a small garrison of Christino Urbanos—men recently drafted from the National Guard of some town in the South—had established themselves, and were levying heavy contributions upon the monasterier, besides doing bloody execution occasionally among the scattered peasants of what Zumalacarregui con-

sidered as his own proper domain. The country people flocked in with urgent entreaties for his interference to rid them of this annoyance—he did not require much persuasion; but the enemy's columns were hovering about; Zumalacarregui had but a small force with him at the time; and the attempt must at least have been delayed, but for the zeal of a veteran smuggler, Ximenes, who, with a sturdy youth, his son, offered to conduct a detachment by a safe byway.

'I shall never forget,' says our author, 'one old woman, dressed almost in rags, her grey hair floating dishevelled about her neck, who came up to the captain of a company with whom I was in conversation, and probably mistaking him for a superior officer, doubled her shrivelled hand in his face, and shrieked out a volley of insulting epithets, which she concluded by invoking "*La malediccion de Dios*" on all our heads, if we retired like *falsos*, and left a single one of the *blacks* alive. Having inquired of a bystander who was this fanatic? we were informed that she was an old weaver, of a neighboring village, whose only son had been shot that day fortnight—having been dragged from his bed by some of the Urbanos; it was supposed for having carried tobacco to the Carlists.'

The detachment approached the village, and found that the Urbanos had fortified themselves in the church—while *Ximenes* made the discovery that *his own eldest son* was their commandant!—Forthwith,—

'The two four-pounders taken at Vittoria, and which at that time were all the artillery, were brought to bear on the church-gates, which were lined with heavy sheets of iron. The gates having been burst open, with the loss of three men wounded only, our volunteers rushed into the church, but they were only able to surprise one or two of the enemy, the rest having retreated into the steeple, of which the staircase had been broken away, and where they had most strongly barricaded themselves. As they obstinately refused to surrender, and it would have taken too long to undermine the massive walls of the old steeple—in which act the approach of some Christino column would probably have interrupted us—it was resolved to set fire to it. Piles of wood, tow, goat-skins full of brandy, and other inflammable matter, were piled at the foot of the steeple, from the interior of the church; and the Baron de Los Vales,* having just arrived, was entrusted with the commission of setting fire to it. The besieged had no doubt of being relieved before day break, and therefore were loud in their jokes against the Carlists, to whom they called out, "Mountain thieves! sons of monks! rebels! you will soon have to run back to your mountains—the columns are advancing.'

Night closed in—but it brought no intermission of the assault—by and by—

'The shrieks of some who had taken refuge in corners of the building where they were reached by the flames, as well as the women and children who saw the devouring element raging below, were heard at intervals; and although orders were given to fire only on the men, it was often impossible to distinguish the dark figures that flitted before the light, endeavoring to breathe an instant out of the smoky atmosphere. It was repeatedly proposed to them to let the women and children out, but this they refused. The bells had all fallen in, and packets of cartridges were constantly exploding. Towards morning a few faint cries of "*Viva el Rey!*" were heard from the women, and the commandant of the Tower inquired if quarter would be given them? He was answered "No; the men had none to hope for." He then inquired if it was Zumalacarregui who had besieged them, and which was he? The general had just arrived, and most imprudently went beyond the corner of the church, exclaiming "*Aquiestoy!*"—Here I am! The commandant then said they could bear the heat and smoke no longer, and asked if they would be allowed the consolations of religion before they suffered death. Zumalacarregui replied, that the Carlists had never denied that yet, but not to flatter themselves with the hope of mercy. The commandant then answered, that they surrendered. But now men who had defended themselves desperately, and who had no chance for their lives, missed the opportunity of shooting the Carlist leader, who was not above fifty yards from them, firing downwards, when it is so much easier to him, and a bullet carries so much straighter than in a horizontal direction, has always been a matter of surprise to me, particularly as several shots were fired afterwards by them.

'When ladders were placed to the church roof, and the volunteers went up to receive their arms, they shot one soldier, and an officer was wounded; the men who had fired were bayoneted on the spot—one in particular, who defended a narrow ledge, and was stuck in the breast by a volunteer, fell from the top to the bottom of the steeple headlong at our feet; the rest made no resistance. Three women (one a Carlist prisoner) and four children had perished, and above thirty of the garrison, either by the smoke or the flames, or the shot of the assailants. Those that remained were so blackened by the smoke, that they presented a most ghastly appearance, when, with considerrble difficulty, they were got down over the roof of the church, which, although the steeple was burning for ten or twelve hours, had never taken fire. The commandant and his lieutenant were brought before the general, who inquired whether the garrison had been acting all along by their orders. The commandant hesitated, but the ex-schoolmaster boldly replied, 'Yes: they acted by our orders.' The former was a short man, about four-and-thirty, his form athletic and his bones all thickly set; he was dressed in blue trowsers and zamarra. The smoke to which he had been all night exposed, had swollen his eyelids and darkened his face. *This was the son of Ximenes;* on the whole, he presented the idea of a bold and determined ruffian. The schoolmaster, who was also below the middle stature, had an open and prepossessing countenance, and he behaved in every respect with the firmness of a man; while the captain occasionally betrayed signs of weakness, which I should scarcely have expected after his gallant defence, for such it incontestibly was.

'"Have you any thing to say in your defence?" inquired the general. The reply of the lieutenant was, "That he neither begged for mercy, nor did he suppose it likely that pardon would be granted him. They might, however, do worse than let him live; he had no affection either for the Queen or for Don Carlos, but where chance had thrown him, that party, as they had seen, would he serve; if they chose to try him, and let him live, he would serve the King like a soldier; if they shot him, like a soldier he would die.' 'And you?' said the general to the captain. 'I only surrendered,' replied Lorenzo Ximenes, 'because I was promised quarter; if not, I should have held out longer.—You may judge from my behavior whether I would not have perished in the tower if I had not distinctly understood so.' 'It is false,' hastily interrupted the general; 'who did I speak to myself?' 'To me,' said the lieutenant. 'And did you say to the commandant that I had offered quarter?' 'No; I told him that you had refused us our lives, and we should both have perished there, only the smoke had grown intolerable: this is the truth, or you would not hold me here now.' The general beckoned with his hand for them to be removed. 'You will remember my father and brother?' said Lorenzo, imploringly. 'If I have done wrong they have served the king faithfully.' The whining tone in which this appeal was made contrasted unfavorably with the bold and frank demeanor of his fellow captive. 'If your father and brother had been taken,' said the general, 'your treason would have been no palliation of their loyalty.' The schoolmaster, I remember, held a paper cigar between his fingers (for at all times and seasons the Spaniards smoke), and was looking round for a light. *The general took his own cigar from his mouth and handed it to him to ignite his by; he bowed respectfully as he returned it to him.* 'Think on what I have said, general,' cried he as they were led away. It was evident that Zumalacarregui was strongly prepossessed in his favor; he gazed after him with that intense and penetrating look so peculiar to him, and muttered a few words, in which, 'What a pity for that lad!' alone was audible.'

Henningsen happened to be one of the officers of the watch that night, and he and his comrade had established themselves in the same house with these two unhappy men. Presently the father of the Christino Captain, old Ximenes, the most devoted of the Carlists, announced himself at the door.

'When I heard that Ximenes was come I could not help feeling a thrill of horror, and we were all about retiring, when the prisoners begged us to remain. The meeting—and the parting of the father, for the last time on this side of the grave, from a son,—who, however divided in opinions, and sinning in his political tenets, was still united to him in blood and in affections, which he in vain tried to control and to smother,—this was a heart-rending scene. Ximenes had sacrificed his fortune, and the ease and independence of his old age to his duty—and he now saw his eldest and once best beloved son, about to suffer death, with the consciousness that he had done his part to bring him to a punishment so bitter. He had resolved at first not to trust himself with an interview, but the prayer of his son, against whom all animosity was now buried, he had been unable to refuse. Ximenes, whom I have known much of both before and since, is a man who, although advanced in the vale of years, is still hale and healthy—short of stature, sharp featured, and gray haired; but I shall never forget when he entered the room, his son's throwing himself at his feet, and the expression of his countenance as the tears started to his eyes and rolled over his weather beaten cheeks; in an instant they were locked in each other's embrace; retiring into the alcove they conversed earnestly for some time, but not, from what I involuntarily gathered until the last, about the possibility of saving him. As the father took leave of him we heard him distinctly and earnestly say, 'Is there no hope, then?' '*Pide usted a Dios!*' 'You must pray for it to God!' replied the old man, as he tore himself away. When he was gone, we sent up the larger part of our supper to the prisoners, who had their rations, but which they could only get cooked soldier fashion. We had much conversation with them. The commandant seemed much more tranquil after this interview; and his lieutenant preserved the same sang-froid as at first. A day, or two days after, having been tried by the auditor of war, the prisoners were shot.

'I have often seen old Ximenes since. He still continues to serve us with the same zeal, and has been on many and dangerous expeditions, but he is visibly altered, and has always a settled gloom and melancholy in his countenance. I have heard that Lorenzo had offered him a large sum of money to gain him over; this had come to Zumalacarregui's knowledge, through the intelligences he kept up in the heart of the adverse party, and he had reproached Ximenes with not having informed him of it.'

* This is the French officer who has published a volume entitled 'The Career of Don Carlos,' and containing some very interesting chapters—especially one on Don Carlos's escape from London, and incognito journey through France to the seat of war. We have great doubts, however, whether Prince Talleyrand was not perfectly well aware of all that was going on. If Carlos be finally overthrown in Spain, nothing can prevent his resuming all his natural rights as First Prince (after the exiles at Prague) of *the House of Bourbon.*

New Iron Steamboat.—The wrought iron steamboat, ordered from England by the Steamboat Company of Georgia, arrived (in pieces) at Savannah, last week, on board the British ship Alcyone, Captain Muir from Liverpool. Her length is 120 feet, her beam 26 feet, and her depth 7½ feet. It is estimated by her builders that she will draw, with all her machinery and every thing on board, 2 feet 3 inches. She will have an engine of 46 English horse power, on the low pressure principle.

Rule for determining the weight of hay.—Hay in the field-rick, says Low, weighs somewhat better than 122 lbs. the cubic yard; after being compressed in the stack, it weighs from 140 to 180 lbs. and when old 200 lbs.

HARTFORD AND NEW-HAVEN RAILROAD.

From New-Haven to Meriden, eighteen miles of this Railroad is now located, and is expected to be ready for contract about the 25th of May. The attention of contractors is invited to this work. A more definite advertisement of the time when proposals are to be received, will hereafter appear.

JAMES BREWSTER, Agent.

New-Haven, April 27, 1836. m16—3t

[Editors to whom this is MARKED, are requested to give it three insertions, and send their bills to James Brewster, President Railroad Company,

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

NEW-YORK AND ERIE RAILROAD.

TO CONTRACTORS.—Proposals will be received at the Engineer's Office of the New-York and Erie Railroad Company, in the village of Binghampton, on and until the 30th day of June next, for grading 69 miles of the Railroad, from the village of Owego, in Tioga County, to the village of Deposit in Delaware County.

Proposals will also be received at the Engineer's Office, in Monticello, on and until the 11th day of July next, for grading 48 miles of the Railroad through the county of Sullivan, extending from the Delaware and Hudson Canal up the valley of the Neversink, and thence to the mouth of the Callikoon Creek, on the Delaware River.

Plans and profiles of the line above mentioned, staked out in convenient sections, with printed forms of the contracts, will be ready for exhibition at the said offices twenty days before the days of letting above specified.

The Company reserve the privilege of accepting only such proposals as they may deem for their advantage.

New-York, 26th April, 1836.

15—tf JAMES KING, President.

NOTICE TO CONTRACTORS FOR EXCAVATION AND EMBANKMENT.

PROPOSALS will be received at the Office of the Munroe Railroad Company, Macon, Geo., between the 19th and 21st of May next, for Excavating and Embanking the whole of the Railroad from Macon to Forsyth, a distance of 25 miles, embracing much heavy graduation.

For further information, apply to

DANIEL GRIFFIN,
Resident Engineer.
J. EDGAR THOMSON,
C. Engineer.

Macon, March 28th, 1836. 11—5t

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS
OF VOLUME II. OF THE
CHICAGO AMERICAN,
TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wildnerness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

⁂ Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

⁂ All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

⁂ Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

GEORGIA RAILROAD & BANKING COMPANY.

NOTICE TO CONTRACTORS.

SEALED PROPOSALS will be received at this Office, between the 1st and 3d of June next, for laying the superstructure on 50 miles of the Georgia Railroad—all materials to be furnished by the Company.

The first ten miles to be commenced by the 10th of September, and completed by the 15th January next—the remainder of the line MUST BE finished on or before the 1st of May, 1837.

Plans and Specifications of the work, may be seen, and all other information obtained on application at the Office, one week previous to the letting.

J. EDGAR THOMSON, Chief Eng'r.

Engineer's Office, Augusta, Geo., April 2d, 1836. 12—4t.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.

feb 20—ytf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames'	superior	back-strap Shovels
150	do	do	plain do
150	do	do	cast steel Shovels & Spades
150	do	do	Gold-mining Shovels
100	do	do	plated Spades
50	do	do	socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

RAILWAY IRON.

95 tons of	1 inch	by	½ inch.			FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.
200	do	1¼	do	½	do	
40	do	1½	do	½	do	
800	do	2	do	½	do	
800	do	2½	do	½	do	
soon expected.						

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, APRIL 30, 1836. [VOLUME V.—No. 17.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 30, 1836.

ROTARY STEAM ENGINE.—The general interest manifested not only in this country, but also in England, in the result of the experiments being made in this country with the *Rotary* Engine, induces us to refer again to the subject—which we are enabled to do more satisfactorily, as we find in the Journal of the Franklin Institute for April, the specifications and drawings of the patentees. From these drawings and accompanying description, it will be easily understood; and by the statement which we are enabled to make on good authority, it will, we trust, be judged "by its works," and not by the prejudices of those who cannot satisfy themselves as to the why, and wherefore.

That there is something about it which is not generally understood, we are willing to admit, and therefore are not surprised that there are many who not having seen it fairly tested, *doubt* its power, but as actual demonstration is all that intelligent men require to establish its superiority over the ordinary engine, it will at no distant day be duly appreciated, and generally used in all parts of the country.

We have been often asked if it would answer for engines of 30 or 40 horse power—but were entirely unable to answer the question, as experiments had not to our knowledge been made beyond 15 or 20 horse power; we are now, however, authorised to say, that engines on this principle can be made of 60, 80, or 100 horse power, and guaranteed to perform as much, and even more, with less fuel, than any other engine of the same estimated capacity.

There is one now in course of construction, with *nine* feet sweep, or four and a half feet arms, and another one contracted for, with twelve feet sweep, or six feet arms, from the shaft to the aperture—which will, when completed, settle the question, as to its being susceptible of application on a large scale—to the satisfaction of the public. Those who have watched its progress require no such evidence.

NEWBURGH AND DELAWARE RAILROAD.—We are gratified to learn that this Road from Newburgh to the Delaware River, or to intersect the New York and Erie Railroad, is now to be undertaken in earnest. An engineer, Mr. Sargent, is employed, and will enter immediately upon his duties. This is as it should be; and we hope soon to see measures adopted to continue the Road *eastward* from Newburgh or Fishkill into New England, with a view of accommodating the travel from those States to the West, via. Newburgh and the New-York and Erie Railroad. This is a measure demanding the attention of the gentlemen interested in these two, or perhaps ultimately, *one*, road.

We have frequently called attention to Avery's Rotary Engine. The following specification, from the Journal of the Franklin Institute, will place the subject fairly before the public.

From the Journal of the Franklin Institute.

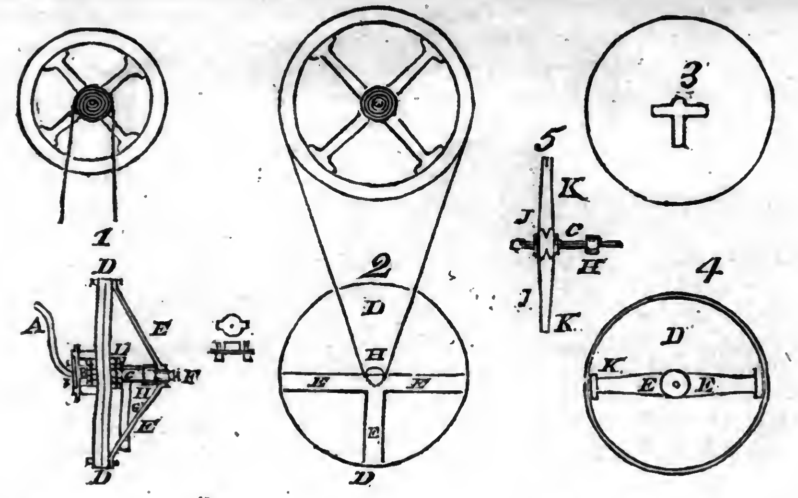
FOSTER'S AND AVERY'S ROTARY STEAM ENGINE.

We made some remarks on the subject of this engine, in the last number, and as it has attracted considerable attention, we have determined to publish the specification entire, in order that the nature and amount of the part claimed may be fully understood. This, with some further remarks upon it, was crowded out of the last number of the Journal, and, upon reflection, we have determined to omit the said remarks, and to give the specification alone. The original notice of this engine may be found at page 171, vol. ix.—[EDITOR J. F. I.]

SPECIFICATION OF A PATENT FOR AN IMPROVEMENT IN THE REACTING STEAM ENGINE. GRANTED TO AMBROSE FOSTER, BRUTUS, CAYUGA COUNTY, AND WILLIAM AVERY, SALINA, ONONDAGA COUNTY, NEW-YORK, SEPTEMBER 28TH, 1831.

To all whom it may concern, be it known, that we, Ambrose Foster, of Brutus, Cayuga county, and William Avery, of Salina, Onondaga county, in the State of New-York, have invented a certain improvement in the steam engine, commonly called the reacting engine, and that the following is a full and exact description of our said improvement.

Fig. 1, in the accompanying drawing, represents a side view of the engine, the revolving arms not being visible, in consequence of their being enclosed in a circular case, to be presently described. A is a steam tube, connected with a boiler, and forming a steam-tight joint, in the box B, where it opens into the shaft C, which is made hollow to the requisite depth. D is the edge, or periphery, of a case, or drum, within which the arms from which the steam is to issue, revolve. E, E, are braces, which may be attached to the case, or drum, and at their junction support a socket, containing a centre pin, or screw, F, against



which the shaft C is to run. G is a tube, through which the steam passing into the case from the revolving arms, is allowed to escape ; a portion of this steam is employed to heat the water by which the boiler is to be supplied. H is a whirl upon the shaft C, a strap from which may be employed to drive machinery. Where the same parts occur in the other figures in the drawing, they are represented by the same letters.

Fig. 2, shows the flat side of the drum, or case; the arms, or braces, E, E ; the whirl H, and the manner in which straps, or other gearing, may be carried from one wheel to another. Fig. 3, is the opposite side of the drum, or case.

E, E, in Fig. 4, shows the flat sides of the revolving hollow arms ; and J, J, Fig. 5, is an edge view of the same. In Fig. 4, one side of the case is supposed to be removed, and, in Fig. 5, the whole case. At K, K, openings are made in the narrow edges of the arms, in directions opposite to each other, to allow of the escape of the steam introduced into them through the shaft C, with the hollow of which they communicate.

In an engine which we have in actual operation, the arms, E, E, (or J, J,) are each twenty inches in length. The width of the arms at the centre is about six inches, and at the ends about two and a half inches; in depth, or thickness, they are about one and a half inches, near the centre, and about three-fourths of an inch near the end. The size of the holes through which the steam escapes, is about one-quarter, by one-eighth, of an inch. The holes are so perforated that the steam shall issue at right angles with the shaft.

We have found this engine to act with great power, but do not intend to confine ourselves to these particular proportions, as we mean not only to vary the size of our engines, but also the relative proportions of their respective parts, according to circumstances.

L, L, are parts of stuffing boxes, employed to prevent the escape of steam, in a manner well known to machinists.

We find it to be a point of great importance to give such a form to the revolving arms, as shall subject them to the least possible resistance from the air; we, therefore, instead of making them in the form of round tubes, which has been heretofore done, give to them the form which results from making each half of the arm a segment of a large circle, so that, when the two halves are united, the edges of the tube present acute angles. The tubes, however, may be made elliptical, or oval, and the same end will be, in a great measure, attained. We use any number of such arms on the same shaft, as we may find best adapted to our purpose.

We do not claim to be the inventors of the reacting steam engine, nor of the case, or drum, within which we intend the arms shall, in general, revolve ; but what we claim as our invention, is, simply, the giving the oblate, or flat, form to the revolving arms, so that, in proportion to their capacity, they shall experience much less resistance from the air than that to which they have been heretofore subjected, thereby obtaining a greatly increased power.

AMBROSE FOSTER,
WILLIAM AVERY.

To the Editor of the Railroad Journal.

London, December 19th, 1835.

DEAR SIR,—I observe, by your Journal of the 21st November, that you have published my communication dated London, October 9th, and as it appears, you attach some importance to information respecting Railway Iron, I will now continue my notice of this article from the date of my letter up to the present time.

In my last letter you will recollect I mentioned that the following advances in price had taken place in common (Welch) bars, viz:

On 25th August the price at Newport and Cardiff was, per ton,	£5 10s.
On that day the manufacturers advanced the price -	10s.
September 12th they advanced it again - - -	10s.
October 2d, " "	10s.
December 1st, " "	12s. 6d.
	£2 2s. 6d.
	£7 12s. 6d

Thus you see there has been a furthe advance of 12s. 6d. per ton since my letter to you. But the price of 7*l.* 12*s.* 6*d.*, as fixed by the meeting of Welch Iron Masters at Romney, on the 1st inst., is not observed by some of the leading houses, who refuse to sell under 8*l.* per ton, and others decline orders at all, for the present, alleging that their engagements are already so heavy, and the prospects of the trade are such, that they prefer to confine themselves to the execution of orders on hand, and thus enable them to take advantage of increased prices in the spring. The meeting at Romney adjourned to assemble again on the 12th January next, when it is confidently expected the price of 8*l.* will not only be generally confirmed, but that a further advance of 10*s.* will be agreed to. The iron market is in a most extraordinary state; the demand is far greater than the supply, which it is impossible to increase immediately, owing to the inability to obtain competent workmen to mine the coal, iron stone, and limestone, and to manufacture them into iron when procured. Aid cannot be expected from the lead, copper, tin, and other manufacturers of metals, which would be practicable if these branches were in a depressed state, but so far from this being the case, these trades are in nearly as flourishing a condition as the iron trade. Hitherto the iron masters always considered themselves fortunate, if they could get through the winter without a decline in price, *now, in the month of December,* the effort of the most judicious among them is to prevent too frequent and too great advances of price, which they deprecate, lest consumption should be checked, and also, what they fear more than any thing else, the workmen should combine and "strike" for higher wages.

You may inquire what effect has been produced on railway iron. I can answer, by quoting my own experience. I have within a week received an order for a very large quantity, (so large that I have not revealed it to any one lest it should affect the market,) of railway iron, from America. I have issued my circulars to all the houses in this line, and I find a most wonderful alteration in the tone of their communications; formerly they were all eagerness to give an answer by return of mail, and they manifested the greatest anxiety to secure the whole order, or as much of it as possible. Now some of them decline making tenders altogether, owing to the magnitude of engagements on hand; others, rather than break off connections, mention such high prices for very small parts of the total quantity wanted, that they think they will not be accepted. A decided indisposition is manifested to come under any further engagements, unless at exorbitant prices, until it is ascertained what will be the result of the adjourned meeting at Romney on the 12th proximo. I very much fear that the same pattern of rail, which I put out in the

middle of September last at 8*l.* per ton, will not now be contracted for under 10*l.* per ton, but I will do my best to screw them down to the lowest price. Notwithstanding the present high price, I have every reason to believe that prices will be still higher in the spring, for since I wrote to you I have traversed the whole iron region, visiting every establishment of any importance, and every where I found an activity and bustle which I never before witnessed during my long experience in this business. Every establishment is full, to excess, of orders, and the greatest exertions are making, day and night, to execute them. The Pacha of Egypt's order for about 5,000 tons for the railway across the Isthmus of Suez, is about one half completed; but others pour in from France, (there are two recently from that country for about 6,000 tons,) from Germany, Belgium, America, and every part of this country, in a way to astonish even the most enthusiastic friends of the Railway System. Besides this demand for railway iron, the consumption of other kinds of iron fully keeps pace with it. This country being in a more prosperous condition, and every branch of trade, cotton, silk, wool, flax, hemp, tin, lead, copper, &c., being more flourishing than at any period since the termination of the Napoleon wars, it is reasonable to suppose, and such is the fact, that iron, which is the foundation upon which the arts of civilized life rest, should be in great demand, when all other branches of industry flourish. Hence the demand for domestic consumption for ordinary purposes is very great, which when added to the demand for foreign countries, and railway purposes, you may easily imagine will readily account for the present prices, and the prospect of still higher in the spring, unless war or some other calamity should ensue to check the brilliant progress of civilization arising from the long continuance of peace. Most sincerely do I trust that you and I will never live to see another war carried on,—particularly do I deprecate a war with France,—our old ally, one of our best customers, and who ought to be our best friend. A war with that country would be little short of insanity,—it would interfere with the prosperity of both countries in a most melancholy manner, and nothing but empty, worthless glory, would result to either party. I most sincerely hope so great an evil will be averted.

I am, dear sir, very respectfully
and truly, yours,

GERARD RALSTON.

To the Editor of the Railroad Journal.

MONTREAL, 29th March, 1836.

Sir:—The communication of S. D., in your Journal of the 13th Feb., has recalled my attention to two Reports hastily perused some time since. I refer to Mr. Campbell's Report, published in your Journal of the 26th Dec., 1835, and Mr. Seymour's Report to the President of the N. Y. and Erie Railroad Company. S. D. only alludes to the Report of the latter gentleman, and has confined himself to general remarks, and I now offer you the following observations on some of the detailed statements of that gentleman.

Mr. Seymour states, "that one of the American locomotives, weighing $8\frac{1}{2}$ tons, will draw upon a level road 200 tons of freight, at the rate of ten miles per hour; that the same engine will draw, upon an ascent of 25 feet per mile, 100 tons," and so on. The rise which doubles the traction being stated at 25 feet per mile, gives us at once the power equal to the $\frac{1}{211}$ of the load, and supposing the engine to act by $\frac{4}{5}$ of its weight on the driving wheels, and assuming the adhesion equal to the $\frac{1}{12}$ of the weight, we have $\frac{4\times8\frac{1}{2}}{5\times12}\times211=119{\cdot}5$ tons *gross*, instead of 200 tons *freight*, and even this, only by taking every thing in the most extravagantly favorable light, for the weight on the driving wheels, is in general, only $\frac{3}{5}$ of the weight of the engine, and the adhesion assumed at $\frac{1}{12}$, is far above the average, in all states of the rails.

Again, Mr. S. observes, that "about the year 1829, it had not been supposed to be practicable to ascend with locomotive engines with loaded trains, upon grades exceeding 30 feet to the mile," etc. Now it is subsequently stated by Mr. S. himself, that at this day, with the most improvdd engine, only half a load can be taken up an ascent of 25 feet per mile. This passage I have quoted verbatim, above. The *absolute* load taken up any given ascent, is of course greater with engines having the advantage of the latest improvements, and the still greater advantage of the enormous addition to the weight, which is becoming almost universal, but the *relative* load differs but little from what it was six years ago, and the first tolerably constructed engine would have taken half *its* load up an ascent of 25 feet per mile, which is as much as the best will do now, according to Mr. S., which agrees with practice. Great improvements have and will continue to be made, in the mechanical construction, in avoiding fractures, rendering the parts less liable to wear, diminishing the quantity of fuel, etc., but as long as they draw by the adhesion of the wheels, only so long will the trifling ascent of 25 feet, or on well constructed roads with good carriages, about 22 feet, per mile diminish the power of the engine one half. Unfortunately, the adhesion of the wheels to the rails forms the limit of the power of the locomotive as at present used, and this limit is soon reached, and any even tolerable engine will, if the load or ascent be sufficiently great, cause the wheels to turn without advancing the train. Baldwin's engines are, I believe, generally admitted to be at least equal to any made in this country or in England, and I have known one of his latest, draw about 80 tons freight, say 110 tons gross, on a road greatly descending in the direction of the load, at the rate of 10 to 12 miles per hour, with the exception of half a mile on a straight line, which ascended at the rate of 26 feet per mile, and was with difficulty overcome by the combined action of the momentum of the train, by great diminution of the velocity, and by an immense addition of power produced by throwing a large portion of the weight of the tender on the driving wheels. By this simple expedient, the power of engines may be much increased, but it is utterly ruinous to our wooden superstructures, few of which are able to bear the action of a 6 tons engine, without injury, as is only too well known. This expedient is, I believe, due to Mr. Baldwin's, and would, were any proof wanting, be alone sufficient to show the very narrow limits of the powers of locomotive engines.

Mr. S. also speaks of avoiding the faults of the English engineers in "forcing" a line within certain limits as to grades and curvatures, at great expense. That this would be a fault as applied to many of *our* Roads, I readily admit; but if *we* could afford the capital as *they* can, then would our present cheap, temporary modes of construction be faults indeed; and, even under existing circumstances, could the Erie Railroad be so graded as to have no ascent in coming from the lake to the city, and no descent in the same direction greater than 18 feet per mile, it would, at the end of ten years, be a better investment for 20 or 30 millions of dollars, than as at present contemplated, for 5 millions. It is well known that this is impracticable, and I merely suppose this case to illustrate my position, that the power of locomotives on inclinations is much overrated, or perhaps, more correctly speaking, not understood by many who have much at stake on the successful solution of these very questions.

In the Report of the Baltimore and Ohio Company of '31, the traction is estimated at $\frac{1}{150}$, and allowing for unavoidable imperfections at $\frac{1}{400}$ of the weight, and yet now in '36, it has increased to $\frac{1}{211}$! Then, a car, was in equilibrio with gravity on an inclination of 13.2 feet per mile, now it requires 25 feet per mile to overcome the friction, which was then reduced by the use of friction wheels, and cars thus fitted up were recommended in the strongest possible terms, and the results of experiments given, apparently so decisive, as to lead irresistibly to the conclusion, that implicit reliance might be placed on them. Here then, after 4 years experience, after experiments and patents innumerable, are we far, very far, behind what we were in '31, as publicly announced at that time by the Engineer and Directors of the B. and O. Company. It is impossible to conceive a stronger case than this, of the caution with which these flattering statements should be re-

ceived, and right glad shall I be to learn, that an engine weighing 8½ tons will draw 50 tons freight upon an ascent of 25 feet per mile, 10 miles per hour, as the average performance—just half the reputed performance of the Baltimore engines. How much have these extravagant statements done to shake the public confidence in that noble undertaking which has scarcely advanced 5 miles in as many years, and which is now indebted for its chance of ultimate completion, to the spirit and energy with which similar and rival works are undertaken in other States, and from which Baltimore has at length derived that confidence in the Railway system, with which her own exertions had failed to inspire her.

Mr. Campbell states, that one of "Baldwin's engines will take from 70 to 80 tons freight, 10 to 12 miles per hour, up an ascent of 45 feet per mile." If this assertion refer to an engine of about 8 tons weight, then does it far exceed what the B. and O. Company profess to do—I say *profess* to do, for the performances recorded by Mr. Seymour are mere fractions of the above, and, even the greatest (150 passengers) is not more than ⅓ of what the engines are said to be capable of doing, and is rather below the average performance of the Hudson and Mohawk Railroad. On this Road, English and American engines take 50 tons gross, 15 miles per hour, overcoming an inclination of 26 feet per mile, for about ⅓ the distance run. The engines weigh about 7½ to 8 tons, and their average performance, as well as the extraordinary performance of Baldwin's engine mentioned above, are both within the limits of locomotive power, s stated in the beginning of this communication, though the performances recorded by the two gentlemen quoted above, go very far beyond them.

Of course, Baldwin, or any other good manufacturer, *can* make an engine which will take 80 tons freight up ascents of 40 to 45 feet per mile, at the rate of 10 miles an hour, but it must be a very different thing to one of Baldwin's ordinary engines, of about 8 tons weight, to which the general reader naturally supposes M. C. refers; and I think it at least doubtful if on any road the average performance of the engine is equal to 40 tons freight, drawn 10 to 12 miles up an ascent of 25 feet per mile, by a 7 to 8 tons locomotive. I need scarcely observe that the average useful effect for weeks and months together is that which is alone useful to the public, and on which the calculations of the capacity of engines should be founded, for it is well known to all who have any acquaintance with machinery, that nearly twice the ordinary amount of work can be turned off, *for a short time,* without injury to the machine, though were this attempted to be kept up, its durability would be comparatively trifling, a most important consideration in locomotives, the first cost of which is very great. My immediate object in troubling you with this communication is, that these, (as I think,) extravagant statements are more than any thing else, calculated to injure the cause of internal improvement, by being ultimately productive of mortification and serious loss to those embarking in enterprises founded on such data, by undermining the confidence of the public in the profession, and by leading inevitably to a hasty and imperfect system of location, the natural consequence of the light manner in which these heavy grades are spoken of.

In conclusion I beg leave to state, that I shall be much pleased to be proved in error as to the power of locomotives, and should any of your numerous contributors undertake the task, it will be received with the spirit in which this is offered,—that of seeking the truth.

Your obedient servant,

C. R. W.

☞ The Directors of the Detroit and St. Joseph's Railroad Company, have ordered, from England, the Iron for 40 miles of the road; being 720 tons, the cost of which will be about $60,000—$1500 a mile.

The grubbing and clearing on the part put under contract has been commenced, and will probably be finished by the 20th of May, the time stipulated in the contracts. We presume the iron will be received early in the fall or the latter part of summer.

The contracts for grubbing the first 15 miles of the Detroit and Pontiac Railroad, were let last Monday.—[Detroit Journal and Advertiser, May 3.]

We find the following article in the National Intelligencer, and as it relates to a subject of interest to many of our readers, we give it a place in our columns:—

We republish the subjoined article from the "Southern Patriot." When the arrangement for the survey of this great railroad was announced in the Columbia Telescope, we were aware that there was some misunderstanding in the case, as we knew the rule of service to be not to place the chief of the party of U. S. engineers in subordination to the civil engineers of any State or Company, but that when States or Companies had chief engineers, and U. S. engineers were associated on the same duty, the chief of the latter was allowed to be placed only on terms of equality with the former, receiving, like the former, his directions from the State or Company, and, like the former, making his reports and returns to the same authority.

The misunderstanding of these relations, in the associated service of private and U. S. engineers, and which had been inadvertently adopted in the preliminary arrangements for the survey of this road, by the authorities of the State of South Carolina, is now, we perceive, happily corrected.

The compliment paid by the "Southern Patriot," to Captain Williams, of the corps of topographical engineers, is, we understand, no more than the known science, great intelligence, experience, and industry of that officer justly entitle him to.

We lately observed to have been laid before Congress a report from Captain Williams, said to be a very able one, of a survey made by him for a ship canal around the Falls of Niagara. The report also embraces a plan of the work and an estimate of its cost. The whole, together with the drawings, has been ordered to be printed; and some time or other we shall give our readers some further account of the report, &c.

"Charleston and Ohio Railroad.—Capt. Williams, of the United States topographical engineers, arrived here in the steamboat from Norfolk, on Saturday. The officers to be associated with him in the survey of the proposed railroad, (viz. Lieutenants White, Dayton, and Reed, and Mr. Featherstonhaugh,) reached this place a short time since, so that the brigade is now full, and we are gratified to learn that these officers will enter immediately on the great work. Captain Williams, who is at the head of this corps, is, we understand, a gentleman of distinguished talents, of much experience, and admirably qualified for conducting the surveys about to be made; and all the officers under his command are gentlemen of high reputation, well qualified for the important duties which will devolve upon them.

We understand that Colonel Gadsden, and Captain Williams, as the chief, civil and military engineers, will, with General Hayne chairman of the commissioners, constitute a Board to arrange the measures to be adopted for the early and successful completion of the necessary examination, surveys, and estimates, to enable the Knoxville Convention, (which will assemble on the 4th of July next) to act efficiently upon the subject. Captain Williams will leave here with his party, (indeed, two of his officers have already gone,) for the mountains in a day or two, and will enter upon his work as soon as the necessary arrangements can be made. The best wishes of the citizens of Charleston go with them, and we know that it is only necessary to give this intimation to our fellow citizens of the interior of the approach of such visitors, to secure for them only a hospitable reception, but a cordial welcome, and the most *efficient aid.*"

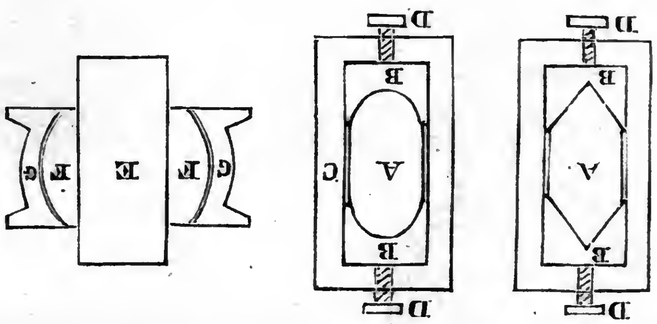
[From the Journal of the Franklin Institute.]

SPECIFICATION OF A PATENT FOR A MODE OF FITTING THE BOXES FOR GUDGEONS INTO THE PLUMMER BLOCKS; AND ALSO THE FITTING OF THE BEARING OF THE SLIDES FOR LOCOMOTIVE AND OTHER STEAM ENGINES, AND FOR OTHER PURPOSES. GRANTED TO MATTHIAS W. BALDWIN, CITY OF PHILADELPHIA, AUGUST 17, 1835.

The boxes in which the gudgeons used about locomotive and other steam engines, and machinery of various kinds, are received and turn, have heretofore been fitted into the plummer blocks, or pedestals, made to receive them, by filing, or other analogous means, their ends being made either square or angular, and adapted to corresponding parts in the plummer block, or pedestal, prepared to receive them. My improved

mode of fitting them consists in turning or boring the opening, or seat in the plummer block, into which the boxes are to be fitted, so as to make each of the cheeks cylindrical segments. The boxes in which the gudgeon is to run, are then to be attached to each other by screws, or otherwise, and turned by means of a slide rest, or worked in any other manner, so as to make their ends cylindrical, and to cause them to fit exactly to the cylindrical cheeks, prepared for their reception, in the plummer block.

In constructing the slides for the pistons of locomotive and other steam engines, and for other purposes, the slide bar has usually been made square, or four sided, and its angles usually right angles; and the brasses, or bearings, contained in the box within which it slides, have been adjusted to it by set screws operating upon three sides thereof. In my improved mode of construction, the adjustment is made to operate upon two sides, or edges, only. For this purpose, I make my slide bar flat on two sides, and the other two sides, or edges, half round, or otherwise form them into two planes, meeting each other along the middle thereof, by which means the rod will become six sided, this latter form being preferred to the rounding of the edges. The box within which the bar slides, is provided with two brasses, or bearing pieces, with hollows, or grooves, in them, adapted to the edges of the sliding bar, and fitting accurately between the parallel sides of the box; when, therefore, the brasses, or bearings, are adjusted to the edges of the rod by set screws acting against them, the rod is embraced by them so as effectually to check all tendency to a lateral motion, as will appear by an inspection of the drawings deposited in the Patent Office.



Figs. 1 and 2, cross sections of the box and slide bar, with angular and with circular fittings.

A, slide bar.

B, brasses, or bearings.

C, boxes.

D, adjusting screws.

Fig. 3, horizontal section of a plummer block and boxes, through the centre of the gudgeons.

E, gudgeon.

F, box.

G, cheeks of the plummer block.

What I claim as my invention, and wish to secure by letters patent, is the mode of fitting the boxes of gudgeons into plummer blocks, pedestals, or other receptacles, by boring, turning, or otherwise, so as to make the fittings cylindrical. I also claim the fitting of the slides for the pistons of locomotive engines, for other purposes, into brasses, or boxes, adjusted and operating in the manner hereinbefore set forth.

MATTHIAS W. BALDWIN.

PREVENTIVE AGAINST DRY ROT.

We have been favored by an intelligent ship master with the following communication relating to recent successful experiments in England in the means of preserving ship timber against premature decay, which cannot fail to be of practical interest and value to many of our readers.—[New-Bedford Mercury.]

Mr. Lindsey:—If you think the following description of the method of preserving timber from rot, insects and worms, now universally adopted in England, is of importance to the public, you will confer a favor by giving it an insertion.

The writer of this is personally acquainted with the ingenious inventor—has attended the lectures in London on the subject, and is satisfied of the efficacy of his plan.

The material employed by the inventor is Corrosive Sublimate, long known as a great preservative of animal substances from decay. The timber to be prepared must be placed in a tank or vessel, from 40 to 80 feet long, 4 or 5 feet deep, and about the same width. A solution of the corrosive sublimate is then thrown upon it until covered; the proportion, according to the inventor, is 1 lb. of corrosive sublimate to 5 gallons of water—but individuals who have tried it, say 1 lb. to 10 gallons of water. Pine plank are saturated in 48 hours. An oak stick, 40 feet long and 1 foot square, requires three weeks—during which time it becomes effectually seasoned, and will not contract or shrink even on exposure to the highest temperature of a tropical climate. The corrosive sublimate has a strong affinity for the albumen or vegetable juices generally called sap, combines instantaneously with it, and forms a new chemical compound which is solid, insoluble, and will not attract moisture. The efficacy of this invention has been tested in the most extraordinary manner. Pieces of the timber prepared with a solution of the sublimate, and unprepared pieces, the latter well seasoned, were placed in the "*Rotten Pit*," at the King's Dock Yard, Woolwich, in 1828. In 1831, the writer of this was present when they were withdrawn. The prepared timber was perfectly sound—the unprepared, although of the best English oak, was a mass of rot and decayed vegetable matter. The prepared sticks were left on the ground in the open air six months, and then again placed in the Rotten Pit, with other pieces of well seasoned timber. At the end of two years the prepared timber was found quite sound—the seasoned very rotten.

The Rotten Pit, at Woolwich Yard, is a cave under ground, 80 feet long by 20 feet, and built by order of government, for the purpose of testing the efficacy of the various proposed nostrums for preserving timber. The pit is lined, top, bottom and sides, with vegetable matter in the worst possible stage of corruption—very damp and full of carbonic acid gas—it is a perfect hot-bed—a candle will not burn in it a minute, so foul is the air of this subterraneous chamber. In fact, no timber, although thoroughly salted, docked, or seasoned, will resist three months the powerful decomposing qualities of the Rotten Pit. The specimens were placed on the bottom of the pit, and half buried in the putrid vegetable matter with which the cave is kept supplied. This experiment seemed so conclusive, that Government immediately paid the inventor £10,000, and advised him to take out a patent. He was ordered to construct tanks at all the Dock Yards, and the government timber was immediately prepared in the above manner. Previous to this, individuals had fitted tanks, and two whalemen were built entirely of timber and plank prepared with the solution. House builders are also using it very generally in London. The sleepers, or foundations for railways—staves for oil casks, canvass, rope, and all vegetable matter, may be preserved by its use. It is found that a cubic foot of oak, will absorb three pints of the liquid, which will cost at the present price of quicksilver, 7¼ cents per cubic foot. A mere trifle compared with the immense advantage of having a material not liable to be destroyed by rot, worms, or insects of any kind. The objection urged against this material, is its poisonous nature. But it has been proved by careful experiment, that corrosive sublimate, when it combines with the sap of wood, forms a compound perfectly insoluble, and quite innocent—in fact, a complete chemical change takes place in the poisonous nature of the mixture by this combination.

The writer has seen experiments tried upon canvass and rope, which was immersed in the solution, and placed four months in a dunghill—the unprepared pieces were destroyed—while the texture of the prepared specimens was not weakened in the slightest degree—any one can try this by using the above proportions.

Satisfactory accounts have been received by Messrs. B. Rotch and M. Enderby, of London, from the captains of the whale ships constructed at their instance, of timber prepared as above—testifying that the crew were remarkably healthy, although they slept actually in contact with the ceiling plank thus prepared, through all climates and changes of temperature.

It is well known to practical men that salt is not an effectual preservative—as many ships salted on the stocks, have been found rotten the first voyage—one instance, the Enterprise of Nantucket. The Golconda, of New-Bedford, has had a new windlass three voyages in succession, and the lower masts of ships very quickly decay. These parts of a ship it is impossible to salt. In the British navy, the use of salt has been discontinued, as it is found to corrode the iron rapidly, and it also keeps a ship in a very damp state.

From Genesee Farmer.

BEST VARIETIES OF THE SWEET APPLE.

BY HAMBURG.

Mr. Tucker—I noticed an article in the Monthly Genesee Farmer on the various uses and valuable properties of the sweet apple for fattening hogs, cattle, &c. I am impressed fully with the belief, that sweet apples for fattening hogs and cattle, are, when compared with the expense of cultivation, invaluable, though my experiments are quite limited as to the practical results. But the object of this communication is, to make some suggestions as it regards varieties, together with the seasons of ripening. It is remarked, I think, justly, that the early sweet Bough is worthy of particular attention, as being an excellent sweet apple, and as far as my knowledge extends, quite the best of the early varieties. There are two kinds of this Bough: the smaller kind is raised and much preferred in the county of Dutchess as being much the richest and most valuable, and quite as early—both excellent eating apples. The latter kind I have never seen in the western counties. The early Leicester Sweeting is also an apple of equal value, but about two weeks later. This is an excellent bearer, and will keep well to October. The Pound Sweeting comes along now, and is a good and profitable apple—also the Cabashire Sweeting, which is both large and fine. Then the Wing Sweeting, Tift Sweeting, Jersey Sweeting—also the Crow Egg. The Wing and Tift Sweetings are remarkably sweet, of a middling size, and very delicious for eating—also excellent bearers. Another remarkable quality is, they are fine for eating in October, and if they are put up with care, they are equally as good in the months of April and May, after being kept over the winter. They are fine through the winter for store hogs. The length of their season, the richness of their flavor, and the crops yearly produced by each tree, render them worthy the particular attention of every farmer. The Jersey Sweet is no less worthy of culture as it regards its qualities. In its richness and deliciousness for eating, &c., it is not surpassed by any other sweet apple in the State. There are a few kinds which I find among the selections made by persons grafting about the country that exceptions might be taken to, among which I will mention the pumpkin Sweeting, Golden Sweeting, &c. I am well acquainted with these fruits, and in my humble judgment they are not worth cultivating. In the first place they are a very coarse apple and quite liable to be watery at the core, and they will not keep any length of time; and further, there are others to be obtained that, to say the least, are much more valuable. One remark respecting grafting: I discover, from a number of years' observation, that the best time for grafting is as early as the weather in March will admit of their being set the best, as those early set generally grow much more thriftily and much larger the fisrt year than those set late.

Respectfully, &c,

HAMBURG.

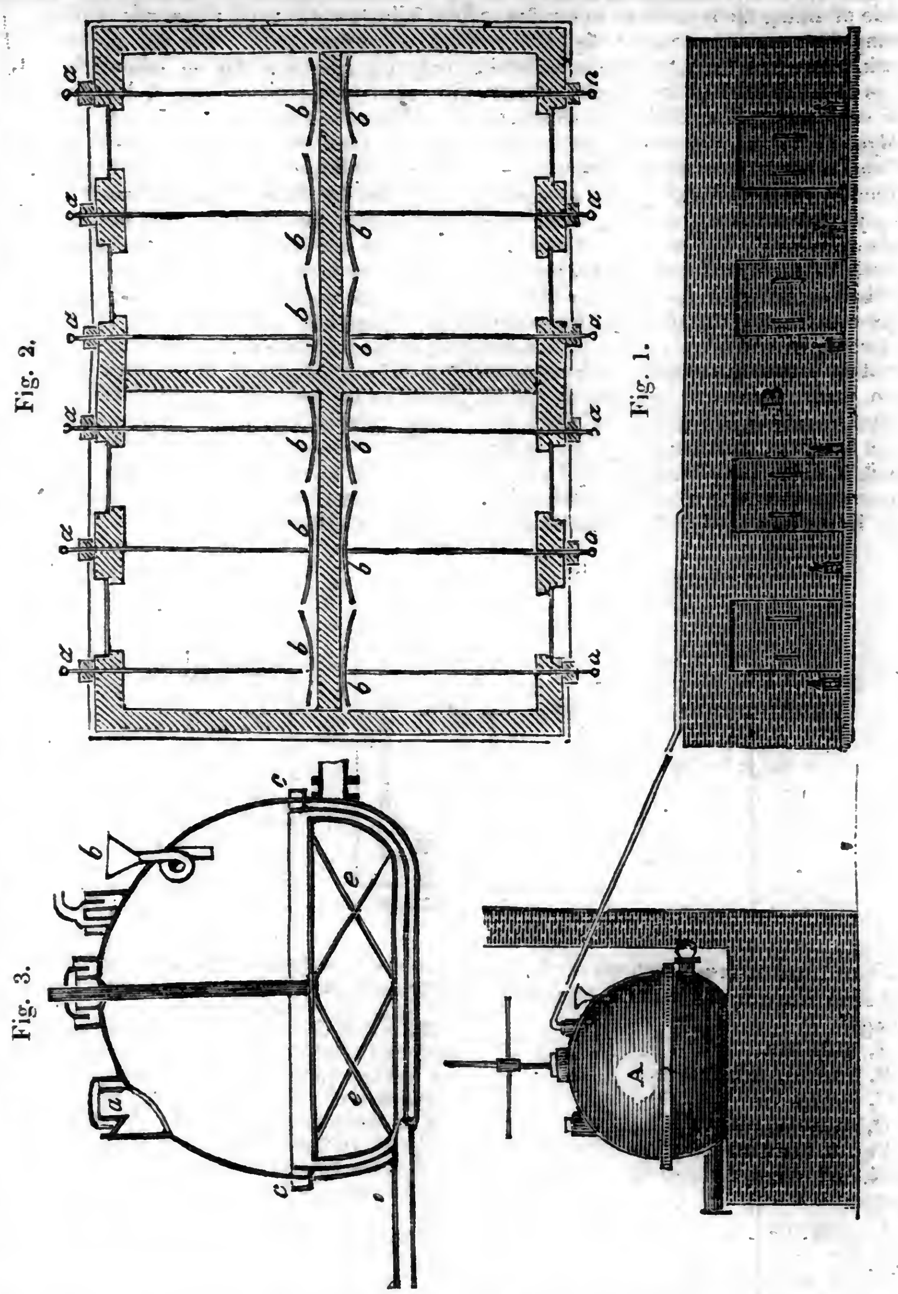


Fig. 1. Fig. 2. Fig. 3.

Applications of Chemistry to the Useful Arts, being the substance of a Course of Lectures delivered in Columbia College, New-York, by James Renwick, Professor of Natural Experimental Philosophy and Chemistry.

IV.

APPLICATIONS OF CHLORINE.

Chlorine may be applied in its gaseous form, as obtained in the mode practised in laboratories by action of manganese (*peroxide of manganese*) upon muriatic acid; or by the action of sulphuric acid on common salt and manganese; or as evolved from the chloride of lime. It may also be applied in solution, prepared by passing the gas through water, by steeping chloride of lime in water, or in the form of the liquor of Labaraque (*chloride of soda.*) The use of chloride of lime in both cases, and of chloride of soda in the second, have superseded the other methods. In consequence, before explaining the uses of chlorine it is proper that the manufacture of these two preparations should be understood.

MANUFACTURE OF CHLORIDE OF LIME.

Authority.—Dumas. Chimie appliquee aux arts.

Chloride of lime in a dry form is manufactured in an apparatus invented by an English chemist, from whom the article is often called Tennant's bleaching powder. It consists of a retort or still of lead, connected by a pipe with a brick chamber cemented by a lute, which is not acted upon by chlorine. The still is heated by steam introduced into an envelope or *jacket* of cast iron. In the top of the still are two openings: one furnished with a stopper by which it is charged with manganese; to the other a bent tube is applied for the introduction of the acid, a part of which remaining in the tube serves as a valve to confine the gas. Within the still there is a reticulated vessel of cast iron, which is attached

to a rod passing through the top of the still. By means of this the materials are continually stirred in, order to bring new surfaces into contact. The still is so large as to receive a charge of 200 lbs. of manganese, and four are usually employed at once, for which reason the brick chamber is divided into four compartments.

The floor of the chamber is covered to the depth of three or four inches, with powdered lime, prepared by slaking. In some manufactories the hydrate of lime is disposed in wooden trays resting upon shelves within the chamber. Only half of these are filled at first. At the expiration of two days, the process is stopped, the chamber ventilated, and the remainder of the trays are introduced, being placed on the alternate shelves. The gas being again admitted, the process goes on for two days more, when the first set of trays are removed and replaced by others charged with fresh hydrate of lime. In this way the chamber always contains a portion of lime nearly saturated, and another portion nearly free of chlorine, and thus the decreasing rate at which hydrate of lime absorbs chlorine is compensated.

A still better mode, which is employed in a few instances, would be to keep the lime in a state of agitation. This has been objected to on account of the expense of the moving power, but in an establishment furnished with a steam engine, this would be of little importance.

The apparatus most generally used will be understood by reference to the annexed plate.

Fig. 1, elevation of the apparatus.
- A, leaden still.
- B, chamber in which the hydrate of lime is placed.

Fig. 2, section of still on a larger scale.
- *a*, opening by which the manganese is introdoced.
- *b*, funnel and bent tube for the introduction of the acid.
- *ce*, water valve by which the head of the still is adapted.
- *ee*, apparatus of cast iron for stirring the materials.

Fig. 3, plan of the chamber in which the hydrate of lime is placed.
- *aa*, iron rods which move the scrapers *bb*.

In some manufactories on a small scale, the hydrate of lime is placed in conical vessels of stone ware, having a hole near the bottom, to which the pipe that conveys the gas from the retort is luted. At the end of the process, the vessel is inverted, and the lime falls out. That which is not charged with chlorine remains in powder, and is therefore readily separated from that which is converted into chloride, which is adhesive.

The direct mode of obtaining chlorine, is by the action of peroxide of manganese on muriatic acid. This may, and is often, followed in the manufacture on a large scale. The equivalents of the substances which are employed in the laboratory, are, 1 of peroxide of manganese to 4 of hydrochloric (muriatic) acid. The results are 2 of chlorine, 2 of water, and 1 of protochloride of manganese. The proportions are approached on the large scale by 6½ lbs. of pure oxide of magnanese, or a proportionate quantity of the common manganese of commerce, and 40 lbs. of common muriatic acid. The result should be about two cubic yards of the gas, weighing nearly ten pounds, and capable of saturating nearly fifteen pounds of hydrate of lime.

It is, however, obvious that a part of the chlorine has been lost by entering into combination with metallic manganese, and remaining in solution in water. A better process is therefore proposed by Dumas, by which an equal quantity of chlorine may be obtained at a far less expense of acid from a given quantity of common manganese. His formula is 10 or 12 lbs. of common manganese, equivalent to 6 1-2 of the peroxide, 4 lbs. of sulphuric acid, 4 lbs. of water, and 20 lbs. of muriatic acid. The retort being first charged with the manganese, the water is introduced, then the sulphuric, and finally the muriatic acid. The mixture of the water and sulphuric acid produce sufficient heat to cause the separation of the chlorine. No more fuel, therefore, need be used than is sufficient to keep up this temperature. In addition, the mixture is less likely to rise in viscid bubbles, and the chlorine is more free from water, as the attraction of the sulphuric acid will prevent that liquid from boiling until all the chlorine is disengaged. Sulphate of manganese will remain in solution instead of the chloride.

In some cases, however, the chloride of manganese may be of value, as it is used in dyeing. Here of course the existing process is to be preferred. When the manufacture of artificial soda is not a profitable object of industry, muriatic acid may be too expensive for the manufacture of chloride of lime. In this case, the materials whence that acid is obtainod (sulphuric acid and common salt,) may be used in its stead. The proportions in which they may be employed are, to 10 or 12 lbs. of common manganese, 12 of common salt, 20 of sulphuric acid, diluted with an equal quantity of water. The residuum of the retort is a solution of the sulphates of soda and of the protoxide of manganese.

A liquid mixture of lime and water (milk of lime) will condense 60 per cent. more chlorine than the dry hydrate. This preparation is not readily portable, but when the consumer manufactures it for himself, might be employed to great advantage. To make this liquid chloride, the milk of lime has been placed in a cylindric vessel of stone ware, lying horizontally, through the ends of which an axle is passed that carries a set of arms like those of a barrel-churn. The use of these is to agitate the mixture, and thus bring fresh surfaces of chlorine in contact with the chlorine.

From what has been stated above, it would appear that hydrate of lime is capable of condensing about two thirds of its weight of chlorine. In the ordinary manufacture, this strength is rarely reached, and the article may also be injured by exposure. It is therefore important that some mode should be pointed out by which the actual quantity of chlorine condensed by the lime should be ascertained. No ready method fitted for the use of practical men has yet been proposed, by which this object can be effected with certainty. The method in common use is rather relative than absolute, and consists in inquiring into the quantity of the solution of indigo in sulphuric acid, the solution of a given quantity of chloride of lime is capable of discoloring. This method will give different results, both from the different qualities of indigo and different modes of manipulation. But by using the same solution of indigo, and operating in exactly the same manner, the comparative value in reference to a standard parcel of chlorine of lime is capable of being ascertained with tolerable accuracy.

PREPARATION OF THE SOLUTION OF CHLORIDE OF SODA OR LIQUOR OF LABARAQUE.

The works on elementary chemistry give the mode proposed by Labaraque himself, for forming this liquor, by passing chlorine in its gaseous form through a solution of sub-carbonate of soda. It is therefore unnecessary to repeat it here. It may, however, be stated that the value of the liquor is not increased by saturating the water with chlorine, but that it is in its best state when the chlorine is condensed in the largest quantity which can exist without causing the escape of the carbonic acid; and it is usually inferred that the chlorine, decomposing a part of the sub-carbonate, causes its acid to unite with the remaining soda to form the neutral carbonate of soda. If the quantity of chlorine exceed this proportion, which is of course just half of what might be condensed, muriatic acid will form in the solution, and chloride of sodium will be the final result.

The most convenient process for the preparation of chloride of soda on the large scale, is that invented by Payen, in which the chloride of lime is decomposed by subcarbonate of soda. The proportions in his formula are: 100 parts chloride of lime, 188 of crystalized sub-carbonate of soda, and 1800 of water. The chloride of lime being dissolved, and the solid residuum washed, the sub-carbonate of soda dissolved in boiling water is added; the liquor is filtered, and to the clear liquor 62 parts of crystalized sub-carbonate of soda is added.

1. DISINFECTING.

Rationale.—Chlorine owes its powers of destroying the offensive effluvia of putrescent animal and vegetable substances, and of rendering innocuous the matters which convey the contagion of infectious diseases, to its powerful affinity for hydrogen. The gases which arise from putrescent animal matter are principally ammonia (a hydroguret of nitrogen) and carburets of hydrogen; and although they are not the substances which affect our nerves most offensively, they are certainly the vehicles which convey those which do so to our organs of smell. The effluvia of decaying vegetables are principally composed of carburetted hydrogen, and although our senses cannot detect any other substance, yet there can be no question that the gas so produced does convey a matter injurious to the human constitution, for while the gas

manufactured for illumination may be breathed, even in quantities sufficient to render the air highly offensive, without injury, the same gas evolved from marshes and stagnant waters is always unwholsome. The diseased animal matter which composes the virus of cutaneous diseases, such as small pox, and collects in the sores of the plague, is also composed partly of hydrogen, and therefore capable of decomposition by chlorine. These peccant substances being capable of forming vapor, may thus be conveyed through the air, but in this state also, chlorine will act upon them.

Chlorine is destructive of animal life, and even when largely diluted immediately kills small animals. Even then, if, as some have supposed, the malaria which causes yellow fever and other analogous diseases of less malignancy, is owing to the presence of animalculæ, chlorine may be applied to destroy them.

Application.—Chlorine may be applied in its gaseous form to the disinfection of the air. The gas may be prepared as it is needed, by the action of peroxide of manganese (common manganese of the shops) on muriatic acid. This action, however, need not be aided by heat, as when the gas is prepared for chemical experiments, inasmuch as the object is to produce a constant and steady current, instead of a sudden and copious supply. A bottle, furnished with a glass plate ground to lie upon its neck, is well suited for this purpose, and may be made of various sizes, according to circumstances, there being a form so small and so conveniently arranged, that it may be carried in the pocket.

Chloride of lime may be decomposed, by the action of water. In order to obtain the gas, a portion of chloride of lime is put into a shallow basin and covered with water. As the evolution of the gas becomes feeble it may be rendered more rapid by adding a small quantity of acid. Sulphuric acid very much diluted may be employed, but it is better, particularly when it is used in families, to add common vinegar.

In disinfecting chambers and buildings, the doors and windows are to be closed, and the fumigation continued until the peculiar smell of chlorine can be perceived in every part, and remains permanently when its source is removed. In a sick room it will be expedient to continue the fumigation as long as the sick person remains in it, and for some hours after. All moist offensive matters should be sprinkled with the dry chloride, and dry matters covered with its solution.

A solution of chlorine may be prepared by steeping chloride of lime in water in the proportion of eight ounces to each gallon of water, and decanting it from the lime. This may be used for steeping the bedding and clothes of persons affected with contagious diseases, or to wet cloths in which putrescent matters may be wrapped; but the chloride of soda is a much more convenient and cleanly preparation. By the aid of it, human bodies far gone in putrefaction have been disinterred for examination; and by one or the other preparation, the disagreeable and often dangerous effects of animal and vegetable decomposition may be in a great measure prevented.

In cases where it may be necessary to touch persons affected with contagious diseases, the hands should be washed with one of the solutions, and this will be efficacious even after many minutes, unless the virulent matter have been introduced through a wound. By the use of these substances several diseases that have hitherto been scourges of the human race, have already been diminished in extent, and might, if all were prudent enough to employ them, be extinguished altogether.

To show their important value, a French physician in the Levant (Parisot) was able to inspire five other persons with confidence in the efficiency of chlorine; these were of various ages and different constitutions. Six suits in which persons had died of the plague were purchased, steeped in solution of chloride of soda, and dried. Each person being furnished with a suit, wore it for several days. No one of the six took the disease, while, had there been no precaution, all former experience would have made it nearly certain that more than two thirds of them must have been infected, and a considerable proportion of these would have died.

In our own naval service, the only vessel in which yellow fever has occurred in the Gulf of Mexico, since fumigations with chlorine have been practised, was one where they were not employed; and in one of the Spanish expeditions against Mexico, several vessels loaded with soldiers and sailors, were exposed for months to the pestilential air of the Terras Callientes without a single case of fever occurring.

In fine, we cannot avoid expressing our conviction that it is impossible, that any disease truly contagious can be propagated in air so charged with chlorine that its peculiar smell is sensible, nor any malady arising from the presence of unwholsome vegetable and animal matter. It will of course be impossible to disinfect extensive districts by artificial means, but so long as a disorder is confined to a limited space, its further extension may be checked, and even a building in an infected district may be rendered safe to its inhabitants, provided they do not quit its walls, by the aid of chlorine.

Experiments seem to be wanting, whence we might judge whether chlorine is as efficient in checking the extension of cholera, as it certainly is in preventing the spreading of other diseases; the impression of medical men, however, is that it is not.

2. BLEACHING.

History.—The ancient progress of bleaching vegetable matters is the same as that employed for domestic purposes, with the addition of an agent to neutralize alkaline matter which might otherwise injure the vegetable fibre. The articles were repeatedly washed with alkaline leys, or with soap; they were then steeped in a weak acid; and, after being well rinsed in pure water, were spread out on meadows in order to be exposed to the sun and air. In this position they were frequently sprinkled with water. The only water which is adapted to this purpose is that which in ordinary language is called soft. This is found in streams only at a distance from their source, and from a command of water of this description, as well as from the extent of its meadow lands, Holland for a long time monopolized the bleaching of the greater part of Europe. The linens of Ireland and Great Britain were sent thither to be bleached, and, as the process was a long one, it was seldom that the capital employed in the manufacture was turned more than once a year. The successive washing, and exposures to the air requiring to be repeated fourteen or fifteen times, and the latter being only practicable in fine weather. The acid used to neutralize the alkaline matter was sour milk, in which by fermentation acetic acid had been generated.

The first improvement in the process was the substitution of dilute sulphuric acid for the sour milk. Still, there was no great saving in time, until Berthollet in France proposed the application of the bleaching properties of chlorine. This substance was at first applied in its gaseous form to the articles, suspended while wet with water in close chambers. Its solution in water was next introduced. This has the defects of being difficult of carriage, and of becoming charged with muriatic acid by the decomposition of the water. In order to neutralize the acid as it forms, the water, was charged with a carbonated alkali or with magnesian earth. In the use of the former it was discovered that a chloride of the alkali was formed which would be decomposed by the coloring matter of the vegetable substance, and that in this liquid chloride, more of the chlorine was retained than in the same bulk of pure water.

This liquid chloride of Potassa has been much used under the name of liquor of Javelle.

The use of magnesia led to the discovery of the dry chloride of that earth, and it being found that a similar compound was formed with lime, the latter in consequence of its inferior cost finally superseded the former. By the use of chlorine in either mode, the process which formerly occupied several months, is now completed in a day or two.

Rationale.—Hemp, Flax, and Cotton, which are the only substances of vegetable origin that are much employed in the manufacture of cloths, are more or less colored with a brown or yellowish substance. This coloring matter is partly oleaginous, and partly resinous. The oleaginous matter is rendered soluble in water by an alkali; but as any excess of this would attack the vegetable fibre, it must be neutralized by an acid. The resinous part of the coloring matter, if moist, decomposes slowly on exposure to the sun and air; hence the ancient mode of bleaching. This resinous matter when no longer protected by the oil is rapidly decomposed by chlorine; hence the modern method.

(A) BLEACHING OF COTTON YARN BY CHLORINE.

AUTHORITY—VITALIS, Cours de Teinture.

First operation.—Alkaline Bath.—A quantity of good pearlash in powder is mixed with half its weight of recently slacked lime. To this is added water in the proportion of thirty times the weight of the

potash. The mixture is occasionally stirred, and at the end of twenty-four hours is allowed to settle. The clear liquor is then decanted. The yarn to be bleached is thrown loosely into a copper boiler, and the alkaline solution poured upon it, until the upper part of the cotton is two or three inches beneath the surface of the liquid. The boiler is then slowly heated until the liquor boils, and the ebullition is kept up for four hours. At the end of this time the cotton is removed, and after being permitted to drain, is well rinsed in running water, after which the liquid is wrung out, and the yarn hung up to dry; in fine weather in the open air and in bad weather under sheds.

Second operation.—Bath of Chlorine.—This bath is formed by steeping chloride c. lime in water, in the proportion of eigh ounces to each gallon; the insoluble mattei is allowed to settle, and the liquor decanted. The yarn is placed in regular layers in a wooden vat, the hanks in the successive layers crossing each other. On these the clear solution of chloride of lime is poured until they are completely immersed, and the liquor rises above them three or four inches. The yarn having been steeped for a couple of hours, the liquid is drawn off by a spigot in the bottom of the vat, and is replaced by pure water, which being drawn off in its turn, carries with it the chloride which may have adhered to the yarn. The yarn is then rinsed in running water, wrung and hung out to dry.

Third operation.—Acid Bath.—Sulphuric acid is diluted with sixty times its weight of water, and the yarn is steeped in it for a time not exceeding a single hour for the coarsest numbers and less for the finer yarn. On taking it from this bath. it must be repeatedly washed with great care in running water.

Fourth operation.—Soap Bath.—The yarn is washed with white soap in water for the purposes of neutralizing any sulphuric acid which may remain, of removing the last portions of chlorine, and of rendering the cotton soft and flexible. It is then rinsed, wrung, and dried.

In order to brighten the color, cotton is sometimes steeped after the four preceding operations in water, through which a small quantity of cobalt blue has been disseminated.

These operations are sufficient for the inferior qualities of cotton yarn. The finer kinds are immersed in an alkaline bath of greater strength; are twice passed through a bath of chloride of lime, that used the second time being weaker than the first; and cobalt blue is always employed to finish them.

Linen and hemp threads are bleached in the same manner as cotton yarn, but they must be prepared for the alkaline bath by steeping them for two or three days in water, by which the coloring matter is softened and made more accessible to the chemical agents. The methods for bleaching woven cloths of the three several materials are more difficult than are necessary for yarn, but do not differ in principle. It is only necessary, according to the firmness of the cloth, to repeat the processes in regular succession two or three times.

It may be remarked that bleaching by chlorine, if carefully performed, is, contrary to general prejudice, less likely to injure the texture of the material than grass bleaching. The latter, too, may be said to be wholly abandoned, so that the inscription upon foreign goods of "genuine grass bleach," is untrue, and were it true, would be no warrant of superiority in quality.

Chlorine does not act upon the native coloring matters of wool or silk, but as the modes for discharging them go under the same name, we may with propriety consider them in this place.

(B) BLEACHING OF SILK.

AUTHORITY.—VITALIS. Art de Teinture.

Silk is covered with a substance which has the character of a gum, and is usually of a color more or less inclining to yellow, although the finer raw silks of China are said to be perfectly white. Even in the latter case, the process which is used to discharge the color, is in some degree necessary to prepare the silk for receiving dyes.

Silk may be bleached either by the aid of sulphurous acid or without it.

To bleach it without the use of sulphurous acid, a bath is prepared by dissolving white soap in water, in the proportion of 30 parts to 100 of silk. The solution is raised to the boiling temperature, but not permitted to undergo the act of ebullition. The silk is steeped in this bath until the harshness given by the gum disappears, and is then wrung out and dried. It is next put into sacks made of coarse canvass, each of which holds about thirty pounds of silk. These sacks are put into a boiler with a weaker solution of white soap, which is boiled for an hour and a half. The silk is then taken out, rinsed in running water, and dried. The dry silk is finally steeped in a bath of hot but not boiling water, in which white soap in the proportion of a pound to 30 gallons of water has been dissolved. To this is added a small quantity of some coloring matter, which is anatto when the hue of Chinese silk is to be imitated, and cobalt blue in other cases.

This method is less perfect than that which brings in the aid of sulphurous acid, as a substitute for the last of the three baths above described. The silk, after being rinsed from the second bath of soap is suspended upon poles about 8 feet above the floor of a chamber, which has no chimney, and is provided with doors and window-shutters that can be opened and closed without entering the chamber. For every hundred pounds of silk a pound and a half of roll-brimstone is put into an earthen dish on the floor of the chamber, and set on fire. The doors and windows are then tightly closed. The sulphurous acid which is first generated by the combustion of the sulphur is condensed by the water adhering to the silk, and after this is saturated, fills the chamber. The silk is left in this atmosphere of sulphurous acid for twenty four hours, after which the doors and windows are opened and the chamber ventillated. In summer the current of air which replaces the sulphurous acid is sufficient to dry the silk. In winter portable furnaces containing charcoal in small fragments are introducee into the chamber, and after they are set on fire the doors and windows are closed. In both cases, the combustion, whether of sulphur or charcoal is slow, as the necessary oxygen must make its way through the accidental crevices of the doors and windows.

In neither of the ways above described is the discoloration of the silk permanent. On exposure to the air in wear, the natural color of the silk is partially restored. It therefore becomes necessary to bleach white silks that are in wear, from time to time. This is done by suspending them, while wet, in a barrel, in the bottom of which a small quantity of sulphur is inflamed in an earthen vessel. The top of the barrel is then covered by a cloth, and the whole is left undisturbed for several hours.

BLEACHING OF WOOL.

Wool is coated with a greasy substance called the *Yelk*, with which a yellow coloring matter is combined. The coarser wools contain least of this substance, but in the finer merinoes it amounts to two thirds of the whole weight. The removal of this cannot be wholly effected by chemical means, but must be partially effected by the mechanical operation called fulling. This may be performed upon the wool, on yarn, or on the woven cloth. It consist in beating the article in a mill, with water and a mineral called Fuller's Earth, which is a silicate of alumina in which the silex is in greater proportion than in ordinary clays.

After having been fulled, the wool is washed in luke warm water, in which a small quantity of a soap is dissolved, until the residue of the yelk is removed. After being allowed to drain, it is rinsed in running water, permitted again to drain, and dried in the air.

This method is not successful unless the water is perfectly free from saline matter, or in ordinary language soft. In districts where large supplies of soft water cannot be obtained, it is considered necessary to mix the water used in cleansing wool with one fourth of its bulk of putrid urine. This supplies an ammoniacal salt, (phosphate of ammonia and soda,) by which the sulphate of lime, which gives to water the character know by the epithet *hard* is decomposed. In countries where the woolen manufacture is carried on extensively, this disgusting substance is in consequence a profitable article of commerce. There are however modes of rendering water soft, which we shall have occasion to describe hereafter, which might be advantageously introduced in the woolen manufacture.

LABORERS WANTED.—Two thousand laborers, says the Philadelphia Price Current, will find constant employment upon the upper section of the Lehigh Canal and the Railroad connected with this work. The country is healthy, and the wages liberal.

The coal dealers on the Schuylkill also advertise for 500 laborers, at $1 per day, from 6 to 6, and 12 1-2 cents per hour for extra work.

THE UPPER LAKES.—The Troy and Erie Line have made arrangements to despatch a Steamboat from Buffalo for Chicago every ten days. The first Boat is advertised to start on the 25th instant.

AGRICULTURE, &c.

From the British Farmer's Magazine.

ON THE UTILITY OF CHEMISTRY TO AGRICULTURE AND HORTICULTURE.

By Mr. Towers, author of the "Domestic Gardener's Manual," C. M. H. S.

I do not affect to apologise for the introduction of this subject at some length, into your pages, because I conceive that, however it may have occupied the attention of practical farmers, upon the urgent recommendation of men and science, it has been misunderstood, and, therefore, unjustly agitated.

I have been induced to resume the consideration, by the perusal of those admirable papers in your two last numbers, entitled *Essay on Calcareous Manures*—by Mr. Ruffin—papers which, I think, contain the soundest truths, and, therefore, may be rendered more practically available than most of the elaborate works that have preceded them. The propositions of the writer require, however, to be impartially examined; but before I attempt to do so, I shall cite a passage from a chemical work, written by that worthy and zealous man, the late Mr. Samuel Parkes, whereby the reader may, at one view, appreciate the object of the chemist, and the weight of the arguments he employs, when he urges the necessity to call his science in aid of the agriculturist.

"Chemistry" (it is observed) "will teach him" (an opulent land-owner) "how to improve the *cultivated* parts of his estate; and by transporting and transposing the different soils, he will soon learn some method by which each of his fields may be rendered more productive.

"The analysis of soils will be followed by that of the waters which rise upon, or flow through them; by which means he will discover those proper for irrigation, a practice, the value of which is sufficiently known to every good agriculturist.

"Should he himself occupy the farm, and become cultivator of his own estate, he must, of necessity, be a chemist, before he can make the most of his land, or put it in a high state of cultivation, at the smallest possible expense. It will be his concern, not only to analyze the soils on the different parts of his farm, but the peat, the marl, the lime, and the other manures, must be subjected to experiment, before he can avail himself of the advantages which they possess, or before he can be certain of producing any particular effect by their means. The necessity of analysis to the farmer is evident from a knowledge of the circumstance, that some kind of lime" *(magnesian limestone)* "is really injurious, and would render land which had been hitherto very productive, actually steril."—(Chemical Essays, vol. i. pp. 8, 9,)—Again:

"A knowledge of the first principles of chemistry will teach him when to use lime *hot* from the kiln, and when *slacked*; how to promote the putrefactive process in his composts, and at what period to check it, so as to prevent the furtillizing particles becoming effete, and of little value.

"It will teach him the difference in the properties of marl, lime, peat, wood ashes, alkaline salt, soap waste, sea water, &c., and, consequently, which to prefer in all varieties of soil. A knowledge of the chemical properties of bodies will thus give a new character to the agriculturist, and render his employment rational and respectable."—(Idem., pp. 10, 11.) And in a note—

"Lavoisier cultivated 240 acres of land in La Vendee, on chemical principles, in order to set a good example to the farmers; and his mode of culture was attended with so much success, that he obtained a third more of crop than was procured by the usual method, and in nine years his annual produce was doubled.—[From Lalande's Life of Lavoisier.]

Thus far the pretensions of the chemist are made out; his objects are defined, and it must be admitted that with the exception of one or two points, which, not to be hypercritical, we may safely pass by, science has laid no claim that she cannot establish. Chemists *can* analyze soils, *can* determine the quality and quantity of their component parts, *can* detect acids if such exist, and point out antagonist principles by which they may be rendered neutral, and, to a certain extent, innoxious: thus far, then, the chemist and his science must be useful to the agriculturist; nothing but the most dense prejudice can oppose this admission; and were every farmer to become an analytic chemist, to the extent above referred to, and be able to detect the components of his soils and manures, his mind would be enlarged, his sources of rational pleasure and amusements increased, and his practice removed further from that of the empiric, in proportion as it became based upon philosophic truth.

In a former paper (No. xxxiv., p. 537,) I have endeavored to elucidate the science and operations of analysis: I now find a powerful coadjutor in Mr. Ruffin; and am satisfied that, his remarks and observations under that head of his essay, entitled "*Results of the chemical examination of various soils,*" and the process therein described, are some of the most luminous which I have ever met with. The prespicuity of his description clearly demonstrates that he was familiar with his subject, and the young agricultural chemist may safely follow his steps, and rely upon the general accuracy of his deductions.

Having thus upheld the cause of chemistry I must advert to those points wherein I consider it has less claim to confidence; and these may be shortly exhibited, so as not to burden the subject unnecessarily.

The operations of chemistry have a legitimate object when they are performed upon what is considered dead or inert matter; thus, there is no material substance throughout the range of created things, which, provided it be not endowed with the *vital principle,* may not justly be submitted to the test of chemical agents. It is now admitted by our best philosophers, that chemical action is entirely dependent upon, and identical with, electrical energy; that, in fact, the combination of all substances, and their decomposition, are maintained and effected by electrical affinities. As electricity, is the most influential of the great natural agents; being an immediate emanation (I use this word for want of a better term,) from the source of light, the sun, whose rays have been poured upon the world from the commencement of time; and as chemical action is but a manifestation of electric energy, it follows, that every individual thing which can be dissolved, decomposed, or in any way disturbed, so as to cause a change in the arrangement of its constituents, is imbued with the essence of light. Chemistry, therefore—to say the least of it—is one of the grandest and most comprehensive sciences which the human mind can employ in its researches after truth.

But the vital principle, though it may be, and probably is, connected with electrical action, is not a legitimate subject of chemical experiment; and those chemists have erred who have attempted to discover its nature by chemical ageny. *That which destroys life,* or interferes with the vital functions, can neither tend to elucidate the nature of the one, nor discover the causes of the other. The principle of life, whether it be that of animals or of vegetables, appears to be directly antagonist to chemical energy; no one, therefore, can be justified in attempting to interpret any of the phenomena of vegetable life, by the application of chemical principles. Chemists, then, it appears to me, have weakened their own cause by endeavoring to prove too much: we know nothing of life, we consequently cannot interpret its phenomena, or refer them to those agencies which are called into action by its extinction.

Scientific men have also laid themselves open to reproof, or even reproach, by their speculative reasonings upon the practical operations of the farmer. In the laboratory the chemist moves in his own appropriate sphere; there he can, and ought to investigate the substances which nature has rendered the matrix of her vegetable productions; and thence, he may diffuse, in every direction, a knowledge of the facts which his genius and experimental acumen have enabled him to elicit; but he has no right to criticise the practice of the agriculturist in respect to the management of his crops. Abstract reasoning, from deductions drawn from the most refined experiments upon dead matter, can never authorize any interference with the well grounded practice of the cultivator—of an organized being endowed with the mysterious principle of life. Even in that modern and comprehensive doctrine of the *radical exudation by plants,* which bears directly upon the *rotation of crops,* and interprets its philosophy, the experiments which have detected exuded matters by the test of re-agents, ought to be regarded with suspicious caution, inasmuch as they have, one and all, been performed upon plants placed in unnatural situations, and acted upon by some medium altogether different from that of the soil, in which alone they could flourish, and perfectly develope their foliage and fruit.

It is the duty of the chemist to lay down clear and definite rules, by which soils and manures may be correctly analysed; and if, with an intimate knowledge of practical and theoretic science, he can combine a knowledge also of farming, attained by actual experience—as was in fact exemplified in the person by the renowned Lavoisier, and now by the writings of Mr. Ruffin—he is pre-eminently qualified to instruct, and to recommend his principles by the force of example. But in ordinary cases, men of the highest attainments in experimental science cannot command time, or the means to become extensive cultivators: hence it would always be wise to point out those facts which cannot be controverted, and to let the practical man avail himself of the aids thus furnished, in any way which his good sense may direct. If the farmer be so unconcerned or prejudiced, as to overlook or reject those important instruments of research which are offered to his notice, the blame must rest with himself. Farming is, at the present moment, in a state that demands all the resources which science can furnish. The prices of every product of the farm are reduced to a very alarming extent: but the reduction though great, bears no comparison with that of almost all the preparations of the manufacturing chemist. Yet the extension of his science has enabled him to bear up with a bold front against a depreciation of two, three, per-

haps four hundred per cent.; and now to produce, with a remunerating profit, chemicals of a quality far superior to those which his predecessors sold at an enormously high price. Farmers, therefore, while they feel and admit the necessity to adopt every economical measure to insure increased produce, ought to regard the chemist and his art with reverential deference. Even the simple perusal—by a man of discernment—of the "*Electrical Researches*" of the amiable and accomplished Faraday, is amply sufficient to prove, beyond a doubt, the scientific chemist to be a person of superior order; one to whom the revealment of the wonder-woking secrets of nature is intrusted; and his art, the grandest, the most sublime treasure that could be conferred on any created being. That science, legitimately directed, is well qualified to assist the farmer, and promote his welfare, for it bears directly upon the agents which he employs in the culture of every one of his crops.

One other objection to the general utility of chemistry to agriculture remains to be noticed before I pass to the investigation of Mr. Ruffin's propositions, namely:—it is asserted and freely admitted, that the nature of soils lies open to the investigations of the chemist; but it may too frequently occur, that although experiment can readily detect the components of a soil, point out an antidote for any deleterious substance which may be traced therein, and show that in which it may be deficient, the substance required, either to correct the evil or supply the deficiency, may not be at hand. Thus, a soil may superabound in sand, or exhibit a poisonous salt of iron; but alumen or pure lime may be unattainable, unless at an outlay which would neutralize the benefit to be derived from the use of either. Fortunately, however, science can go a considerable way towards procuring an artificial remedy, and thus tend to supply the deficiency of the natural one; but as I must recur to this subject hereafter, I shall not dwell upon it now.

It is somewhat unfortunate that the "*Essay on Calcareous Manures*" was written expressly for America. Mr. Ruffin, it is true, makes frequent allusions to the theories and experiments of British chemists; but his own observations and analyses apply purely to the soils of the United States—to that part at least of which he observes, "no chalk is to be found in our country, and it is only from European authors that we can know any thing of its agricultural characters, when nearly pure, or when forming a very large proportion of the surface of the land."

Mr. Ruffin's arrangement, however, of the three principal earth, is clear, precise, and correct; as is also his general conclusion at the end of the before mentioned page, viz. "the mixture of the three earths, in due proportions, will correct the deffects of all; and with a sufficiency of animal or vegetable matter, putrescent, and soluble in water, a soil is formed in which plants can extend their roots freely," &c. &c.

But he, perhaps, labors under an error in supposing that all the earths, when pure, "are entirely barren; or that *chalk*, alone, could give them the fertilizing principle." The only soil which I have ever met with, that has appeared to be wholly destitute of calcareous matter, (or, at least, that which affords no trace of it to the muriatic acid test,) is a black bog peat; but in this soil a few plants will grow with extreme verdure. It does not appear to me that the absence of calcareous earth is the sole cause of the general sterility of turbary soils; I refer it to the situation in which they are originally produced, and in this point, a remark made by Mr. Hayward will apply very pertinently. In the paper on the *Food of Plants*, which precedes *the Essay*, and in the middle of the page 197, it is observed: "if a quantity of the leaves of trees be collected, and immersed in a cistern or pool of stagnant water, and permitted to remain undisturbed for three years, they will be decomposed, and in appearance will be in that state, which, placed on the surface of the earth, should form a fertilizing substance; yet it will be found so sterile that no plant will grow in it."

Now the true peat mosses are formed, in the large way, in a manner analogous to the earth of decayed, immersed leaves, above described; that is, a bulk of vegetable matter is burried, and becomes sodden under water. Now leaves, and, indeed, vegetable substances in general, if burnt, yield a great abundance of *carbonate of lime*, as indeed, Mr. Ruffin asserts; therefore, though it may be presumed that, while in a growing state, these substances contain no *chalk*, properly considered as such, yet the elements of that earth must exist in them, otherwise it could not be revealed by the action of fire. Inert vegetable soils then, may originate in the peculiar action of water upon them, while they are deposited in a situation from which atmospheric air is excluded. This, too, accords with Mr. Hayward's idea, and it appears to be well founded. One of the most energetic loams which I have ever tested, contains merely a hint of *conbonate of lime*; it is of a fine, ochrous color, a velvety, unctuous texture, and when washed by various effusions of water, yields nearly three fourths of its bulk of impalpable matters, the remainder being a moderately fine silicious sand. When muriatic acid is applied to the fine matters, it produces little effervescence, and detects scarcely two per cent. of chalk. This loam is applicable to almost every species of plants; far more so than many earths which contain three times the proportion of chalk named, with double the quantity of warm sand. But if calcareous matter be the principal meliorating medium, the quantity required must be small indeed, if that in the loam just alluded to be sufficient to establish the fertilizing principle.*

The first proposition of the Essay refers chiefly to the hypothesis that "soils naturally poor, cannot be permanently enriched;" and, "that the labors of man have been but of little avail in altering the characters and qualities given to soils by nature."

In as far as this view extends, I heartily assent to the opinion of the Essayist, and on the ground which I, for some time, have asfsumed—that, "soils, be their nature what it may, tend to reduce manuring substances to earths of their own precise quality;" and in accordance with this doctrine, I hold it highly probable that the ultimate end of manuring is to support and maintain the quality and bulk of the staple soil.

Earth may be gorged with manure, but it is not thereby enriched. Plants may be rendered richly luxuriant in a gorged soil, but their health and vigor are not thereby increased. A medium state of soil, wherein it contains a prper quantity of enriching decomposable matters, is most favourable to healthy and robust vegetation; and in it those matters soon disappear, and nothing but earth remains after a few crops have exerted their energies upon the soil. Any one who has witnessed the effects of sand upon a very liberal supply of manure, after a crop has been taken, will not be at a loss to determine what the terms "barren" and hungry, mean when applied to land. Strong loams, on the contrary, hold the manures unchanged for a considerable time when not cropped, and retain the active principle more tenaciously by far, than light sands, even when severely cropped. Now it is certain that every correct analysis has proved the convertibility of farm-yard manures into, not only the elements of vegetables, but also into the three staple earths themselves; if then, a hungry sand, after a liberal system of manuring for years, still return to its original state of poverty, what must have become of the *alumen*, the *carbonate of lime*, and the *oxide of iron*, which the manuring substances were capable of yielding under certain conditions, to say nothing of the oxygen, the hyrdrogen, the carbon, and the azote, all of which gaseous products, may be presumed to have been taken up by vegetable vital action.

Every fact that I am aware of, seems to prove—first, that vegetable action tends to decompose manuring substances within the soil: secondly, that these substances are either wholly consumed, or deposite a residuum which is percisely similar in character to that of the natural earth, leaving it, whether it be sandy, clayey, or loamy, neither more nor less rich than it was in its original constitution. If this view of the results of manuring be correct, then Mr. Ruffin's first proposition is so far, to all intents and purposes, established.

The second proposition of the Essay unfortunately refers almost exclusively to the soils of Virginia, but one point of it, which is of great interest, is contained in the following lines—"The abundance of *putrescent vegetable matter* might well be considered the cause of fertility, by one who judged only from lands long under cultivation."—"Vegetable matter abounds in all rich land, it is admitted; but it has also been furnished by nature, in quantities exceeding all computation, to the most barren soils we own." The author then proceeds to state, that calcareous earth—by which term he always intends to express *chalk*, i. e. *carbonate of lime*—is "the cause of fertility, and the cure for barrenness."

The arguments are well sustained throughout theremaining part of the Essay, and prove the value and importance of chemical knowledge: they are, however, far too extensive to permit of being minutely investigated, and, indeed, may not be generally applicable to the soils of England. However, it would be highly desirable that particular attention be given to the facts adduced, in all districts where peat mosses exist, or have been recently reclaimed, for therein vegetable remains abound; and

* Th soil, containing "scarcely two per cent. of chalk," is abundantly calcareous to have acquired, and to retain all its fertility, according to to the theory maintained in the Essay on Calcareous Manures. Any quantity, however minute, of CARBONATE of lime found ntaurally existing in a soil, proves that there had been enough for its use and benefit. The author of the Essay was far from maintaining that the proportion of CARBONATE of lime found in any soil, was the measure of its fertilty. The quantity originally given to soils, by natural causes, when not excessive, and under like circumstances, might have served to measure the power to acquire and fix fertility. But in the course of reaching that end, the lime is supposed by combining with vegetable acid, to cease to be the carbonate, and is no longer detected in that form. This soil which Mr. Towers scarcely considers calcareous—or as containing "merely a hint of carbonate of lime," is in fact better supplied with that ingredient than almost any natural soil in our Atlantic States—not even excepting our limestone soils. Indeed, the only soils more calcareous, are the few and very limited spots on which shells have been deposited.—ED. FARM. REG.

though these substances contain the elements of calcareous earth, they also are replete with those of vegetable acids, inasmuch as they are chiefly composed of oxygen, hydrogen and carbon—the bases of all such acids. The presence of acids need not therefore, be questioned, though they may not be traceable as such, being taken up and neutralized by the chalk, or alkalescent matters with which they come in contact as they are produced.

The sterility of pure peaty soils, and their incapability of improvement by manuring substances, tend much to strengthen the second proposition, as does the fact that paring and burning are found experimentaly, to be meliorating processes of great efficiency; and why? simply, because the agency of fire decomposes the vegetable matters, destroys the acidifying elements, or, to speak more correctly, disperses them in the form of gasses, or aqueous vapor, liberates and fixes the carbonate of lime, and a portion of free carbon, and perhaps, (generally) a little carbonate of potassa, also. Here, then, we perceive another proof of the importance of chemical science, for nothing else could ascertain the results of the combustion of the peat, or refer them to their proper causes.

Mr. Ruffin's observations prove the correctness and accuracy of his analysis and conclusions. *All wood ashes*, as I have proved by reiterated experiments, and asserted, do contain *carbonate of lime*, and some other neutral alkaline salts, but whether these saline compounds have been furnished "by soil on which the plants grew," as he supposes, is to me a matter of some doubt. The *roots* are the media which connect the plant with the earth, and the *leaves* expose it to the influence of light and air; of these facts there can be no doubt; but several experiments with the sap of a bleeding vine, have led me to hesitate on the subject of the components of that fluid. I have not been able, as yet, to detect the presence of carbonic acid in it, but future experiments may furnish more decisive evidence than any which have yet come under my observation; still however, I lean to the opinion that, it is by no means from the soil alone that plants derive their specific juices. When we perceive that *aerolites*, containing metalic compounds of a peculiar nature, are formed in the atmosphere; that masses of hundreds of pounds in weight are precipitated from the air to the earth—(admitting the records of these startling phenomena to be founded in fact)—we need scarcely doubt the possibility of the convertion of the elements of water alone into all the specific secretions of plants, through the agency of light and air.

But, be this as it may, the theory of the neutralization of the vegetable acids by the carbonate of lime, naturally existing in the soil, is at once bold, novel and extremely plausible. The whole tissue of arguments adduced, are very ingenious and philosophical; and though they do not apply with equal force to the soils of Britain, are highly important to the philosophical agriculturist.

Nothing can be more correct than the assumption that vegetable matters under fermentation, (which is a chemical change of the constituents of dead vegetable matter, effected by the play of electrical affinities,) produce acetic and carbonic acids, perhaps also the muriatic acid; and these would be taken up in their nascent state by any alkaline substance existing in the soil. Acetic acid would be carried off, were it not fixed by some chemical agent; but if met with lime or potass, a neutral soluble compound would be formed; such, to an extreme degree, is the acetate of potass, a salt so greedy of water, that it liquifics if it be exposed only for a few minutes to the action of the atmosphere.

Leaves, and most vegetable bodies, affords manifest proofs of the presence of salts, particularly of salts of lime; not that they contain any chalk in its pure state, but they, in many instances, yield it to the mineral acids by mere digestion in them, without having undergone combustion. Thus, while we attest the truth of the chemical law adduced by Mr. Ruffin—that if any combination of lime with a vegetable acid "had been taken up into the sap vessels of a tree, it would be decomposed by the heat necessary to convert the wood to ashes; the acid would be reduced to its elementary principles, and the lime would immediately unite with the carbonic acid," produced by the process of combustion; we feel assured, by the evidence of facts, that mineral acids may attract from *green* vegetable substances the calcareous matters which lie masked among the cells of the plant, in a state of union with some unsuspected acid. I have thus detected, or rather produced, carbonate of lime, by digesting some sorts of moss in a weak cold solution of muriatic acid. I have also found a considerable portion in the leaves of a pine apple, but not to equal that which was yielded after combustion.

The combustion of vegetable remains, as leaves, haulm, sticks, and all such refuse, offers the ready means to furnish calcareous matters and alkali to land that is deficient of those important substances, in cases where it may not be easy to procure them in bulk. Many have objected to the process of burning, styling it a wasteful expenditure of manure; and so it may be considered if a soil be ill supplied with decomposable matters; but it is self-evident that, if a farm-yard manure be abundant, and the land of a light friable nature, void of chalk; or, on the other hand, if it be clayey and too adhesive, the products of combustion must offer meliorating substances of first rate quality.

I cannot now dwell upon Mr. Ruffin's observations concerning the original constitution of what he terms *neutral soils*, or notice the changes they may have undergone; these considerations, and others which refer to his remaining propositions, must be, for the present, deferred.

I regard his essay as a master piece; he has therein practically demonstrated the importance and vast utility of chemistry. His knowledge of refined processes may, perhaps, as he leads us to infer, be somewhat limited; but he has shown that he knows enough to analyse correctly, to describe accurately, and to apply the principles of chemistry with the best effect.

I trust we shall soon be favored with the remaining parts of his essay, for science owes him much, and its friends cannot but be delighted with the aid she has received at his hands. A few more such papers, widely disseminated through the most influential channels, could scarcely fail to convince the most sceptical, that he who could thus apply to the operations of husbandry the scientific principles which he has acquired, must be, in every way, qualified to make the most of his land, be its quality what it may; and thus to increase his profits while he improves his practice of agriculture, and calls into action the utmost productive power of his farm by a liberal, but wisely directed system of tillage.

G. I. T.

October 21st, 1835.

From the Genesee Farmer.

LETTERS FROM A FATHER, LIVING IN THE STATE OF NEW-YORK, TO HIS SON IN WESTERN PENNSYLVANIA, ON THE ADVANTAGES OF KEEPING LIVE STOCK, THE IMPORTANCE OF HAVING GOOD BREEDS, ETC.

Having taken a cursory view of the principal crops cultivated in the country, and having noticed the quality of soil and manner of culture adapted to each, and in some instances their comparative value, I am now ready to take my leave, as to these letters, of this department of husbandry. I take my leave of it accordingly, and bid it farewell.

There is another department of rural husbandry which, if I am not mistaken, offers to you, and your fellow citizens, peculiar inducements to become interested in it. I allude now to the breeding and rearing of domestic animals, and the various uses in which they are susceptible of being rendered serviceable to man. It does not appear to me that your farm, or any other in your immediate neighborhood, is so well adapted to the growth of grain as to the several uses of grazing. Nor is it, in my view, likely that Western Pennsylvania, in general, will ever be distinguished as a grain growing, and especially as a wheat growing country. For other attributes, not less desirable and important, it may be, and probably will be, highly distinguished. Who that has witnessed the fine pastures of white clover that are to be seen there in all directions, can doubt that the country is admirably adapted to grazing purposes? The inhabitants of that country should listen to the voice of nature, and yield prompt obedience to the lessons which she teaches. What says nature? What is the language which she speaks, in exhibiting those fine pastures? Most certainly it is, bring hither your flocks and herds. It is hard to struggle against nature. To make the culture of grain the primary and leading object, while nature clearly points to another and better way, is little else than rebellion against her sovereign mandates.

It is my opinion that you have not given that attention which your interest requires to the breeding, rearing, and proper use and management of live stock. I did not see about you such specimens of fine stock, especially young stock, as would have been pleasing in my sight. Yet I do not intend to single you out as the only delinquent. It did not appear that your fellow citizens in general had done better, in this respect than yourself. In regard to the husbandry of domestic animals, the whole country around you is behind what it should be, and far behind its own interest.

Good breed is the first requisite towards good husbandry, in regard to live stock. The rule noticed in one of my preceding letters, that the more perfect the parents are, the more perfect the offspring or progeny may be expected to be, applies certainly no less to animal than to vegetable tribes. A particular regard to the principles of this rule is absolutely essential to successful enterprise in the husbandry of live stock. Yet it is believed few good rules for the regulation of human agency are less regarded. By many it seems to be considered as a matter of indifference what animals, whether good or bad, are employed for the propagation of their species. Very inferior animals are often employed for that purpose, and it rarely fails that the consequences are just such as should have been expected—a degenerate and worthless race

of animals. I know not to what extent you and your fellow citizens have practised such indiscretions. I regret, however, to say, that the specimens of live stock which I saw in that vicinity, did not afford satisfactory evidence, that the general practice there had been in these respects altogether unrebukable. To excite in your own mind, and among your neighbors and fellow citizens, proper inquiries relative to the importance of entering more deeply than has been done in that place into the husbandry of domestic animals, and of practising therein according to the principles of economy, is the object at which I am aiming while I write this letter.

It has been suggested, that the first step to be taken towards improvement in the branch of husbandry now under consideration, is to procure good breeds of animals. This is a fundamental concern, and it is scarcely possible to attach to it greater importance than justly belongs to it. Will not the farmers who compose that respectable agricultural community with which you are connected, agree to act in concert for the accomplishment of a revolution in their practice, in conformity to plans herein suggested? Owing to the liberality and practical enterprise of sundry public spirited gentlemen, the best breeds of European stock have already been introduced among us, and are now to be found in almost all parts of the country. It is, I believe, universally admitted, that these breeds, some of them at least, go far ahead, in point of excellence, of any thing that can be found among our own native breeds.

Do you, or do your fellow citizens, desire to become possessed of one of the best breeds of cattle, or the very best that ever grazed in the pastures of any country? I apprehend you need not travel far abroad to find such a breed. Certainly you need not go for that purpose much beyond Buffalo, perhaps not half that distance. LEWIS F. ALLEN, Esq. of the city just named, supposed to be one of the best judges of live stock, has taken unwearied pains to procure the best breeds of cattle. We are credibly informed that he has been successful in his enterprise. It is believed that gentleman has now in his possession on Grand Island several fine bullocks of the improved Durham Short Horned breed, graded differently as to blood, which he will dispose of to his fellow citizens on fair terms. Many other gentlemen in Western New York, and other parts of the same State, are also in possession of highly improved breeds of cattle. But why speak of N. York, as if good breeds of cattle could be found only in that State? Good breeds and good breeders of cattle abound in your own State no less, to say the least, than in any other.

Since then, there are in the country, and not far from you, the best breeds of cattle, can it be supposed that you, and your agricultural neighbors, are doing yourselves justice while you neglect to become interested in them? If gentlemen who understood their own interest, have thought it an object worthy of their attention to send to Europe for good breeds of live stock, is it no object to you to avail yourselves of such breeds, when they are brought near to you, and can be obtained at a trifling expense? It does not appear that farmers in general consider as they should, how great the difference in value is between bad and good, or inferior and superior stock. They are inclined rather to estimate the value of their stock according to its numerical amount, counting the number of animals of which it is composed. This is a fallacious rule of estimating. It should be considered that a single animal of superior breed and excellence, may be worth more for the market, than some dozens of such as generally compose the stocks of this country. For illustration of this remark, I refer you to a recent sale of cattle in the State of Kentucky, published in the Genesee Farmer, current vol., No. 5. It will be seen that a single heifer calf, 8 or 9 months old, was sold for $295. One cow was sold for $300, and several others nearly as high. It is true, these were breeding prices, and if the cattle had been sold for other uses, such prices could not have been sustained. Nor is it to be expected, that when cattle of the best breeds shall have become plenty in the country, such prices can be sustained even for breeding. Yet the difference in value between inferior and superior animals, will always be very great.

It is believed my object in making the preceding remarks cannot be mistaken. I have been laboring to convince you, and that cluster of farmers with whom you are connected, that effectual measures should be taken to improve your breeds of live stock. I am not, unaware, however, that neither yourself, nor any other individual in the neighborhood to which you belong, may have money to spare for the uses that have been suggested, nor be able to spare the time that will be requisite for accomplishing the objects which have been recommended. For such reasons it may be feared my counsels will fail of having their intended effect. Permit me then, further to remark, that farmers have in many respects a common interest, and the better to manage that interest, they would do well, in many instances at least, to form themselves into small associations. Should it become the practice of farmers, *every where*, and in all little farming communities, to form themselves into such associations for the better promotion of their general interest, incalculable advantages would be the results. Such associations should be regularly organized, and have stated periodical meetings for consultation and action on subjects equally interesting to all the members. There should also be rules and by-laws for the better regulation of such associated communities. To every such association a treasury, containing a small amount of public funds, should be considered as an indispensable appendage. If then an association of farmers in the vicinity to which you belong should be formed after the plan here suggested, what useful purposes would it answer? It almost appears to me that the question admits of an amendment, and should be amended so as to read, What useful purpose might it not answer?

At the meetings of such societies, the members might communicate to each other much useful intelligence relative to practical husbandry—suggest plans of improvement—adopt measures for improving their breeds of stock—agree how to practice when their territories are invaded, or threatened with invasion, by pernicious weeds, such as Canada Thistles, Johnswort, Daises and the like. Indeed, the useful purposes to be answered by such associations as have been suggested, are too many to be readily enumerated. It should be known, that while individual effort is feeble, combined action is powerful and irresistible.

To apply the above remarks to the case more particularly in view, it remains for me to say, that the farmers of your neighborhood should agree to act in concert, relative to adopting and pursuing measures for the improvement of their live stock. If no individual is able or willing to assume the expense or take upon himself the responsibility of introducing good breeds of stock, still this should be done by the combined agency of twenty or more farmers. Let a public purse, made up of individual contributions, be provided for this purpose. Let a discreet citizen, who should be a good judge of live stock, be appointed general agent, and let him go abroad in search after good breeds of cattle. By such means let a good bullock be introduced among you—let him be committed to the care and keeping of some one who is known to be a faithful and skilful manager of cattle stock—and let the privileges, profits and expenses, be justly divided among the members of the company.

A FATHER.

New-York State, March, 1836.

From the Genesee Farmer.

BREAKING AND MILKING COWS.

The proper management of cows to render them gentle and tractable, is a thing of the first importance. The unpleasant consequences of attempting to milk unsubdued and irritable animals,—the loss of a swimming pail of milk,—"the long face, the grave step, an apology and an empty pail,"—it is certainly always desirable to avoid. Even cows of naturally mild and gentle disposition, (for there is a great difference in them, as in almost all animals,) are sometimes completely spoiled by injudicious treatment. Where no system of management is adopted, and where animals are punished for bad conduct, merely as the convenience, caprice or passion of the milker dictates, it is not to be expected that they will improve in manners, or become otherwise than a terror of female, and finally, of male milkers.

Whenever young cows show any thing of a rebellious disposition, the first thing they should be made to feel, is the *superior physical force* of man, in a decided and effectual manner. As soon as this is felt, the animal is overpowered, and prefers surrendering at once to contending further, to manifest detriment. The best way to effect this, is to shut the animal up, and immediately accustom it to handling on every part, speaking to it at the same time in a loud firm voice, a single word at a time, and at intervals. It will thus become familiar to us, and become conscious of superior power. This consciousness will be more strongly produced, if the handling be firm and even rough. An animal should never, for the same reason, be spoken to in a *coaxing* voice, though a kind and soothing tone should always be adopted whenever it manifests submission. If it should show a disposition to resist, as by kicking, the act should be followed *instantaneously* by a *single* stroke of a whip, or other punishment. If this is *invariably* adopted, the animal soon submits, not finding it pleasant or profitable to resist. But never punish an animal unless it can be done instantly after the commission of the offence, and never strike but once; and above all, never get in a passion, for this will certainly spoil the whole. If an animal thus finds that bad behaviour is always followed immediately by punishment, and that submission is always attended with kind treatment, it soon learns to distinguish one from the other; and a change in its manners is wrought in a remarkably short space of time. We have seen cows of several years of age, and apparently of almost incorrigible ferocity, completely metamorphosed in this respect, so as never, for years, to show the slightest

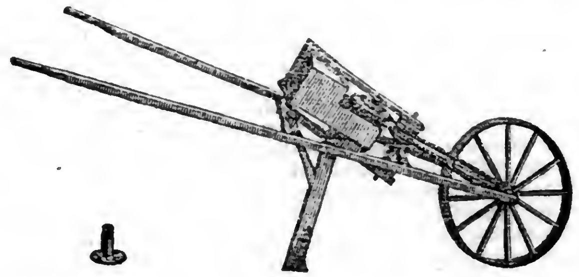
disposition to resist or disobey; but on the contrary, to become even attached to their master. We need not ask how much more humane to the animal, or pleasant to the keeper this is, than where a different course is pursued

It will assist materially in the breaking of young cows, to accustom them to be frequently handled from the first year; and to enable them to acquire a familiarity with the voice and presence of man.

A heifer should never be allowed to have a calf till the early part of summer, or if deferred even until nearly the middle, it will be no detriment. It will then be most vigorous, and there will then be a better supply of nutritious grass for food, which will cause a more perfect enlargement or swelling of the udder. The period of gestation in the cow, is, on an average, two hundred and eighty-seven days, or forty-one weeks, with a bull calf; a cow calf comes one week sooner.

The best cow may be spoiled by not milking clean; too much attention, therefore, cannot be paid to this subject. The udder should be perfectly drained to the very last dripping; for besides the extreme injury ultimately caused to cows by leavnig a part of the milk, the last milk is always far the richest, according to the remark of an experienced Cheshire dairyman, "each succeeding drop the cow gives at a milking excelling the preceding one in richness."

Sore or chapped teats, so common an evil, may be very effectually prevented by washing them perfectly clean with cold water always before milking. Very bad cases have been thus perfectly cured in a few days.



From the Cultivator.

ROBBINS' CORN PLANTER.

Mr. Buel—Sir—Having been applied to by letter, from various sources, for a description of "Robbins' Corn Planter and Drill Barrow," and answers to the following questions solicited, I have concluded, with your permission, to reply through the medium of the Cultivator, should you deem them of sufficient importance to occupy a small space in one of your columns.

Question 1st. "Is Robbins' machine complicated, and liable to get out of repair?" *Answer.* At first view, it would appear rather complicated; but on further inspection and a trial, the complication ceases, and it becomes very simple. There is, however, but one way of placing the band on the pulley, for that must be turned with the sun, *i. e.*, the band should pass from the top of the nave or hub of the large wheel, to the left side of the pully or whir. Particular attention should be paid to this, as, by placing it the opposite way, the wire spring in the small circular box might be injured. The band is shortened or lengthened by twisting or untwisting. The speed may be accelerated or retarded by placing the band on the larger or smaller groove on the nave and whir. By increasing the motion of the droppers, the seed will drop faster, and, of course, nearer together.

2d. "What and how many kinds of seeds will it sow?" *Ans.* It has six droppers, with different sized holes, and will plant corn, beans, peas, broom-corn, beets, mangle wurtzel, turnips, teazles, onions, carrots, mulberry, and all kinds of round or oval seed not larger than corn or beans, with more system and correctness than can be done in the usual manner of planting with the hand and hoe. One man may easily put in five acres in a day, placing the seeds any given distance apart, from two or more inches, and in rows two and an half feet apart one way, and the rows at such distances as may be deemed best. In drills, one or more seeds may be dropped, at eight inches asunder.

3d. "Is it drawn by a horse?" No—it is pushed by a man or boy, like a wheel-barrow, but it is much smaller and lighter.

4th. "Will it answer for planting corn in hills of equal distances, in squares, over a large field?" Yes, it will plant corn in hills, dropping from three to four kernels at a time, two and an half feet apart; and, by a little experience and attention, being particular on starting the rows, the hills may be placed at right angles and at equal distances.

5th. "Will it regulate and drop any required number of seeds?" Yes, by using larger or smaller sized droppers.

6th. "What is the price?" Fifteen dollars.

To plant one acre of ruta baga, the rows twenty seven inches apart, and the seeds in the drill one inch apart, only from four to six ounces of seed is required.

In a letter from a gentleman who has had one of these machines in use for several years, I find the following observation, which I have taken the liberty of transcribing.

"The corn I planted with Robbins' machine, last season, on my farm, exceeded that planted with the hoe, by the acre, at *least fifteen bushels*, under circumstances equally favorable, as to soil and cultivation. And I have conversed recently with a number of gentlemen who have used the machine, and tried some experiments, and find that the result has been in favor of the machine in all cases, they think, *not less* than *ten* bushels."

Such is the description and character of "Robbins' Corn Planter and Drill Barrow," and I know of nothing wanting to make it perfect, except a roller, which I consider of very essential service to cover and press the earth on to the seed, which causes a more rapid vegetation. The roller may be attached by an additional expense of $2.

The above machines may be obtained at the seed store of Wm. Thorburn, No. 347 North Market-street, and of the subscriber, No. 80 State-street, Albany.

C. N. Bement.

Albany, March, 1836.

We have extracted the following notice of the manufacture of Beet Sugar, desiring to bring all the information on the subject before our readers.

We are under the impression that the *white beet*, or *scarcity*, contains more sugar and less coloring matter than the *red beet*, the *betterave* of France.

Manufacture of Beet-root Sugar.—We are indebted to Mr. Isnard for the following interesting commuuication, accompanied with a number of documents, which we regret that we have not room to notice at the present time, any farther than to say that they fully confirm the statements contained in the letter.

Boston, March 28, 1836.

To the Editor of the Daily Advertiser.

Sir,—If you should judge the present communication worthy of attention, it is at your disposal. In order to satisfy yourself concerning the authenticity of my statements I subjoin documents for your perusal, when at leisure.

The manufacture of Sugar of Beet has ceased to be an object of ridicule; the advantages that France draws from it are palpable and great, and the benefits which the manufacturers derive from it are now such that the French Minister of the Treasury has proposed to lay a tax upon it. France owes this new branch of industry to that great man whom she will honor through all time; for, had it not been for his sagacity and powerful assistance, it would have shared the fate of many other improvements lying for ages, or dying in their infancy, once pronounced by ordinary men visionary projects.

The discovery that beet contains a perfect sugar remained for over sixty years without any useful application; many attempts, however, had been made to derive the benefit of it; but those having made these attempts, being rather men of science than men of business, having operated only upon a small scale, with purely scientific views, and having made no calculations, either of expenditures or results, they had no ground to proceed upon. I undertook to solve that problem, and to that effect made, the first in France, an experiment on a large scale, and by a sufficient reward induced a chemist to assist me.

The result of this experiment was transmitted to Napoleon on the 19th March, 1811, and by his order rendered public; and though the birth of his son took place on the 21st of this same month, on the 25th following appeared the decree, a copy of which is among the subjoined documents. By this decree, as you will perceive, he created six experimental factories for the manufacturing of sugar; he appointed me the director of one of them, which factory he gave to me in property, as a reward for my labor, and for having (*perfectionne*) improved the process for obtaining the sugar of beet. Such was my zeal, that my factory in the fall of 1813 was prepared, and all the beet raised by me, or contracted for, so as to produce 1500 lbs. a day of brown sugar, and the

same refined. The first entry of the allies into France caused the total ruin of my establishment. Up to 1816 political events were unfavorable for sugar making, but from that year this manufacture was resumed, and has since never ceased to increase and improve; it is now computed that over 300 such manufactories exist, producing together yearly about from 18 to 20 millions of pounds of brown sugar.

Now, sir, since the making of sugar of beet begins to attract the attention of some agriculturists of the country, I deem it of interest for them, and to gratify the curiosity of others, here to state what were the calculations made in France in 1832, (the latest date of my information,) and add a few observations respecting the benefits one may derive by the mere culture of beets in this country. It is generally admitted, viz:

That one ton, (2000 lbs.) of beet delivered at the factory, costs $3
That the expenses to work one ton of beet for obtaining its sugar, amount 4

That 2000 lbs. beets will yield 100 lbs. brown sugar, costing $7

Thus one pound of brown sugar, good quality, costs 7 cents.

By a comparison of the expenses of culture in various parts of France, and on various soils and situations, the average expenses of cultivating there the extent of an American acre of land, are as follows:—Rent and taxes, $5 00; ploughing and harrowing, $2 88; manure, $1 93; sowing, 50 cents; weeding and hoeing, $2 40; gathering, $1 60; carting, $2 56; farmer's profit, $4. Making a total of $21 47.

The produce varies according to the quality of the soil, the quantity of manure used, and the care bestowed on the culture—as we have taken the average of the expenses, so we must take the average of the produce, which is of 7 tons. Some lands yield as much as 15 tons.

The four dollars profit the French farmer derives from this culture, on every acre, is far from being the only one; the others are,

1st. The good state in which the field is left after gathering the beets—no further manure being wanted for the succeeding crop, which crop experience has proved to be always more abundant and of a better quality when succeeding the culture of beets, owing to the destruction of the noxious weeds removed by weeding the beets when young, and prevented from growing, by the thick foliage of the beet when strong.

2d. The facility afforded the cultivator to apply to the culture of beet lands, which he formerly let lie fallow, and consequently, without any additional expenses of rent and taxes, deriving as good a revenue from this land as from any other producing the most.

3d. The advantages the cultivator derives by the purchase from the manufacturer of the pumice of beet at a price not higher than beets, when experience has proved this pumice is worth for him fifty per cent. more; for in fact it is after all but beet deprived of two thirds of water, and consequently a more nourishing food for his cattle, perfectly fitted for fattening them, producing wonders in that respect, which could not be expected from beets in their natural state.

The following is a statement of the receipt and expenditure of a sugar-establishment, as reported to the Society for the Encouragement of Manufactures in France. The whole work was performed in 91 days.

Purchase of 500 tons of beet, delivered at $3 20,		$1600 00
1638 days work of men, at 20s., 455 do. of women, at 12s., 364 do. of children, at 5s.,		400 40
For extra working during the night,		109 20
40 cubic feet wood for fuel daily, (28 cords 3-100 at $16 7-100 per cord,)		473 20
Sundry materials for manufacturing purposes,		813 60
Food for 18 oxen used in the mill,		163 60
Interest on $3000 at 15 per cent. for wear and tear,		450 00
Rent for buildings,		120 00
Total,		4130 00
Deduct for molasses sold for	$320	
125 tons pumice at $3 20,	400	
Value of some materials left,	30	750
Produce of 50,000 lbs. brown sugar at 6 7-10 cents,		$3380 00
Sale of 36,000 lbs. 1st quality, at 15 cents,	$5400	
Sale of 14,000 2nd quality, at 10 cents,	1400	6800
Profit,		$3420 00

Should this notice be favorably received, I have at your disposal a few particulars respecting the cultivation of beets.

I am respectfully, sir,
your most obd't. serv't.,
MAX'N ISNARD.
French Vice Consul for Boston.

HINTS ON GRAFTING.

J. BUEL, ESQ.—If you deem the following hints on grafting of any practical utility, they are at your service, the whole, or any part of them.

The method which I have practised, with excellent success, for eight years past, is as follows. I cut my cions as late in April as they can be, before the buds begin to swell, and keep them with the but ends in the earth, in a damp cellar. When the season commences for setting, which is as soon as the leaves begin to start, I set my grafts. I use a composition of two parts rosin, one of beeswax, and one of tallow, melted in a small kettle, and applied hot, with a small brush, which any one can make in five minutes, nicely painting over the end of the branch cut off, so as to cover the split, and prevent the air or wet from getting in. By this method, one can set much faster than in the usual way of applying the composition cold—it requires less of it, and of apples or pears, not more than from five to ten per cent. need be lost. On other fruits I have not had much experience, but from what I have, believe it will succeed equally well. Respectfully,

LEVI HOPKINS.

Mentz, March 8, 1836.

CORN BREAD.

BY ELIZA.

If the editor of the Genesee Farmer will permit me to occupy a small space in his valuable journal, I will take the liberty to communicate one or two modes to make corn bread. They may be interesting to some of its fair readers, and peradventure assist them to give more variety to the cheer of the domestic board.

SNOW BREAD.

This is made by taking a quart of corn flour, and mixing intimately with it a table spoonful of lard. Then take two full quarts of snow and stir it well in the flour with a spoon; pack it close in the pan or oven in which it is to be baked, and submit it to a quick fire. If managed successfully, it will be found to be a far better article of its kind, than the famous *snow soap*, which attracted so much of the attention of our good housewives some years ago. It is exceedingly light and spongy, and will require nearly three quarters of an hour to bake.

CORN ROLLS.

Take a quart of meal, a spoonful of lard, and two spoonfuls of yeast; mix with warm water until the dough is quite soft. Set it in a warm place at night to rise, and bake it in a pan or in cakes in an oven for breakfast. Both this and the snow bread bake very well in a stove.

ELIZE.

Virginia, 3 mo. 1.

During the months of December and January last, the average number of persons who passed from Brussels to Malines, by the Railroad, was never under 800 every day. The total number of passengers in December was more than 28,000, in January more than 29,000; this will probably be surpassed in the present month.

The Augsburg Gazette states that it has received tidings up to the 3d of March from Patras, which contradict the rumors of an insurrection in Greece. Four hundred Klopths in order to escape from the Turkish troops had flung themselves on the Greek territory. But the garrison of Missolonghi instantly took up arms and repelled the marauders with loss.

HARTFORD AND NEW-HAVEN RAILROAD.

From New-Haven to Meriden, eighteen miles of this Railroad is now located, and is expected to be ready for contract about the 25th of May. The attention of contractors is invited to this work. A more definite advertisement of the time when proposals are to be received, will hereafter appear.

JAMES BREWSTER, Agent.

New-Haven, April 27, 1836. m16—3t

[Editors to whom this is MARKED, are requested to give it three insertions, and send their bills to James Brewster, President Railroad Company,

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

NEW-YORK AND ERIE RAILROAD.

TO CONTRACTORS.—Proposals will be received at the Engineer's Office of the New-York and Erie Railroad Company, in the village of Binghampton, on and until the 30th day of June next, for grading 69 miles of the Railroad, from the village of Owego, in Tioga County, to the village of Deposit in Delaware County.

Proposals will also be received at the Engineer's Office, in Monticello, on and until the 11th day of July next, for grading 48 miles of the Railroad through the county of Sullivan, extending from the Delaware and Hudson Canal up the valley of the Neversink, and thence to the mouth of the Callikoon Creek, on the Delaware River.

Plans and profiles of the line above mentioned, staked out in convenient sections, with printed forms of the contracts, will be ready for exhibition at the said offices twenty days before the days of letting above specified.

The Company reserve the privilege of accepting only such proposals as they may deem for their advantage.

New-York, 26th April, 1836.

15—tf JAMES KING, President.

NOTICE TO CONTRACTORS FOR EXCAVATION AND EMBANKMENT.

PROPOSALS will be received at the Office of the Munroe Railroad Company, Macon, Geo., between the 19th and 21st of May next, for Excavating and Embanking the whole of the Railroad from Macon to Forsyth, a distance of 25 miles, embracing much heavy graduation.

For further information, apply to

DANIEL GRIFFIN,
Resident Engineer.
J. EDGAR THOMSON,
C. Engineer.

Macon, March 29th, 1836. 11—5t

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS OF VOLUME II. OF THE CHICAGO AMERICAN, TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

⁂ Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

⁂ All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

⁂ Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.

feb 20—ytf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

RAILWAY IRON.

95 tons of 1 inch by $\frac{1}{2}$ inch.
200 do $1\frac{1}{4}$ do $\frac{1}{4}$ do
40 do $1\frac{1}{4}$ do $\frac{3}{8}$ do
800 do 2 do $\frac{1}{2}$ do
800 do $2\frac{1}{4}$ do $\frac{5}{8}$ do
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of $2\frac{1}{4}$, $2\frac{1}{2}$, $2\frac{3}{4}$, 3, $3\frac{1}{4}$, $3\frac{1}{2}$, and $3\frac{3}{4}$ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

TO CONTRACTORS.

ENGINEER DEPARTMENT, BALTIMORE AND SUSQUEHANNA RAILROAD COMPANY,
April 25, 1836.

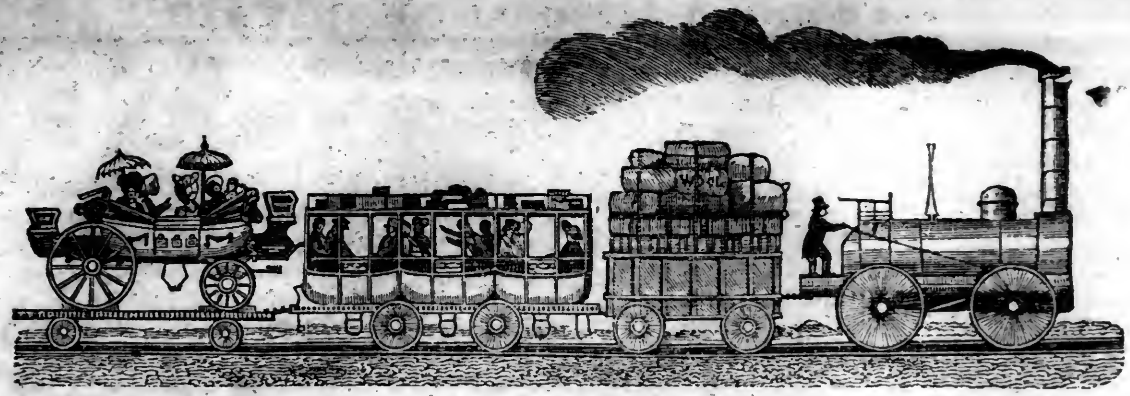
PROPOSALS will be received at this Office until the 10th May, for the graduation and masonry of 20 miles of the Road, including a deep cut at the summit.

This division of the road commences in this State and ends in Pennsylvania; running through a high, healthy country, abounding in cheap provisions.

Satisfactory recommendations must accompany the proposals of those, who are unknown to the undersigned.

ISAAC TRIMBLE,
Chief Engineer.
WM. GIBBS McNEILL,
Consulting Eng

15-tm10



AMERICAN RAILROAD JOURNAL, AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, MAY 7, 1836. [VOLUME V.—No. 18.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 7, 1836.

New Work on Locomotive Engines.—We have in press, and will shortly republish from the London edition, a valuable work on Locomotive Engines, by the Chev. F. M. G. de Pambour, formerly a student of the Ecole Polytechnique, late of the Royal Artillery, on the staff in the French Service, Knight of the Royal Order of the Legion d'Honneur, etc., during a residence in England for scientific purposes.

Auburn and Syracuse Railroad.—The Report of E. F. Johnson, Esq., Chief Engineer of the Auburn and Syracuse Railroad, will be found in this number of the Journal.

Pambour on Locomotive Engines, on Railways.—We have received a valuable work, by the Chevalier de Pambour, on Locomotive Engines. It is the result of a series of experiments, recently made by him in England, with a view of obtaining more correct information in relation to the power and utility of Locomotive Engines on Railroads.

The work contains about 360 pages, small octavo, with four plates, exhibiting a Locomotive Engine complete, and also in detail, or each part separate.

The cost of the English edition is $4, which will prevent its coming into general use in this country, and we are therefore induced to re-publish the book, in a form which will bring it before the Railroad community at a much less cost.

The following extract gives a good idea of the work:—

"The plan we intend to follow in the course of this work will, we hope, render it both clear and methodical.

"We shall begin by a description of a locomotive engine; and we shall acquaint the reader with the means by which the pressure of steam may be accurately measured, so that, before we go any farther, he will be able to see the elements from which the power of the mover we are to employ is derived.

"Our attention will afterwards be directed towards the resistances which that mover must overcome in its motion, so that we shall successively endeavor to discover as well the resistance of the waggons, as that which belongs to the engine itself, either when it moves alone, or when it draws a load after it.

"These points first established, we shall pass to the general theory of the movement of locomotive engines, and we shall lay down the formulæ by which to determine, *a priori*, either the speed the engine will acquire with a given load, the load it will draw at a given speed, or the proportions which are to be adopted in its construction to make it answer any intended purpose.

"After that, we shall have to consider several additional dispositions proper to the engine, which may exercise more or less influence on the expected effect; and we shall then also treat of some external circumstances, the result of which may be of the same nature.

"Lastly, we shall speak of the fulcrum of the motion, or of the force of adhesion of the wheel to the rails; and our last chapter will contain a calculation of the quantity of fuel required for the traction of given loads.

"These inquiries will be sufficient to solve all the most important questions concerning the application of locomotive engines to the draft of loads.

"They will sometimes be necessarily subdivided into several branches, and require calculation and theoretical illustrations, of more or less extent, though always plain and easy, and a series of experiments more or less numerous; but we shall take care to maintain, all along our work, the classification we at present lay down."

Sugar from Urine.—It has long been ascertained, that the urine of persons afflicted with Diabetes, contained pure sugar. The following account of a loaf of sugar from such a source, shows that the manufacture has increased. Indeed, the sugar would, for cheapness of the *raw material*, rival that either from the beet, cane, or Indian corn; but unfortunately, Diabetes is a disease of rare occurrence, and with the exception of a few local instances, we are convinced that the supply from this source may be considered as absolutely nothing.

M. Peligot, a chemist, has presented to the *Societie Philomathique* a loaf of sugar, which he had extracted from the *urine* of a patient now in the hospital of *La Charite*, afflicted with the Saccharine Diabetes.—This man voids about 20 quarts of urine a day, of which 5 parts in every 100 is sugar.

To the President, Directors, and Company of the Auburn and Syracuse Railroad.

Gentlemen,—In compliance with instructions, I present herewith a statement of operations in the Engineer Department of the Auburn and Syracuse Railroad for the past year.

The Engineer Department of the Auburn and Syracuse Railroad was organized, and surveys commenced, in April, 1835. The measurements, examinations, &c., preparatory to the final location, occupied the succeeding six months. On the 15th day of October, 1835, proposals were received for the grading, bridges, and culverts, including the labor and materials of every description necessary to complete the roadbed.

In December and January, the excavation was commenced on a few of the more expensive sections, with a view of advancing the work upon them, and to avoid thereby any delay in the opening of the road, which would result from those sections not being completed in the proper time with the others.

The advantages anticipated from this course have not, in consequence of the extraordinary deep snows, and severity of the past winter, been fully realized.

Much work has, however, been done. The first payment to contractors was made on the first of January, since which time, three successive payments have been made. The work is now rapidly progressing, on most of the sections. The remainder will be commenced as soon as the company have acquired a title to the land, which it is believed will not be long, as the legal measures for effecting that object, rendered necessary in those cases where the parties fail to effect a compromise, are in a train of execution.

It is proper to state, that the sections of the road on which the work is not now actually progressing, are, with one or two exceptions, of the lighter and less expensive character, and the delay in obtaining the land will not therefore prove as serious an inconvenience, as it might under different circumstances.

The contractors are efficient, business men, of much experience in their profession, and well recommended upon other works where they have been engaged.

In January last, proposals were received, and contracts made, for the delivery of the timber for the railway, or superstructure, sufficient to construct a single track. These contracts were made on favorable terms, and it is believed with responsible men, and no apprehensions of failure are entertained.

White Cedar and Red, or Norway Pine, is the timber proposed to be used. The rail timbers are to be exclusively of the latter material.

The width proposed for the rail track is the same as upon the Utica and Schenectady, and Mohawk and Hudson Railroads. A greater width was deemed desirable, but as the Auburn and Syracuse road is to be a link in the same chain with the roads mentioned, it was concluded to adopt the standard which had been established on those roads.

The timber for the railway is to be delivered, the most of it, the coming fall, and the balance early in the season following.

The distance from the principal depot, in the village of Auburn, to the site of the contemplated depot in the village of Syracuse, is 25.73 miles.

The total descent in that distance is 271 feet, making an average descent, supposing the inclination of the road to be uniform, of 10.54 feet per mile.

The maximum inclination of the grade line is 30 feet per mile. This extends only 8600 feet, or $1\frac{2}{3}$ miles, and occurs on the west side of the valley of the nine mile creek.

There are in the whole length of the road 31 changes in the inclination of the grade line, to adapt it, in the best manner, to the shape of the ground. These changes vary from a level to the maximum above stated.

There is, in general, the same average descent on all portions of the line. This appears from the fact, that the grade line of the road does not depart from a line of uniform inclination further, on the average, than 10 feet. The maximum being precisely 24 feet.

The several consecutive inclinations are united by vertical curves, of a large radius, to render the transition of the carriages and engines from one to the other as easy, and with as little resistance as possible.

The total amount of straight line and curves is exhibited in a tabular form as follows:—

		Miles.
Straight line, ...		15.976
Curved do. radius, 10,000 ft. and over, ...	0.379	
5000 ft. to 10,000 ft.,	2.670	
3000 ft. to 5000 ft.	2.394	
1500 ft. to 3000 ft.,	3.067	
1000 ft. to 1500 ft.,	1.248	9.758
Total, ...		25.734

Comparing this with the Utica and Schenectady Railroad, which is among the most favorable in respect to straightness, and the result is as follows:—

	Per centage of straight line and curve.	
	Auburn and Syracuse Railroad.	Utica and Schenectad. Railroad.
Straight line,	62	74
Curved do. radius,		
10,000 ft. and over,	2	1
5000 to 10,000 ft.,	10	15
3000 to 5000 ft.,	9	7
1500 to 3000 ft.,	12	2
1000 to 1500 ft.,	5	
700 to 1500 ft.,		1
Total,	100	100

It appears from the above that nearly two thirds of the whole extent of the Auburn and Syracuse Railroad is straight line,—the relative amount of straight line being but 12 per cent. less than upon the Utica and Schenectady road. The minimum radius of curvature, on the former, is 1000 feet, the curves ranging generally between 1500 and 5000 feet radius. In those places where the inclination of the grade line is greatest, curves of a lesser radius have been avoided.

In passing from one straight line to another, the transition, instead of being made as usual, by a single arc of a circle, has in general been effected by three or more arcs, the radii of the extreme arcs being greater than the middle, or intermediate ones.—This gives an approximation to the elliptic or parabolic curve. The engine and train, on entering a curve of this description, encounters the resistance caused by the change in direction gradually, being less liable to be thrown from the track, and on leaving the curve, the acceleration in the motion, on being relieved from the resistance, is likewise rendered more gradual. The method adopted in tracing the curves, rendered this arrangement perfectly feasible, and afforded a line in general better adapted to the shape of the ground.

The principal depot in Auburn is situated near the site of the State Prison. This point is favorably located for uniting with the contemplated road running west to Rochester and Buffalo.

From this depot the road is to be extended to the termination of the Auburn and Owasco Canal, to accommodate the hydraulic power which will soon be created at that point.

In proceeding from Auburn easterly, the line of the road passes, at the distance of 5 miles, near the village of Brutus. At the distance of $8\frac{1}{2}$ miles it crosses the outlet of Skaneateles Lake, $4\frac{1}{4}$ miles north of Skaneateles village, and $1\frac{3}{4}$ miles south of the village of Elbridge. At the distance of 15 miles from Auburn, and $10\frac{3}{4}$ miles from Syracuse, it crosses, by an embankment, the valley of the nine mile creek, at a point two miles north of Marcellus village.

From thence it passes along the east side of the creek, intersecting the Seneca turnpike near the village of Camillus, and thence occupying ground midway between the turnpike and the Erie canal, through the village of Geddes, to its termination on the south side of the canal, in the village of Syracuse.

The difference, in the distance from Auburn to Syracuse, between the railroad and turnpike, is less than half of a mile, the turnpike being the shortest.

The ground on which the Railroad is located, was selected with the greatest care, and it is confidently asserted that no other Railroad can be made between the same extreme points which can compete with it

on any thing like equal terms, either as it regards the cost of construction or expense of transportation.

The section of country between Auburn and Syracuse is probably as unfavorable for effecting a good location for a Railroad, as any equal portion of the route between Albany and Buffalo. The streams, which are numerous, all run northerly. The ridges and valleys of course lie in the same direction. This peculiar formation of the country, as it precluded the possibility of following the course of the valleys, (the direction of the Railroad being nearly east and west,) added much to the difficulty of fixing upon the best location. These difficulties, it is believed, have all been surmounted in a manner to afford a Railroad which, when completed, will bear a favorable comparison with other portions of the line from Albany to Buffalo.

The descent upon the Railroad being towards the east at a nearly uniform rate of 10½ feet per mile, will favor the expense of transportation, the preponderance of the trade being in that direction. If locomotive steam engines of the most improved description are used, similar to the best recently constructed for the Baltimore and Ohio Railroad Company, a single engine, will be competent to convey from Auburn to Syracuse in the space of two hours, a *nett* load of 150 tons, and to return in the same time with a nett load of about one third of that amount.

The difference between the average and maximum inclination of the Railroad being but 19½ feet, will not exceed (provided a suitable reduction is made in the speed on the heavier grades) the range of the power of the best engines.

This difference is no greater than upon the Utica and Schenectady Railroad, and is much less than the same difference on on the Camden and Amboy, New Castle and Frenchtown, and Providence and Boston Railroads. These roads have their extremes nearly on the same level. The maximum difference on the first is 45 feet, on the second 30 feet, and on the last 37 feet per mile, the latter extending 5 miles. It is less, likewise, than the same difference on that part of the Baltimore and Ohio Railroad between Baltimore and the Parr ridge.

The average inclination from Auburn to Syracuse, is the same with what is usually termed the *level* portion of the Mohawk and Hudson Railroad, situated between the inclined planes. The greatest departure of the grade line in the latter case, from a line of uniform inclination, is 50 feet. Upon the Auburn and Syracuse road it does not exceed, as already stated, 24 feet.

The ground on a very considerable portion of the line of the Auburn and Syracuse Railroad is exceedingly well adapted for forming a firm and substantial road, being composed principally of gravel and loam, and loose shell rock, which is generally of easy excavation. On that portion of the line located upon the side hill, along the valley of the Nine Mile Creek for a distance of four miles, Gypsum, or Plaster of Paris, is found in the excavation, in considerable quantities. Nearly all the solid rock which is required to be excavated in forming the road bed, appears thus far to be of that material. This is deemed very favorable, as the value of the plaster, if disposed of at the usual prices, will cover the cost of its excavation.

The cost of constructing the road cannot now be correctly stated. The general rise in the value of labor, Railroad iron, provisions, &c., which has taken place during the past winter, will have a tendency to enhance the expense.

From the facts before me, it is probable that the cost of grading, masonry, &c., for a double track, together with that of the superstructure complete for a single track, will not exceed 12 or 15 thousand dollars per mile.

It is contemplated to form the road bed in a substantial and permanent manner.

Lime stone is the material principally used in the various structures, and is obtained in any quantity, in the vicinity of all parts of the line, of the best quality.— The bridges are few in number, and of very limited space.

The total value of perishable material used in forming the road bed, will not probably exceed for the whole road the sum of $3500. This, it is believed, will have an important and favorable influence in the cost of repairs.

In the location of the Railroad, throughout its whole extent, particular regard was had to the prospect of its becoming a portion of the great line of rail way from Albany to Buffalo, and all considerations of a minor and merely local character were made to yield to this one paramount object. To the liberal and enlightened views of the Board of Directors in this respect, the public will hereafter be greatly indebted.

The road will be completed and may be put in operation, it is confidently believed, if no unexpected difficulties occur, previous to the month of September of next year, in time for the fall business.

Respectfully submitted,
E. F. Johnson, Chief Engineer.
Auburn, April, 1836.

We are obliged to the friend who furnished us with the following statement in relation to the opening of Buffalo Harbor and the Erie Canal.

To the Editor of the Rail Road Journal.

Sir—I enclose you a tabular statement of the periods of opening the canal for the ten previous years, and also of Lake Erie. You will confer a favor by inserting the same in your valuable journal for future reference. Yours, &c.

D. K. M.

To the Hon. the Common Council of the City of Buffalo.

Your Committee, to whom was referred the annexed petition,* respectfully report, That, through the attention of the Hon. Geo. P. Barker, they have procured from the Comptrollers department, at Albany, an official copy of the dates at which the Erie Canal has been opened and navigated each spring at Buffalo and Albany, for the last nine years, a copy of which will be found hereto annexed. Your Committe are also indebted to the politeness of Gen. H. B. Potter, for an accurate statement, (in the correctness of which your committee have the most implicit confidence,) of the dates at which Lake Erie has been navigable, and *actually navigated*, to and from the port of Buffalo, each spring, during the last nine years, all which will be found exhibited in the annexed statistical table, the whole of which your committe trust will be found strictly accurate and satisfactory :—

Year	Canal opened at Buffalo	Canal opened At Albany.	Estimated time of the arival of boats at Buffalo from Albany.	Lake Erie open at Buffalo.	Opening of Canal in favor of Buffalo.	Opening of Lake earlier than canal boats arrive.	Opening of Lake later than canal boats arrive.
1827	April 21	April 21	April 29	April 21	0 days.	8 days.	0 days.
1828	1	1	9	1	0	8	0
1829	25	29	May 7	May 10	4	0	3
1830	15	20	April 28	April 6	5	22	0
1831	16	16	24	May 8	0	0	14
1832	18	25	May 3	April 27	6	6	0
1833	22	22	April 30	23	0	7	0
1834	16	17	25	6	1	19	0
1835	15	15	23	May 8	0	0	15
1836	25	25	May 3	April 26	1	7	0
					17	77	32

Showing that for the last nine years, the Erie Canal has been navigated at Buffalo in five instances, to wit: 1827, 1828, 1831, 1833, and 1835, as early in the spring as at

*The petition referred to, was from the citizens of Buffalo, to the Common Council. It had its rigin in some remarks contained in the Governor's annual message relating to this subject.

Albany; and in four instances, 1829, 1830, 1832, and 1834, an average of four days earlier each spring. Thus showing conclusively, that property destined east, via. the Erie Canal, is not detained at Buffalo, though the "*ice*" *may* obstruct Canal navigation at *Albany* to a later period, also showing, that for the last nine years, Lake Erie has been navigable and *actually navigated* to and from *Buffalo* in six instances, to wit: 1827, 1828, 1830, 1832, 1833, and 1834, from eight to nineteen days *earlier* than property could have arrived at this city from the city of Albany, via. the Erie Canal, and in three instances, viz. 1829, 1831, and 1835, property could have arrived at this city from Albany, via. the Erie Canal from three to fifteen days earlier than Lake Erie was navigable from this Harbor, giving in the aggregate on the "*ice*" question an average advantage within the said nine years, of four and 2-9 days each spring, in favor of Lake navigation to and from Buffalo, over the Erie Canal arrivals from Albany. It will be observed by referring to the statistical table, that 8 days time is allowed for the first arrival of canal boats at this port from Albany on the opening of the canal in the spring, which is *withing* the average as it is well known that from one to two days more time is required in navigating the canal on the first opening of navigation, than is the case after the towing paths and banks become settled, and farther your committee have not made any estimate of the delays incident upon breaches or obstructions in the canal, which in several instances have occurred previous to the first spring arrivals of boats at this place from Albany, all which is respectfully submitted. For the Committe,

W. F. Porter Taylor, Ch'n.

Feb. 26, 1836.

RAILWAY TUNNELS.

(From Mr. Gibb's Report upon the several proposed Lines for a Brighton Railway.)

An objection has been made generally to all tunnels—namely, that the air contained in them will be so contaminated by the noxious gas produced by the locomotive engines in passing through them, as to render it unfit for respiration. Whether this objection has ever been advanced, or at all supported, by any scientific man possessing sufficient chemical knowledge to enable him to judge correctly on the subject, is doubtful. The probability, however, is, that the fear of any injurious effects from foul air has originated in those who have witnessed the effects produced by steam engines in passing through the small tunnels on some of our canals; and if they have for a moment imagined that any similarity will be found in the effects in the two cases, their fears are quite justifiable. The tunnels on canals are commonly constructed of such limited dimensions, that it would be highly dangerous to attempt the same application of steam power as will be necessary on a railway; for instance, in the tunnel constructed by Mr. Telford on the Hare Castle Canal, the area above the water in the canal is only about one hundred feet; and even the Thames and Medway in transverse dimensions, perhaps the largest canal tunnel in England, has only an area of four hundred and fifty feet; while the smallest tunnel contemplated on the Brighton Railway, will have an area of at least six hundred feet.

In order to explain to what extent the air in a tunnel is contaminated by a locomotive engine passing through it, let us suppose a tunnel one mile in length to be traversed by a locomotive engine, and its train of a gross weight of one hundred tons. The experience of the Liverpool and Manchester Railway has shown that the average consumption of coke is considerably less than half a pound per ton for each mile it is carried on a railway; but taking the consumption at half a pound, the whole weight of one hundred tons will require the consumption of 50 lbs. of coke. It may be calculated that every 10 lbs. of coke will evaporate a cubic foot of water; so that the whole 50 lbs. will convert into steam 5 cubic feet of water in the distance of 1 mile. Now to convert into steam 1 cubic foot of water, requires 1,950, or say 2,000 cubic feet of air, then 5 feet of water will of course require 10,000 feet; and this will be the whole amount of contaminated air in one mile in length of tunnel. To determine the proportion of such an amount of foul air, and the whole air contained in the tunnel, we may take for example a moderate sized tunnel 30 feet high, and having an area of 800 feet. One mile in length of such a tunnel will contain 4,224,000 cubic feet; hence the contaminated air will bear to the whole quantity in the tunnel the ratio of 10,000 to 4,224,000; or it will be as 1 to 422. It will scarcely after this appear that any valid objection to tunnels, to assert that an injurious effect must result from the contaminated air, when we find that the quantity of this description of air, produced by the passing of the whole train, will be no more than $\frac{1}{422}$ part of the whole quantity in the tunnel.

Let us then venture to hope, that any prejudices which may now exist against the construction of tunnels upon railways will be dispelled, when we find that no injurious consequences will ever result from the foul air, or any other of the numerous evils which have been so forcibly dwelt upon by those who affect to perceive the most unhappy consequences from their adoption.—[London Mechanics' Magazine.]

From the London Mechanics' Magazine.

SCRIVNER'S WROUGHT-IRON RAILWAY CHAIRS.

Sir—In reading your interesting and valuable miscellany, I have been much gratified and amused with the different articles on railways; it seems as though the scientific and mechanical world were all intent on the subject, for it appears to be calling forth all the learning of the one and ingenuity of the other; and it must be allowed to be a subject of such importance, that science and art cannot, at this time be more usefully employed on any other. That there is and will be difference of opinion on the subject is no more than is to be expected; but amidst all the plans and suggestions that are, or may be advanced, the descriminating and skilful engineer will know what to choose and what to reject. The subject of rails and chairs, has occupied some space in your Magazine, and my object in now writing to you is to call the attention of railway companies and engineers (particularly those of the continent of Europe and America,) to a wrought-iron pedestal or chair, patented by Harry Scrivner, Esq., a gentleman connected with the British Iron Company. That a wrought-iron chair must be better than a cast-iron one, no one, I presume, will deny. Why else adopt the wrought-iron rail in preference to the cast-iron one? It cannot be simply owing to its extra length, and consequently causing fewer joints in a railway. The superiority of wrought-iron chairs to cast ones, must be to say the least, in proportion as wrought-iron is superior to cast-iron.—What the comparative strength of cast and wrought-iron is, I cannot exactly say, as it differs according to quality. But suppose a wrought-iron chair of 10lbs. weight to be equal in strength to a cast-iron one 20 lbs., and the cost to be the same in manufacture, the advantage to the purchaser is one-half in the conveying of the chairs from the *iron-works* to the place of destination; so that if a double railway one hundred miles in length take in cast-iron chairs of 20 lbs. each, 6,775 tons, it will take, in wrought-iron chairs of 10 lbs. each, but 3,387 tons 10 cwt.; which is such a saving in carriage, as one would think would not be lost sight of,—especially by the purchaser for the foreign market. Another advantage of the wrought-iron chair to the cast-iron one is its durability. As the oxydizing influence of the atmosphere is not so great on wrought-iron, as cast-iron, the durability of the one, compared with that of the other, must be in the ratio of corrosive liability.

Now, sir, as utility and economy must always be two leading considerations in all railway undertakings, the wrought-iron chair must, in point of saving, alone have ample recommendation.

Yours truly,

A Subscriber.

ADHESION ON RAILWAYS.

At a meeting of the institution of Civil Engineers (reported in the *Athenæum*) it is stated that a great increase in the power of the engines in drawing loads after them arose from the use of wrought iron rails, and wheels hooped with wrought-iron, instead of cast. The Planet engine was instanced weighing $7\frac{1}{2}$ tons, and drawing 130 tons. The proportion or ordinary weight between the engine and the load, might be called 1 to 7, though 1 to 11 was a fair representation of power of traction as a maximum in favorable weather on a level. Case-hardened iron had been proposed for the rails, but had been abandoned in consequence of the chills, which answered perfectly at first, losing their effect by the repetition of the process, so that the case hardening was not equally effected.

New railway locomotine.—A locomotive carriage, having a very simple engine on a new principle, is nearly completed for the Greenwich Railway Company. The frame is constructed so that the wheels cannot deviate from the rails at any speed, and that their revolving motion can be instantly

changed to a *sliding* motion; thus the train being powerfully retarded by friction, is speedily brought to rest, and the risk of accidents to the spectators and passengers on the viaduct is materially diminished.—[Morning Herald.]

To the Editor of the Mechanics' Magazine.

Sir,—"When a heavy body is made to revolve in a circle, it has a tendency to fly from the centre, and this tendency is called its centrifugal force. An ounce ball attached to a string and whirled around horizontally, in the manner of a sling, may easily be made to break the string, even though it is strong enough to sustain the weight of four or five ounces; that is to say, the centrifugal force may easily be made to exceed four or five times the weight of the ball. The fundamental rule for comparing this force under different circumstances, is the following:—

1. The centrifugal force of bodies, revolving in a circle, is in proportion to the weight of the body multiplied into the square of its velocity, and divided by the diameter of the circle.

In the comparison of bodies revolving in circles with an *uniform velocity*, the following rules hold good, and are easily deducible from the preceding one.

2. If the weight and velocity of the bodies and diameter of the circles be the same, the force is the same in all points of the circle.

3. The centrifugal force is in proportion to the weight of the body multipled by the diameter of the circle, and divided by the square of the *periodical* time: that is to say, the square of the *time taken to make one revolution.*

4. The centrifugal force is in proportion to the weight of the body, multiplied by the diameter of the circle, multiplied into the square of the number of revolutions made in a given time.

5. The relation between the centrifugal force of a body, its velocity, and the diameter of the circle in which it revolves, is such, that the body would acquire its velocity, by falling, under the action of the force, through one fourth of the diameter of the circle.

By the assistance of this principle, we can easily measure the centrifugal force of bodies, provided we assume some known force as the *unit of force*, as in measuring distance we assume some known unit of length, a foot or a yard. The most convenient standard we can adopt, is the force of gravity at the earth's surface, because it is perfectly well known, and is in proportion to the weight or inertia of the body, as centrifugal force also is. It is required, then, to find the diameter of the circle in which a body must revolve once in a second, in order that its centrifugal force may be just equal to gravity at the earth's surface.

Let D= diameter required, C= the ratio of the circumference of a circle to its diameter=3.1415926—S=the height from which a body falls in one second=193 inches. Since the body by supposition revolves once a second, its velocity per second is =D C; and by the last rule, this is acquired in falling through D-4 under the action of the centrifugal force, which by supposition is gravity. Now by the laws of gravity, a body falling through S, would acquire a velccity of 25 per second, and the velocity acquired is in proportion to the square root of the space fallen through, therefore $D . C : 2S : : \sqrt{\frac{D}{4}} : \sqrt{S}$, squaring all the terms, we have $D^2 . C^2 : 4S^2 : : \frac{D}{4} : S$; by multiplying extremes and means, we get $S . D^2 . C^2 = S^2 . D$; dividing by $D . S . C^2$ gives $D = \frac{S}{C^2} = \frac{193}{3.1415926^2} = 19.554$ inches, the diameter required.

Having ascertained this circle, let D= diameter of any other circle in inches—t= time of the body's revolution in that circle—G=force of gravity—to find F, the centrifugal force of the body.

By comparing this circle with the one whose diameter is 19.554, according to the third rule above stated, we have $G : F : : \frac{19.554}{12} : \frac{D}{t^2}$, multiply extremes and means, and $\frac{G.D}{t^2} = F \times 19.554$, and since we make gravity the unit of force, G=1, therefore $\frac{D}{t^2 \times 19.554} = F$, which expressed in words gives the following rule.

6. Divide the diameter expressed in inches by 19.554 times the square of the periodical time expressed in seconds, and the quotient will be the centrifugal force, gravity being one. For example, if a body revolve once in two seconds, in a circle whose diameter is eight feet, its centrifugal force will be 1.227 times its weight for $\frac{96}{2^2 \times 19.554} = 1.227$.

By comparing the centrifugal forces in these two circles, according to the fourth rule above stated, we have the following:

7. Multiply the diameter of the circle in inches, by the square of the number of revolutions per second, and divide the product by 19.554, and the quotient will be the centrifugal force, gravity being one. For example, if a body revolve three times per second in a circle of ten feet diameter, its centrifugal force will be 55.23 times its weight, for $\frac{120 \times 3^2}{19.554} = 55.23$. And from the first rule above stated, we adduce the following:

8. Divide the square of the number of inches which the revolving body passes through in a second, by 193 times the diameter in inches. Thus, if a body revolve, in a circle of ten inches diameter, at the rate of nine feet a second, its centrifugal force wil be 6.043 times its weight, for $\frac{108^2}{193 \times 10} = 6.043$.

These rules suppose the body to be reduced to a point, and that the diameter of the circle described by that point, is known. This imaginary point is not the centre of gravity of the body. The rules for ascertaining it, in all cases, with mathematical precision, are exceedingly complex, and not within the design of your magazine; but with your leave, Mr. Editor, I will in some future communication, give the methods of ascertaining it in the simpler cases, and a method of approximation sufficient for all practical purposes.

Respectfully yours,

GYAS.

LOWELL, MASSACHUSETTS.

No. II.

BY HENRY COLMAN.

It is exceedingly curious and interesting to observe how closely associated are all the interests of society, interlocking each other in every direction, like a thickly woven web, of the most complicated texture, and united by a common, reciprocal, and indissoluble dependence. How much it were to be desired that men could better understand this; and see that the just prosperity of one branch of business is in a degree the prosperity of all; that there can in fact be no long and permanent monopoly of the great advantages of social life; that success and prosperity in any particular department of business have a tendency to diffuse themselves like the great elements of nature; and that the gains of any one man in the various connexions, fluctuations, and ever varying relations of society, become ultimately the gains of all.

There have been times, when men, under the influence of mistaken views, possibly, in some cases, under the influence of corrupt motives, have endeavored to excite animosities and prejudices among the commercial, manufacturing, and agricultural classes and interests. Now nothing could be more wrong in respect to each of them; and though government may sometimes adopt a partial policy, an unjust system of favoritism, granting peculiar privileges to some, to the prejudice or exclusion of other interests, yet it must be admitted as a great and incontrovertible principle, extending itself through every department of society, through all its multiplied ramifications, that the welfare of one part is the welfare of all; the prosperity enjoyed by any one portion, necessarily reflects its light upon the rest; and that any long continued and exclusive appropriation of any of the great advantages of life is no more possible than a continued and exclusive appropriation of light, or air, or water.

The mutual and reciprocal benefits to be derived from Agriculture by Manufactures, and from Manufactures by Agriculture, may be illustrated by a recurrence to some of the statistical details of some of the Lowell Manufactures, as published in a tabular sheet on the 1st of January, 1836. We

shall recur to them by way of illustration, premising only that our remarks must be brief; and that we are without the means of illustrating the truths with which we set out, so fully in detail as we otherwise might have done.

The Manufactures at Lowell then, have collected a population of nearly twenty thousand in a spot where formerly there were not twenty individuals, all of whom are more or less concerned in, and all of them to a great degree entirely dependent on, the success of these Manufactures for employment, subsistence, and comfort. They are withdrawn from other pursuits, many of them from Agricultural labor, and they are to be supported by the products of Agriculture; for bread and meat must come from the earth. Being withdrawn from Agricultural labor, they render that labor more valuable; and congregating in this way, they consume more of the products of labor, than if they were scattered in the families to which they belonged. Besides this, they have introduced a large amount of foreign population, by whose extraordinary skill and labor we are greatly benefitted and vast public improvements are effected; and whose subsistence of course creates a new demand and market for the products of Agriculture. These effects are strongly perceptible in the immediate vicinity of Lowell; and a ready and high market is found there for all kinds of Agricultural products. This is certainly great gain to the farming interest; and valuable, not solely from the immediate profits, which it now yields, but from the inducement and stimulus, which it gives to improvements; and to a more extended and productive cultivation. There is another mode in which the cause of Agriculture here is indirectly but greatly benefitted. Much of the wages received by the laborers in these factories is remitted to friends at home; perhaps to extingush mortgages or incumbrances on the family estate, or to aid in improving the domicil.

Separate from the products of Agriculculture consumed in the subsistence of the operatives of those establishments, let us look at some of the items of those articles which are used immediately in the process of the manufacture. Of cotton, 13,676,600 lbs. Of wool, 1,600,000lbs. Of wood 4690 cords. Of starch, 510,000 lbs. Of flour, for starch in the mills, printworks and bleaching, per annum, 3,800 barrels. Of charcoal, per annum, 500,000 bushels. Of Teasels, 3000,000. These amounts are certainly enormous; and when added to the bread, meat, vegetables, hay, oats, corn, milk, fruit, &c., &c., necessary for the consumption of the human machinery here employed, it is easy to see what demands are made upon agriculture for the supply of them; and what quick and profitable returns the supply of them brings back to the farmer.

The power of machinery is another circumstance that strikes one with astonishment on visiting these places. Operations which it would require years to accomplish by any other process, are here accomplish ed in a day. Operations which the combined power of a thousand men, could not effect, are here performed under the superintendence of a child. Operations which human power, singly applied, could never effect, are here daily and hourly effected by the simple revolution of a wheel or the pressure of a lever; and all this, with an exactness and precision absolutely perfect, I may properly add, sublime. Of the increased value given by manufactures to the raw material, and of the perfection to which the art is carried, I may be allowed to quote an example from Dr. Ure, in his treatise on the cotton manufacture. Such, he says, is the exquisite nature of the machinery in Manchester, England, that a pound of cotton is capable of being spun into 350 hanks; in which case, the yarn produced by it would extend 294,000 yards, or 167 miles; and that which, in a raw state, cost 3*s* 8*d*, sterling, (this remember, after paying the planter, the merchant, the freighter, &c., &c., an ample profit,) after being thus manufactured, would be worth twenty-five guineas.

The prejudices existing against machinery are fast losing their hold upon all reflecting minds; and its advantages upon *their* condition are becoming far better understood by the common laborers. Whatever tends to abridge the severity of human toil, and to abate the necessity of such an expenditure of human power, as is both wearing to the spirits, and destructive to human life, must be a general benefit. Whatever multiplies to an almost universal diffusion, not only the comforts, but even the harmless luxuries of life, whatever leave men more time to apply to the high purposes of intellectual improvement, or to innocent social enjoyment, must be a blessing. If the man who causes two blades of grass to grow where but one grew before, is to be pronounced a public benefactor, certainly he is not less so, who will cause four to grow with no greater expense of labor than the production of 1 blade formerly cost. Threshing machines have been, in some cases, the victims of popular resentment and frenzy; but there would have been equal reason in tearing down every blacksmith's shop in the kingdom, and breaking to pieces every plough and spade; for the plough and spade are equally machines; and as great advances upon the earliest instruments of tillage, as the threshing machine over the common flail. If the threshing machine debars some persons from their accustomed business, it relieves them from their accustomed toil; if it makes their labor less valuable, it renders their bread less dear; if it closes one source of income and subsistence, it leaves them time, strength, and opportunity to make choice of others. If the stick or the shell, or the improved machine, the spade, must be brought back to take the place of that admirable contrivance for saving human labor, the plough, then must nine tenths of the land, now in tillage and productive, be thrown out of cultivation; the means of human subsistence be in proportion diminished, and the price of what is produced enhanced. In *time*, as we have already remarked, an immense deal is gained; that is now accomplished in a single day, which formerly, years of patient and severe toil could not have completed. I know that cupidity and avarice may still lay claim to all this time, which machinery saves; bnt this does not necessarily follow; for wages are not reduced; and though the means of subsistence are increased the power of procuring it is proportionally extended; and unless men choose voluntarily to surrender their time, they can save much for rational enjoyment and improvement. I know, too, that there are those, who are disposed to tax human strength to its utmost limits under the pretence that men would abuse their liberty if they had more leisure. Many, undoubtly, would abuse it; but this is not a necessary consequence of such a relaxation; and while libraries, public lectures, books of general and useful knowledge, are so much multiplied, and means of improving, and innocent amusement are also multiplied, the danger of such abuses is daily lessened.

Let us remark in the next place, how, by means of improved machinery, the comforts and innocent luxuries of life are diffused. I am disposed to call elegance of dress, for example, when it is such only as befits our circumstances and means of expenditure, an innocent luxury. We have certainly high authority for regarding it with favor; for what is more beatiful, gay, splendid, variegated, brilliant and gorgeous than the flowers of the field; the scales of the reptile; the shells of the crustareous tribes; or the plumage of the birds? Now, how are these innocent luxuries multiplied and placed within the reach of all the industrious classes of the community; so that the most humble dwellings are often decorated with an elegance of furniture, which not many years since, the wealth of palaces could not have purchased; and the dress worn by many of the laborers in these establishments, and paid for too, by their honest industry, before it is worn, is such, as in times not far gone by, princesses of the realm would have envied. A pair of silk stockings, presented by the French Ambassador, to Queen Elizabeth, was a rare possession, to be brought out only on extraordinary occasions; and deemed a magnificent present. A taste for dress I know will be condemned by many ascetic and severe moralists. Pride of dress is, indeed, always contemptible; and can only be excused through want of understanding. But a strict care of the person, and a particular care of the dress, alike in respect to its neatness, propriety, and elegance, will be found not a mean auxiliary to purity of sentiment, decorum of manners, and innocence of conduct. Vulgarity and slovenliness of dress, and utter disregard of personal appearance, especially in the young, is too often but an index to grosser neglects, and the harbinger of moral delinquencies. Every thing on the other hand, which contributes to promote self-respect, increases a sense of the value of character; and a high sense of the value of character is one of the greatest securities of virtuous conduct.

There is another good, resulting from the modern improvements in machinery, which is not immediately obvious at first sight; but which is certain, and deserving great consideration. Much has been said of the division of labor; and the perfection to which by means of it, the arts have been

carried. This has been illustrated by a reference to the manufacture of a pin, which passes through various processes, each requiring or employing a different artizan. The same things occur in various other manufactures. The effect has heretofore been that one person has been confined for life to a single, minute operation; and that, most probably, an uninteresting one; and requiring in order to its expert practice a long and tedious apprenticeship. Such is, in many cases, the improved character of the machine employed in various operations, that the machinery itself, with a self-directing and self-adjusting power, performs many operations at one and the same time; and with a precision which the human hand or eye can scarcely be expected to attain and preserve. This is particularly illustrated in the whip and card manufacturing; and this is a great gain to humanity and a general benefit; since many operations, which were very trying to the health and spirits, which required long practice and intense application, are now performed by machinery under the superintendence of a child, after, it may be, a week's, or a month's instruction. H. C.

March, 1836.

From the Annals of Education for April.

FUNDAMENTAL PRINCIPLES OF THE PRUSSIAN SCHOOL SYSTEM.

We have recently conversed with several officers of the Prussian government in reference to their system of education.—To enter fully into this system and to understand completely any portion of it, it must be remembered that in this kingdom, the State, the Church, and the School, are inseparably united by numerous and intimate bonds. The government is at the head of the church and the school—if we may be allowed to use the latter term in the same general sense as the other, to include all the schools of the kingdom. It assumes the right to prescribe that every village must have its church and its school, that every man shall have the means of religious instruction—that every child shall attend some school. It does this on the ground that its citizens should be prepared to become good subjects, and that they cannot be so without receiving both intellectual and religious instruction. Its right is undisputed to preserve the bodies of its subjects from injury, and to have them trained to military exercises, and military skill, that they may be prepared to serve and defend their country by physical power, and prevented from becoming burdens for want of it. It claims the same right to guard their minds from debasement and corruption—to require, that they should receive that instruction which will aid them in gaining a subsistence, and being useful to their country; and that moral training, which will make them good subjects.

It does not seem to enter into the conception of any officer of State, or church, or school here, that order can be secured in a community without religion, or that morality can have any other sold basis than *Christian instruction and Christian training, in a Christian spirit.* In reference to mere secular instruction, the state prescribes the subjects and directs the modes of teaching through a number of instructors, and a body of inspectors appointed for this purpose, and appointed simply for their qualifications in this respect without any of those distracting questions and jealousies about party or sect which would embarrass our governments. But in regard to religion, it assumes only the right to decide, and to insist, that *instruction shall be given;* leaving to the clergy of each church the entire direction of the subjects and the manner of instruction.

The laws, however, decide one point absolutely, that religious instruction must take the first place in importance, and from a part of the business of this school daily, for not less than one hour in six. It will not permit that it should be confined to the weekly catechetical instruction of the clergy, which is given with a regularity and minuteness unknown to our clergy in general, and still less to the irregular and uncertain instruction of parents, so many of whom cannot if they will, or will not if they can, attend properly to this part of their children's education.

In the application of these principles the laws appear to secure every important point. Provision is first made for the preparation of Christian school masters, of the leading denomination, by the establishment of distinct seminaries for teachers, sustained by government, but regulated and inspected by the clergy of the respective churches. Where the parents in a school district are agreed in reilgious opinions, a teacher of the same sect gives religious instruction, under the direction of the pastor, and everything goes on with regularity and in harmony.

In places where each of two or more denominations is sufficiently numerous to *sustain* a school, the Government, although connected of itself with the reformed, or as it is now termed the evangelical church, consisting of the old Lutherans and Reformed united, establishes and sustains schools for each. The Catholic Seminaries supply teachers for the Catholic schools, and even the Jewish children are furnished with an instructor of their own sect.

The most perplexing case is that in which the inhabitants of a small village or district are so divided that no single sect is sufficiently numerous to sustain a school. Here the laws direct that a "simultaneous school" shall be established; that is,—one in which children of *all sects* are united for the purpose of mere intellectual instruction. Still, the Government here insists, that religious instruction shall be given in connection with the school. Pastors are accordingly required to give instruction to the children of their respective flocks, during the week, and are subject to the supervision of the Inspector of Schools, in regard to the faithful performance of this duty; whilst no interference is allowed as to the opinions taught. There is so little jealousy between *good* men, even of different denominations, that the teacher of such schools is sometimes of one sect, sometimes of another.

It is in this manner that the Prussian system of education establishes certain fixed points of support, which leave room for universal and indefinite improvement, and which brings every institution of society in harmony with the rest. It secures permanent superintendents devoted to these objects, previously well-qualified, and gaining every year stores of experience for themselves, and the minister of education, by their regular tones of inspection and examination, and aided by the more detailed reports of local inspectors. It is in this manner they furnish every child in the land with a complete and harmonious course of instruction of the best kind, and *confer no power* on a subject, without endeavoring to instil the principles and form the habits of thinking and feeling which shall direct him in *using it aright.*

The nature of the Government also enables them to execute a law,—which however reasonable, might meet with resistance elsewhere,—to secure by civil regulation the attendance of every child on the instruction thus provided.

It would seem at first sight difficult to apply such a system to countries differently situated. It is certain indeed, that where the direction rests with the mass of the people, light must be more extensively diffused, and education better understood, and more highly appreciated, before such measures can be executed, or even adopted. It is not less true, however, that if we admit the fundamental principles, that the State has as much right to claim the mental, as the bodily services of its citizens, and to require suitable preparations for it, and that religious instruction is indispensable, as the basis of moral principle, and of a spirit of obedience to the laws, and of genuine liberty, the plans adopted to carry them into effect, are the most simple and excellent which could be devised.

Frankfort on Mayne, Nov. 27, 1835.

DEPTH OF MINES.

	Feet.
Kits puhl copper mine in the Tyrol mountains, - - - -	2764
Sampson mine at Andreasberg, in the Hartz, - - - - -	2230
Valencia mine, (silver,) Guanaxuato, Mexico, - - - - -	2170
Pearce's shaft, (copper,) consolidated mines, Cornwall, - - -	1650
Monkwearmouth colliery, Durham,	1600
Wheal Abraham mine, Cornwall,	1410
Eiton mine, Staffordshire, -	1380

The deep mines in the Tyrol, Hartz and Andes, above described, are all in high situations—the bottom of the Mexican mine is six thousand feet higher than the top of the Cornwall shaft. The deepest perforation beneath the level of the sea, and consequently the nearest approach to the earth's centre, has been made at the Monkwearmouth colliery, which is fifteen hundred and thirteen feet below the surface of the German ocean. Pearce's shaft (thirteen hundred and thirty-eight feet below the level of the sea,) was, until lately, the deepest in the world.—[Geology in 1835, (Mining Review.)]

From the London Mechanics' Magazine.

SELECT COMMITTEE OF THE HOUSE OF COMMONS ON ARTS AND MANUFACTURES.

(Continued from page 185.)

MINUTES OF EVIDENCE.

George Foggo, Esq., Historical Painter, examined:

I have been repeatedly employed to design for the application of my art to bronze and silver. That manufacture now in England is exceeding depressed; principally, I should suppose, in consequence of the want of copyrigh, on which account the French have very greatly surpassed us.—In England at the present moment the uncertainty of recovering in cases of piracy, and the great expense attending a lawsuit, make it almost impossible for any but men of great capital to undertake such works at all. When they are undertaken, as the sale is exceedingly limited, those articles are almost universally converted into silver. In France, in consequence of the cheaper law and the greater facility of recovery, a much greater proportion of works of that nature are cast in bronze. So doubtful is the recovery, and so great the expense attending it, that where otherwise 50 guineas would be expended on a design, not more than 5*l.* would now be ventured by the silversmith. As, for instance, in one case where the amount to be expended on a piece of plate was 800*l.* I received 8 guineas for the design. In other cases, where the finished work would amount to 200 or 300 guineas, the utmost the silversmith could spend upon the design has been less than 5*l.* If the copyright could enable the undertaker of such works to spread them to the amount of 20 or 30, he could then afford tbn times more on the design, employing none but the best artists, and rewarding them liberally. The main advantage of the copyright in France depends on the circumstance of the cheap law. I was lately in court in a case where the sale of spurious works was most clearly proved. The expenses, I was informed amounted to 100*l.*, and the award for the sale of five different and distinct prints was 15*l.* From what I recollect of such cases in Paris, I should say that the expense would have been under 15*l.*, and the award might have been 100*l.* It is, therefore, in France worth while (particularly when we consider the certainty of recovery) for a man of talent to claim his protection; it would not be so in London. Bronze and silver are the same kind of manufacture, I should say: in most instances, bronze is first cast for the sake of the silver plate; that was the case with the celebrated Achilles' shield, by Flaxman. The original shield in bronze, most elaborately and beautifully finished, could not have been sold for much less, if any thing less, than the silver-gilt. But the taste is so much in favor of the more costly metal, that no one would give 3,000 guineas for the bronze, when they could get the silver-gilt for 4,000 guineas, although the value of the silver be not above 250*l.*; and I should say decidedly the bronze was most valuable; and I apprehend the taste of the public in that respect is deficient, inasmuch as gold and silver, having what I should term a positive color, are less applicable to the works of art than bronze, and still more particularly marble. In bronze it is more a work of casting. In fine works it is afterwards wrought up with great nicety by the chisseller; in the above case Mr. Pitts, a very celebrated artist, was employed for that purpose. With respect to the mode of protecting inventions and designs in bronze, I think it, if it were worth the while of a man of talent to claim his protection, it would be fast carried out, according to our habits, by special juries, but under the present system this is much too expensive. By special jury, I mean a board of persons conversant with art, but subject, like our juries, to a challenge. Something like a *cour de prud' hommes*, or a board of competent arbitration, but doubt whether it would be right for them all to be artists. I also think that the period of the duration of copyright should be in proportion to the talent displayed, and the importance of the object. Some cases might not deserve three months protection, others would require 50 years. Some things deserve also to be better protected than others, in consequence of the great facility of copying them. All works that can be cast in plaster particularly require protection; for that which has cost the labor of months or years, and vast expense, may be re-produced by the plagiarist in a few hours. Such circumstances prevent the application of first-rate talent to any such productions. In a great measure the protection should depend on the talent of the artist. I consider that it would be for the interest of the public, for instance in a very beautiful work, that such a board or special jury should have the power of proposing, on the part of the public, to the artist, that his design should be bought up; but I have a very strong objection to the consideration of the interest of the public being paramount.—The circumstance of the Americans giving to their citizens an exclusive privilege of copyright, takes away all energy and exertion of those citizens. It has become scarcely worth while for an American to produce a work of talent, when the bookseller can get them from abroad for the price of a single copy. The French are superior to us in the accuracy of the execution of their work, but not equal in fancy and imagination; I have myself been employed to design for a work that has been sent over to France to be executed, and the execution was exceedingly correct. I should speak rather in favor of their execution and knowledge than their taste; for works in metal we still prefer that of the early period of Louis XIV. as more free and effective. I attribute the superiority of the French in correctness of drawing to the various schools of design established in every principal town, but more particularly in Paris; there schools are so various, that I do not think that any but a resident in Paris can fully understand the relative difference; they consist of the Royal Academy and the Government school of drawing; of private schools under an eminent artist, and of subscription academies, with no other than mutual instruction. Having resided seventeen years in that capital, and studied in one of their best schools, and at the Royal Academy, for eight or nine years, I am decidedly of opinion that private schools, under the most eminent masters, are greatly superior to any public establishments. The private schools are the original system of the instruction in France, as they were in Italy during its greatness. These schools are generally intended for the higher branches of art; but persons who do not evince talent of a high order, naturally fall into the employment of manufacturers. There is one school in Paris for the instruction of artisans employed by manufacturers. Each department has also something like a school of that kind; I am afraid it will be found they produce very little of that which may really be called talent. The national course of instruction for artists in France is very superior to the usual means in England; it consists of private schools, which system bears the most national character of any.—Every man of talent, as an artist in France, is supposed to owe much of his reputation to the pupils he produces; his object is to produce men of superior abilities, but the school gets popular, and the system is so well understood, that the number of students becomes very great, and from their superiority they are, when interest does not interfere, appointed teachers in the Government schools, and give a general tone to the talent of the country as far as circumstances admit. The Government schools are very inferior to the others in utility. The private establishments have the spirit of the country in them much more than the Government schools, for the Government schools are founded on one system, and, with one or two exceptions, all follow the same course; they do not fall into the wants of the times and the people so much as the private establishments. I do not mean that they are in name national schools, but they are the schools that give a national character to the French artists; which character is materially checked by the control of Government administration. In France, Government interference in positive instruction is injurious. The encouragement given to art in France is principally from the liberality of exhibitions, and most particularly of the libraries and the museums. The opportunities of study in the libraries and museums are far superior to any thing in this country. I may mention, in proof thereof, that the works of Flaxman, of Mr. Hope, and the publications on Etruscan vases of Sir William Hamilton, were shut up in private collections in England, and produced little effect on the public taste; but being placed in the libraries in Paris and other towns, where not only artists, but the public, had free access, the knowledge and taste of Flaxman and Hope became there generally appreciated, instead of being, as in England, confined to a few. A fine example of their museums was that of the French monuments, where, in appropriate halls, samples of French statuary of seven successive centuries, afforded an excellent opportunity of studying the taste and the history of the nation. That of mechanical machines is also of great utility. Museums, I apprehend,

must be the permanent and all-important sources of taste. Public lectures on the great principles of design and taste may be advantageously added thereto; and from the necessity of the case, another country being so greatly in advance of us in those branches, schools for the instruction of mere outline, and still more of the rules of perspective, would produce very great and beneficial effect. I certainly do think that much advantage would be derived from instruction in the proper simple rules, without shackling the taste; but it appears to me that good taste is so essential to the interests of the community, that museums should be provided at the national expense; but practical skill being an advantage of a more individual nature, ought rather to be paid for (moderately) by the individual. The general taste is decidedly higher in France than in England; but superior taste and imagination more frequent in England. I account for the distinction from this circumstance: I think the arrangements of Louis XIV. and Colbert have placed such fetters on imagination, that the utmost that instruction can do in France is to inculcate fixed principles and precision of execution. In the fourth year of the republic, under the Convention, schools of various kinds were instituted. Exhibitions and prizes were also decreed on a liberal scale, but they were ultimately counteracted by the re-establishment of the Academy, similar to Louis XIV., and the occasional injudicious interference of the Emperor. There has been no alteration in the Academy of Arts from 1800 till the present moment, except the exclusion of foreigners from the prizes, and a few minor bye-laws. I conceive that the fixed principles and correctness of execution are all that can be properly conveyed of instruction to an artist. They are all that can be wished for when competition is encouraged; and without free competition art is stifled, therefore it is absolutely essential. With regard to the departmental schools, if the appointments of professors were popular they might do a deal of good; but when I have seen an old man of 62 or 63 appointed to one of those schools, not for the good of his pupils, but to save him from starving, I cannot expect much good therefrom; when I have known, in the principal school for the mechanics of Paris, a man of the highest talent, M. Peyron, after 25 or 30 years' exertions in the under professorship, superseded in his claim to the higher professorship by a friend of the Minister, I find a total want of that principle which free competition and proper elections would have carried out. The reason I think superior taste and imagination more in England, is on account of the restriction in France, where, being under the Minister of the Interior, all follow one system and routine. In England, competition is created by commerce, which frequently brings a man from the humbler branches of manufacture to the highest stage of art, such as Martin, Muss, Bone, Bacon, and Banks. In fact, the French attempt to teach that which is probably not within the strict limits of teaching, and interfere a great deal too much. The positive, the undeniable, fixed, and positive rules of art, such, for instance, as perspective, anatomy, proportion, and perhaps botany, and those things which connect arts with manufactures, in which the principles are undeniable, should, of course, be taught. I think it almost as necessary for a people to possess a knowledge of those points, as to know how to write; I consider it a second way of reading all the beauties and merits of nature. The deficiencies, both in England and France, which still exist, are, first, the deficiency of correctness of perspective, even where correctness of outline is otherwise generally attained; perspective is often little understood in other countries, but is particularly neglected in England. Secondly, a very imperfect knowledge of the history of the arts and of commerce, their effects on each other, and on the state of nations, and thence false theories. The relative influence of the taste of Paris and London is this: the taste of Paris spreads all over France almost like lightning, while that of London is very much counteracted by the different habits and influences of our commercial towns: for this very reason, museums exactly similar might be established in France without any material injury; but museums in England would be best under the direction of a general board, but modified by the management of men capable of applying them to local purposes. If the town of Liverpool had a museum, it certainly would not, if left to the management of a local board, be similar to a museum in Birmingham or Sheffield, and it would be right that they should not be similar. A knowledge of mineralogy might be exceedingly useful in one town, and perfectly useless in another. Objects of general utility, of general taste, such as fine representations of the most beautiful pieces of sculpture, objects of taste, such as vases and ornamental designs in general, might be exceedingly useful in them all, but each would superadd what was of local interest in proportion to its connexion with different countries, and the manufactures on which it depended.—A local administration should be under a general control, or the control of a general board, in order to prevent local interests from holding too great an influence in the elections, and contracted views in the management; for I am greatly mistaken if, under a well controlled representative system, the arts are not capable of disseminating knowledge in fifty ways that have never yet been attempted, and I am also strongly impressed with the notion that they should tend to a general improvement of the morals of the people as well as of their intellect. I have no doubt that, under a proper general board with local management, they would be highly capable of both. Some of our manufactures far excel others in the merit of the designs, and this is usually in proportion to the difficulty of copying them, as the injury of a deficient copyright is therein less felt. I should instance, particularly, the japan manufacture, where the designs are more exquisite than any thing produced abroad. The excellence of a design is partly to be attributed to the difficulty of copying, inasmuch as it is an impediment to the plagiarist, and consequently a protection to the original designer. In the case of the japan manufacture, in consequence of the difficulty of the manual operation itself, the thing is better protected, and I ascribe it partly to the system of encouragement and competition established in the manufactures themselves; the works in japan are, however, conspicuously defective in perspective. I mention this to show, that of all the branches that ought to be taught, that of perspective is one of the first, inasmuch as it is not readily to be obtained. Each manufacturer in the japan trade has his own designers and painters. Designing is not a trade by itself, by which persons get their livelihood, that is, to furnish patterns to the manufacturers of designs in paint, not at least in Birmingham; what there may be in London I am not acquainted with. In that particular line the designs are very superior, but there are inaccuracies from want of instruction. At some interval of time and distance I examined the French and English japan works repeatedly, but not lately; there are no French ones that can at all compare with ours. The French shun the competition, though many individuals in France are anxious to introduce our japan articles in France at present. We have the advantage in both material and design; we are not equal in execution to the Asiatics, but superior in design. Mechanics' Institutions would be so far more beneficial than any school of design, that they would convey to pupils knowledge in chemistry or mechanics or design, according to their natural genius. They would do exceedingly well if you could manage the election of the professors; but in that case a member of an Instituiton is more likely to be elected than one not a member; it is therefore local talent which gets the influence, which is not so good as a person confirmed by the approbation of a general board. If the Institutions would agree to be subjected to the decision of a board in London, that much good might be effected. The advantage Mechanics' Institutions would derive from the parent Institution is, they would collect a variety of models, which they cannot now obtain.—Therefore, in this country, where you have three or four branches of trade carried on, in Manchester, and in some places almost every branch of trade, you would not confine it to a school of design only, but make it one branch of what would be a drawing class; those who have a taste for chemistry would be good preparers for the materials of printing, and so you would make it useful.—Another way might also be easily accomplished, by placing museums under the direction of men capable of communicating instruction.

(To be Continued.)

The wear of Rails of the Manchester and Liverpool line was stated to be 1-20th of an inch in depth per annum. The flanges rarely come in contact with the rails; one of the oldest wheels being taken off a carriage, the marks of the turning tool was found on the flange.

APPLES FOR STOCK.

We have from time to time published accounts of experiments in fattening pork with apples, which has been done with success and profit. The use of apples as food during winter for stock, has been abundantly successful during the past winter.

Several of our acquaintance have used them for this purpose, and consider them a valuable acquisition to their stores of fodder. Mr. J. Bacon, of this town, informs us that he has fed them out daily to his sheep, and has seldom had a flock of sheep do better during a winter. Several other farmers, who have had two or three hundred bushels, have used them with their hay with good effect. Here then is another reason why farmers should not only preserve their orchards, which they now have, with care, but also set out more, and such kinds as will keep well during the winter. An orchard may be considered as a fixture. When the trees once arrive to the bearing age, they require but very little care to keep them in a thrifty condition. They may be considered as a permanent crop, always planted out, and always ready for the summer.

AGRICULTURE, &c.

AGRICULTURAL BANKS.—The following communication of W. P., is worthy of attention—especially from the agricultural community. We are fully of the opinion, that the Banking System should be regulated by a general law which will allow every citizen to participate in its benefits.

Any individual, or number of individuals, who desire, should be permitted to receive money on deposit, and discount notes at such rates of interest as may be agreed on by the parties.

There should be an *established* rate of interest for all cases where the rate is not specially agreed upon, and also, for all institutions and companies having the privilege of issuing bills, or paper, to an amount exceeding their capital; and further, the private property of stockholders should be holden for the redemption of all issues.

The plan here recommended by W. P., is to us a novel one, and we should be pleased to have the opinion of others in relation to it.

From the New-York Farmer.

ON BANKING AND PAPER CURRENCY.

It is unfortunately too evident, in every debate on this subject, that "preconceived opinions usurp the place of facts, and speculations as unsubstantial as the 'baseless fabric of a vision,' are substituted for correct observation."

The opinion of the mass of our citizens, that to grant monied charters is anti-democratical, has no doubt been given very honestly; but they appear not to be sufficiently informed on the subject to know, that when a given number of charters have been granted, restriction becomes aristocratical, and extension democratical.

Before the introduction of paper currency, it was a very rare occurrence for any man to rise from a state of poverty to wealth and influence; those who were poor had ever to remain in that condition, and were considered by the wealthy as their slavish tools.

Banks, when legitimately established, may be considered as store-houses, wherein those who have more money than they can use to advantage, deposit the surplus, to be loaned to enterprising individuals, who can use it profitably. If banks were restricted to specie issues, there would be no banks established; for the rent of buildings sufficiently secure to keep safely the immense amount of specie to bank to any extent, including clerk-hire, transit of specie, &c. &c., would absorb all their profits. It is, therefore, on their paper the profits are obtained, and the government ought never to interfere, excepting so far as to secure the public against loss.

It is an extraordinary fact, that no civilized nation has ever attained its liberty permanently, unless subject to a system of paper credit; and so closely does the paper system appear to be interwoven with this sacred cause, that it may safely be asserted no nation can long retain its liberty when paper credit is destroyed. Its operation, too, is so simple, that it appears to have been overlooked by our long-sighted party politicians. A great number of individuals, whenever paper credit is established, are constantly breaking through the line between poverty and wealth, who are gradually ascending the scale of society, and carrying through nearly all stages their democratic feelings, at least until they arrive at the summit, when most of them become aristocratic. It is this class, who are constantly contending with the over-grown wealth and influence of old families, that have neutralized the aristocratical power in England, sustaining the principle of liberty, and enforcing a liberal construction of the laws. Let their paper credit be destroyed, and the nation deprived of the influence of that portion of the democracy who are rising from poverty to wealth, and those who are now wealthy would soon combine and tyrannize as much as before paper issues were established. A similar effect would ensue in any other country.

Our agriculturists are deeply interested in the monetary system, as much beyond any other class of citizens, as their annual surplus is larger. As banks are now established, they confer very little benefit on the farmer; and so far as their interest is concerned, they could do quite as well without them. It is truly surprising that the agricultural interest of America has been so generally neglected by our State legislatures, and the United States government. But it is still more singular, that our farmers should coolly look on, and see every other branch of industry seeking for monetary assistance, when as a class they have struck out no means by which they can partake of similar privileges. Capital, and facilities for raising loans, are as essential to them as to merchants, yet no system has been adopted for their benefit.

I would suggest a system for agricultural banking, which may appear crude, but will probably lead some master mind, having more talent and leisure than myself, to improve upon, and carry out to a more perfect system.

I would previously warn our farmers, if they value the existence of our democratical form of government, to put an end to our present mode of banking by specific charters; for so sure as this system is continued, so sure will our legislative bodies become so corrupt, as to be the disgrace of the age in which we live, and to the total prostration of our admirable form of government. The less a government interferes with the circulating medium of a country the better, as their interference ever produces much embarrassment in monetary matters. Banks should be permitted to go into operation under general laws, not by specific charters. This no doubt would have been effected long since, if very many of those who have the power to grant charters were not corruptively interested in the grants made.

Self-interest is so general, and so powerful a motive of action in man, that to expect to have a pure legislative body, with the means of corruption ever before them, is truly absurd. Let us then remove, as far as possible, all means of temptation; and as granting monied charters is one of the most fruitful sources of corruption, we should begin by abolishing it.

Let a general law be passed permitting property owners to establish banks predicated on real estate. The main provisions of such a law should be, that every property owner, who wishes to do so, should be permitted to deposit his deeds in the bank, and the bank have power to issue paper to the amount of the value of all the estates so deposited. Every property owner, after depositing his deeds, should have the privilege of discounting his own notes to an amount not exceeding a given portion of the value of his estate. The profits of the bank to be equally divided among the depositers of deeds. Provisions against fraudulent valuations, and many other regulations to keep in check the overweening selfishness of indviduals, will have to be made.

It must be obvious to our agriculturalists, that a great portion of those who buy estates, have not sufficient funds remaining to cultivate them effectively, and many thousands are kept poor for want of pecuniary assistance to put their lands in good condition. With such a system of banking they could improve their farms to any reasonable extent, and repay the loans as the

produce in after years should remunerate them for extra outlays.

Those who know any thing of farming, must be aware, that few farms will allow of taking up money at seven per cent., with the additional expense of mortgaging. This difficulty would be removed by such a system of banking, and as the profits would be divided among the depositers of deeds, the interest to be paid would be only the expense of the management, which need never exceed two per cent. Their paper, too, would have good credit, it being known to be based on a value ever equal to the issues.

W. P.

From the New-York Farmer.

FARMERS' WORK FOR SPRING.

Ploughing is the first great operation. On this subject, so familiar to farmers, no doubt they will disdain to be instructed. We have to say first, then, let your work be done as neatly and as evenly as possible. The appearance of this work well done, instead of the slovenly manner in which it is generally executed, besides the satisfaction which it gives the farmer himself, renders the after cultivation much more easy. As to the depth of ploughing, this must be in a great measure regulated by the depth of the soil. We believe no advantage is gained, but much injury oftentimes occasioned, by turning up a cold gravelly substratum and turning down a rich loam, out of the reach of sun and air. Our experience has satisfied us, likewise, that land fresh ploughed is much more favorable to vegetation than that which has been long turned up; and though the situation of the work may be such as not to allow of any postponement, it is desirable to sow and plant as soon after the ploughing as possible.

The second great operation is manuring. Too much manure may be given, but the usual error, is that of giving too little. We are satisfied in this matter, that the nearer manure is kept to the surface of the earth, so that it is covered or mixed with the earth, but barely to secure it from evaporation, so much the better for the crop.

Planting, especially of Indian corn, excepting in wet places, can hardly be done too early; the earlier the better; and if the ground were prepared for it, we would always put it in the last week in April, or at farthest, the first of May. Though some some of it may perish in the earth, such a contingency should be as far as possible guarded against, by using an extra quantity of seed—in this matter we are not in general half liberal enough; and also, where early planting takes place, there is in general, in case of failure, the better opportunity of repairing the deficiency. The corn early planted, may, after coming up, be cut down by an early frost; but usually it will start again, and have greatly the advantage of that which is planted late. Our own, and the experience of many of the best farmers, whom we have known, have satisfied us of the expediency of early planting.

The present season has been so backward, and so much time has been lost, that in many things the farmer must do as he can, not as he will. The cold winter and backward spring of 1780, were followed by an abundant summer; and with this experience, there is as yet nothing at present, to forbid the hope that the coming season may be as fruitful.

H. C.

This communication was received in time and should have appeared in the March number of the Farmer, but was by accident omitted. Although late, we give it now, by way of apology for delay.

Our worthy friend, "A PRACTICAL FARMER," will please accept our thanks for this letter and its contents. We have recently received many such tokens of good will.—A TEN DOLLAR note, accompanied by a valuable communication for the Farmer, from each its patrons, who appreciate its worth, would soon restore *that* department of our business to its condition before the conflagration.

From the New-York-Farmer.

ROME, N. Y., Feb. 25, 1836.

MR. MINOR—SIR—I enclose ten dollars to pay arrearages, and in advance for the New-York Farmer.

As the season of the year will soon arrive for farmers to commence their operations on their farms, I should like to communicate to the public, some experiments which I have made on harrowing winter-wheat in the spring. And as I have never seen published, any thing of the kind I will state my manner of operation. As soon as the ground gets settled and dry on the surface, so that a team will not tread it up, I commence dragging my wheat with the drag I usually use in draging in grain, (the square drag,) and let it lop half, and follow immediately with a roller, to press the roots down if any are torn up. I always like to do it just before a storm, and if I want to seed my land with clover, I sow my seed previous to dragging, and have had it catch as well as when sown with spring grain.—And I think dragging has the same effect as hoeing does on corn, and have never seen any injury. I have tried it several years and find it increases the growth both of straw and head, and have seen one fourth difference by good judges at harvesting.

A PRACTICAL FARMER.

P. S. I should like to receive some information on the culture of turnips—the best kinds and the way of cultivating them.

Yours Respectfully.

☞ Will some one of our readers, who can give the desired information in relation to the culture of turnips, do us the favor to furnish us a statement for cultivation?—PROP. N. Y. FAR.

Annexed we give an account of the Lemon tree, to which we alluded in our last.

To the Editor of the New York Farmer.

OYSTER BAY, March 31st, 1836.

In compliance with your request, I give you the particulars of my Lemon tree, as accurately as my recollection will permit.

The tree was planted by Daniel Youngs Jr., deceased, in or about the year 1812. The orange from which the seed was taken was sent from South America, by Thomas Fleet: the orange stock was inoculated with lemon in the year 1830. Since then about 30 of the lemons have came to perfection.—There are four ripe ones upon it at present, and about 20 green ones of various sizes, besides blossoms. The tree itself is about eight feet high, and the body about two inches in diameter. During the summer months standing in the open air, and in winter in a warm room.

Yours, &c.

DAVID YOUNGS.

From the New-York Farmer.

THE SEASON.

We have just closed a winter of most extraordinary severity. The mercury, in some very rare instances, may, in other winters, have sunk to a lower degree—indeed, the preceding winter, on the 4th January, 1835, where we had an opportunity of making observations, the mercury in Fahrenheit stood, for an hour, at 32° below 0, while the last winter, 1836, the same thermometer, in the same situation, never descended below 18° below zero; but when the continuance, as well as the severity of the cold, is taken into view, no winter on record can be compared with the one through which we have just passed. The winter of the year 1779-80, approaches nearest to it; then the snow continued, it is believed, even later than the present winter. The year 1673 was likewise very remarkable for the intensity of the cold. The winter just finished has been remarkable for the abundance and uninterrupted continuance of the snow; in many parts of the country, on Connecticut River, for example, at Greenfield and Brattleboro', the sleighing was uninterrupted for four months and a half; and the amount of snow which fell, exceeded, by actual measurement, any remembered, during an exact record of above twenty years. The spell, however, is now (25th of April,) fairly broken; and if we have suffered from a Russian winter, there is every promise of a Russian spring. The ground has no where been deeply frozen, and the grass has been ready for some time to start, as soon as the covering should be taken off, and it could see daylight.

The grain, where we have seen it uncovered, looks healthy and well set. It has been generally supposed that, where the ground continued covered with snow, it has proved favorable for wheat, but not for rye. We do not profess to understand the philos

ophy of this; and experience, the only infallible teacher, seems this year in a fair way to correct this impression; neither the rye nor the wheat appearing to have suffered at all from the season.

The winter has been dreadfully severe with the cattle; many, in different places, having actually perished by starvation; and others coming out in a miserable condition. The prices which hay and grain have commanded, induced many farmers, carly in the season, to sell, to their own serious injury; having, through the desire of accumulation, been led to *stint* their own flocks. The winter has been so much longer continued, and so much more severe, than any calculations or expectations made it, that this has proved a fatal error to many. High prices occasioned by severity, are no evidence of prosperity. It is only a speculation upon the necessities and sufferings of the community; and where farmers are obliged to buy of other farmers, who, perhaps, have been a little more provident or fortunate, it is only evidence of general distress, and not of prosperity; the community certainly become no richer by this process; and for all the animals that perish or suffer through want, they are rendered the poorer. A strictly domestic trade, and a mere interchange among each other, however high the prices may be, adds nothing to the general stock of wealth. The basis of wealth rests entirely upon *production*, and the improved value for sustenance, convenience or utility given to those products by skill and labor. We do not mean to say, however, that it is other than a time of general prosperity in the agricultural community. In all the great markets all the products of the earth command extravagant price. Beef, in New-York Cattle Market, from 10 to 12 dollars per hundred. Pork, cheese, butter, flour, Indian corn, rye, wheat, &c., bear most extraordinary prices. Broom-corn brush, which for years was sold as low as 2½ cents per lb., now commands 14 to 15—and the wool market affords every promise of remaining firm. The advantages, however, in this case, are not all on one side. If it is a good time to sell, it is rather a hard time to buy. All the articles of living, beyond what the farmer produces, and many of them have become the actual necessaries of life, are dear in proportion; and labor never received a more ample recompense. Various causes of a fictitious nature, have no doubt contributed to these effects, the results of which no human foresight can calculate. We refer particularly, as every one sees, to the immense extension of bank capital, and the flooding of the community with paper money, which, as long as public confidence is secure, works admirably; but which would work very perversely, if that confidence should be shaken. There is, however, one great consolation; if a currency based wholly upon credit, has extended itself to an extraordinary and perilous extreme, it has called out human labor to such an extent, and that labor has itself so much increased and improved the value of the products of the earth, has brought so much more land into cultivation, and rendered that, which has been long since subdued, so much more productive, that the actual wealth of the country, and, consequently, the means of sustaining public credit, have greatly extended, and are daily extending themselves in a most extraordinary manner. H. C.

25th April, 1836.

OHIO AGRICULTURE.

We are happy to lay before our readers the following letter from an intelligent correspondent on Western Agriculture.

From the New-York Farmer.

CHILLICOTHE, Ohio, Jan. 27th, 1836.

REV. H. COLMAN—DEAR SIR—Yours of 5th came in good season, but as there was no particular haste required, I have delayed answering until the present time.

The high prices of produce this season, will have upon the Agricultural community, a good effect to stimulate them to greater exertions, to realize more from their land than they have hitherto dared to hope for. It has raised the price of land throughout the country, and with it the ambition of land holders. Some of our farmers are so much elated with the prospect, that they confidently expect to average *one hundred and fifty* bushels of corn per acre; and one of our greatest feeders of stock told me a few days since, that he has a field of 20 acres that he should cultivate in corn; that he was confident that he would, if a good season, average two hundred bushels per acre. He intends to *drill* in the corn after the plan recommended in the 'Cultivator' some months since, (I have forgotten the page.) I was yesterday informed that a feeder a few miles below town, has sold his corn (in the shock) on the field, for *thirty-six* dollars per acre, to a Drover. The land on which it was grown could, last spring, have been purchased for twenty dollars per acre.

The average crop of wheat in this vicinity, take one season with another, is about twenty bushels, yet there has been as high as forty-five bushels to the acre in this vicinity. With the prices heretofore paid for work-hands, it has been considered that the cost of cultivating an acre of wheat, and putting in stack, was about five dollars per acre, which at the present price of wheat, ($1,) would yield the farmer about $15 nett profit per acre. There is but little rye cultivated, except for hogs, which are turned into the field before it becomes hard, and they are suffered to run upon it untill corn is hard enough to feed to them. It is generally sown early in the season, and is considered the best pasture during the fall and winter for cows and calves.

Buck-wheat and Barley there is but little attention paid to raising, as they are not considered profitable crops. From some cause (to me unaccountable,) the Potatoe does not flourish in this country. The most favorable seasons, and our best soil will not produce more than two thirds of what is considered a good crop at the East.

The root crops, such as Mangel, Wurtzel Rutta Baga, or common Turnip is not raised for stock, although I think our soil and climate both favorable to them. The common turnip, for table use, sells from 25 cents to one dollar per bushel, in our market. The sweet-potatoe grows very well in this part of the country, yet I think they are inferior to those that I was accustomed to eat at the East. We have a very great assortment of apples, which are sold in town, in the fall of the year, at 50 cents per barrel, of the first quality. Fifteen years ago there was a great many good peaches in these parts, but they are now scarce; pears do not do well. The fire-blight seems to destroy all the trees as soon as they are of a size to bear. We have a great abundance of plums of different kinds.

You ask if the water is good? Our water is pure, though hard. It is all more or less affected with the lime-stone gravel, through which it has to pass, in coming to to the surface. Our springs are equally affected with the wells. We have but little of the fever and ague, although we are by no means clear of it; as our country grows older, we have less. Our streams are more open—waste fields are opened for cultivation, and stock to consume the vegetation, which has made a great alteration within a few years. We have more or less of the billious fever every season, but we consider it a healthy country. For my own part, I never enjoyed better health in the Eastern States, than I have here for the last six years. As it respects stock cattle, there is very little difference between the common native stock here, and with you. We have to pay a higher price for improved cattle here than with you, but there is not sufficient difference to justify the expense of a trip to the East, unless a person wanted a large number. *Good* sheep are very scarce, and consequently high, although our common sheep are to be purchased for from 75 cents, to $1 per head.

I think some of taking a tour the coming spring through Indiana and the northern part of Illinois. From what I can learn of that country, I have no doubt but that there is great openings for Agriculturalists, for those too whose means are limited.

Any inquiries you may wish to make respecting this part of the country, I shall feel a pleasure in attending to, and any service that I can render you, I shall be happy in doing. Respectfully.

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From the New-York Farmer.

SILK.

Mr. Samuel Whitmarsh, of Northampton, who went out the last autumn with a view

to inspect the silk manufactures of France and Italy, and obtain what information he could respecting the raising and management of the worms, and the preparation of the raw material, has just returned, after an entirely successful tour. We are promised some full details of the result of his inquiries at a future time. In the mean while, we lay before our readers a few incidental facts, which will be received with interest.

He says decidedly, that every thing which he has seen and learnt, favors the cultivation of silk in this country; that it may ultimately become one of the most important interests of the country; and will satisfy all reasonable expectations. As it respects climate and labor, two points in regard to which there has been much scepticism, we have a decided advantage.

As it respects labor, though wages and living are extremely low abroad, and the peasantry engaged in the raising of silk live in the most frugal and meanest manner, yet so much more is accomplished by a laborer among us than among them, that the difference in the expense finds more than an equivalent in the superior amount performed. Every thing done abroad in this way, is done in the most awkward and slovenly manner; the silk, throughout Europe, is cultivated in a small way, in cottages by humble means; and instances are not unfrequent, in which the peasantry travel five and six miles daily to obtain a supply of leaves for their worms.

The silk raised on the continent, is of a far inferior quality to that raised in this country; eight pounds of cocoons in this country, yielding a pound of silk, whereas in Europe, twelve pounds are required. This, he thinks, is to be attributed to our climate; the colder the climate, as long as feed can be found for the worms, or to speak in more classic terms, for the operatives, the better the silk. The American silk, therefore, is of a superior quality to the European or the Chinese.

Mr. Whitmarsh has brought with him several kinds of mulberry, to which he designs to give a fair trial. The white mulberry is not used, excepting as furnishing stocks for grafting. The mulberry, which he thinks is to be preferred to all others, is one known as Muries de Chine, or Chinese mulberry; but not the Morus Multicaulis. This plant is not yet introduced into France or England, but has been long enough in Italy to test its remarkable value. Its foliage, though not so large as that of the Morus Multicaulis, is yet much thicker and heavier; and it is comparatively proof against the coldest climate.

Of this mulberry he has brought a large quantity of the seed, which he warrants as genuine, and of last year's growth; and of which, he has deposited some for sale, at the store of Mr. St. John, No. 118 Broadway, at five dollars a paper, containing about 4000 seeds. Much of the Chinese mulberry, Morus Multicaulis, brought to this country, is heated in ovens by the Chinese, so as to destroy its vitality; and this is the general occasion of its failure to vegetate. We shall wait with interest for further communications from Mr. Whitmarsh, on a subject so important to the agricultural community, and to the whole country; and are happy that the enterprise has been undertaken by so exact and intelligent an observer; and one, too, who has so deep a personal interest in the concern. H. C.

April, 26, 1836.

From the New-York Farmer.

Peekskill, 27th April, 1836.

Dear Sir:—A method of preserving apples, in this section of the country, has been introduced to some extent, which ought to be universally known. As I have not observed that it has been noticed in any agricultural or other paper, I give it to you, that you may make such use of the information as you may deem proper. The method is as follows:—

Take an ordinary flour barrel, and as much ground plaster or gypsum as will be re required for use, of course dependent upon the quanrity of apples intended to be thus laid down. Cover the bottom of the barrel slightly with the plaster, select the best and fairest fruit, and place them singly in the bottom of the barrel, so as not to touch each other, and cover them with plaster; and so proceed in the same way, until the barrel is filled; head up the barrel and place it in any dry and proper place. The fall pippin has been preserved in this way, until the month of June. I have practised this mode of preserving apples, and find it decidedly the best that I have ever tried. There is no difficulty in thus preserving the Newtown pippin, or any other winter apple, through the summer. The apple, when taken out of the plaster, is in a very perfect state, the flavor in no way injured or affected. To the farmer, this is no additional expense, as the plaster can be used upon his land.

I should recommend this to be done immediately upon gathering the fruit; let the barrels and plaster be taken to the orchard, and laid down in this way as taken from the tree; it is the least troublesome, and the apples will be longer preserved. The reason and philosophy of this method is very apparent, as the plaster absorbs the moisture from the apples, and excludes the atmosphere from the fruit, more effectually than other substance.

Respectfully yours,

W. N.

To the Editor of the New-York Farmer and American Gardeners' Magazine.

Consulate U. S. A., Campeche, 17th March, 1836.

Dear Sir:—Still detained here by unavoidable circumstances, (which may probably exist 15 to 20 days longer, among other employments of my painful time, is the translation of certain portions of Volney's Journey through Egypt and Syria, augmented by notes of the Havana translator, in the Spanish edition of 1830, published in Paris. I send you now, in English, the 5th chapter, "On the Climate and Air of Egypt;" and hereafter will inform you of the application I shall make of the facts it contains.

Very respectfully,

Your ob't. serv't.,

Henry Pemne.

The climate of Egypt is justly considered very hot, as in July and August the thermometer of Reaumure steadily indicates 25° above the freezing point. 1 The proximity of the sun (which in summer is almost perpendicular) is doubtless the principal cause of so much heat; but when we consider that other countries, under the same parallel of latitude, are cooler, we discover a second cause as efficacious as the first; and that is, the small elevation of the surface over the level of the sea. In respect to temperature, there ought not to be distinguished more than two seasons in Egypt, the Spring and Summer, i. e. the cool season, and the hot season. The heat continues from March to November, and even during the latter part of February, the sun at 9 A. M. is insupportable by an European.

In all this time the atmosphere is scorching, the sky scintillating, and the heat insufferable by those who are not accustomed to it. With the lightest clothing, and in complete repose, one melts into sweat, which is here so necessary that the least suppression is a disease; so that instead of the ordinary salute of "How do you do?" one should rather ask, "How do you sweat?" However, as soon as the sun departs from the zenith, the heat becomes somewhat tempered. The vapors from the grounds inundated by the Nile, and those brought by the North and the West winds, by absorbing the caloric diffused in the air, produce an agreeable coolness, and even biting cold, if we credit the natives and some European traders; but it must be recollected, that the Egyptians (who travel nearly naked, and are accustomed to sweat,) tremble at the least degree of cold. The thermometer (of Reaumur,) which, in February, maintains an elevation of 8 to 9 degrees above the freezing point, gives us exact ideas on this subject. It may be said that snow and hail are phenomena which have never been witnessed by many Egyptians of 50 years of age. With respect to the European merchants, they owe their extreme sensibility to the abuse of clothing with furs, which in winter is carried to so great a degree, that they commonly wear two or three coverings of fox skins, and which, even under the heats of June, induces them to keep on ermine.

They pretend that the coolness experienced in the shade is a more than sufficient

reason to clothe themselves with such excess—and, indeed, the currents from North and West, which almost always reign, greatly cool every spot where the rays of the sun do not fall—but the true and secret motive of this fashion is the fact that *furs* are the *lace and embroidery* of Turkey, and the favorite objects of Asian luxury. They are the signs of opulence, and the labels of dignity, since the concession of important offices is always accompanied with a fur skin—and equivalent to saying to the fortunate individual, that for the future, he is a Lord *of such rank*, that he has nothing else to do but *sweat*.

Perhaps some will judge that Egypt is very *unhealthy*, in consequence of the excessive heat, and of the marshy state of the country which lasts three months. In fact, this was the first thought which occurred to me on my arrival; and on seeing afterwards, in Cairo, the houses of the European merchants situated along the *Kalidj*, where the water lies stagnant until the following April, I persuaded myself that the *aqueous halitus* ought to cause them many diseases; bu t*experience contradicts* this presumption, *and the emanations from standing water*, so noxious in Cyprus and Alexandrietta, *do not produce any harm in Egypt*.

To me, the cause appears to be the continued *dryness of the atmosphere*, which is maintained by the vicinity of Africa and Arabia, where the humidity is incessantly absorbed; and by the perpetual currents of the winds, *which encounter obstacles.* [b] In proof of this opinion, is the fact that the *flesh of animals*, exposed to the North wind, even in summer, far from putrifying, *becomes as dry and as hard as a stone*. In the desert are found dried corpses, so light, that one man easily lifts with one hand the whole skeleton of a camel.[2]

Besides this great dryness of the atmosphere, its *saline qualities* are observed in all parts. The stones are corroded by natron, and in humid spots are found long chrystal ized needles, which may be mistaken for nitre. The well of the Jenuts Garden in Cairo, formed of bricks and earth, becomes covered with a crust of natron as thick as a dollar; and when the beds of the garden have been watered with water of the *Kalidj*, as soon as they become dry, white chrystals are seen shining on the earth, which could not have been brought by the water, as it gives no indication of salt to the taste nor by distillation.

This property of the air and of the earth joined with the heat, is what communicates, without doubt, to the vegetation an activity almost incredible to the inhabitants of cold climates. Whenever the plants abound in water, they develope themselves with prodigious rapidity. Whoever has been in Cairo or Rosetta, may have satisfied himself that the kind of pumpkin called *gara*, shoots nearly four inches in 24 hours.

But let us conclude with a very important observation: this fertile soil appears to be exclusive or *intolerant*. It is proved by daily observations that many exotic plants degenerate very soon. The European merchants are obliged every year to bring from Malta new seeds of cauliflowers, beets, carrots, and salsify. These horticultural vegetables, in the beginning, succeed admirably well, but if they are grown afterwards from their own seeds, they become wrinkled and diseased. The same has succeeded with prunes, pears, and peaches, which have been carried to Rosetta. The vegetation in this soil is too violent to nourish well, pulpy and spongy textures; in order to succeed it would be necessary to accustom them by degrees to the nature [of the soil] and to acclimate them by the force of great care in their cultivation. H. P.

NOTES OF VOLNEY.—1. The Astronomer Beauchamp, has often observed 37° and 38° in Bassora, and this degree of heat reigns particularly in the greatest part of the shores of Persia, Arabia, and India; 32° and 33°, blood heat, are very frequent in Georgia and Florida, in America. Hence Egypt should be collocated among the countries of medium temperature.*

2. Nevertheless, we should notice that the air is much less dry along the coast than on the more elevated lands; so that in Alexandria and Rosetta, IRON cannot be exposed 24 hours to the air without being covered with RUST.†

NOTES OF THE SPANISH TRANSLATOR.—* The temperature assigned by the Author to Egypt, is exactly the MAXIMUM of the Island of Cuba, CAETERIS PASIBUS, that is, in the shade. The mercury there rarely passes above 25°, even in the hottest months of July and August. Notwithstanding, in these same months, it constantly maintains itself from 23 to 24° at midday, without more variations than those naturally produced by the nightly absence of the sun, which causes it to descend sometimes 6°, and when least, 3°.

† This note is limited to the conjecture of the Havana man, that the saline productions noted by, are effects of the NITRIFICATION caused by the nitrogen of the atmosphere; but he does not suggest why or how the nitrogen becomes converted into nitric acid.

NOTES OF H. P.—a The PROXIMITY OF THE SUN cannot be the principle cause of the greater heat of summer, if our astronomers tell the truth in saying, that the earth is nearer to the sun in winter; nor can it be the cause of the greater heat of any season, or of any latitude, since, in all parts of the world, and in every day of the year, the nearer the sun that travellers have been on mountains, and æronauts in balloons, the colder have they found the atmosphere.

b The difference in the humidity of climate produced by the absence or presence of obstacles in the course of the winds, is remarkably contrasted by the extreme dryness of the air over the whole great peninsula of Yucatan, and the extreme humidity of the air in the adjoining small State of Tabasco. The North and North-West winds sweep over the level surface of Yucatan, from the Mexican Gulf to the Bay of Honduras, without encountering any elevated obstacle in their flight, and hence the rainy season, as it is called, endures but four months, and will not average more than a shower of an hour to every second or third day. On the contrary, the same winds, which pass over Tabasco, are stopped at its South and South-East boundary by the Chiapian mountains, (a N. E. spur of the great Mexican Cordelleras,) and hence are obliged to precipitate their moisture to so great a degree, that it is a common saying here, that in Tabasco it rains eight months, and showers the rest of the year.

c The Havana man adds, that "the analogies between the physical state of Egypt and of Cuba, or of the W. I. Islands in general, are so notable, that I cannot do less than indicate them at every step. The soil of Cuba does not easily admit foreign plants, although perhaps it does not reach the point of exclusion of Egypt. In fact, as the land of that Island is more varied, there are places in which it does not cost so much to acclimate the exotics of colder countries. I have eaten very good peaches produced in ground not seven leagues distant from Havana. Nevertheless, with respect to garden vegetables, they degenerate as much as in Egypt, but with this difference, that the new seeds, instead of producing wrinkled and infirm plants, vegetate with excessive violence, throw out immense leaves, end do not give time sufficient to season the nutricious juices—a circumstance which renders them extremely watery."

From the Genesee Farmer.

THE HESSIAN FLY.

One of our new subscribers in Ohio, has expressed a wish to see a dissertation on the Hessian fly, and as it may be acceptable to other of our readers, we shall attempt to furnish briefly, the most important of the information which we possess respect ing it.

This insect belongs to the order DIPTERA, which includes all those insects having only *two wings*, and to the genus *Tipula*. The number of species belonging to this genus are numerous, amounting to more than one hundred and thirty of those hitherto known and described, and as many of these resemble each, care is necessary in observations on the Hessian fly, that no mistakes are made in identifying the species.

The following description of the Hessian fly, (*Tipula vaginalis tritici* of Mitchill,) is given by Dr. Akerly, in the American Magazine and Critical Review, of August, 1817. "It is a very small black insect, not so large as the moscheto of this place, with two fine transparent wings, from the roots of which, three ribs diverge, as through the leaf of a plant. The body, when examined by a microscope, is found to be divided into four segments, with a few hairs observable on each. The legs are of a yellowish cast, and transparent; the head inflected, with a short proboscis."

This, in common with nearly all other insects, passes through four distinct stages of existence: 1, the *egg*; 2, the *larva*, or maggot; 3, the *pupa*, or dormant state; and 4, the *perfect winged insect*. In this part of the country, it passes through two generations in one season, and attacks the wheat both in the spring and in the autumn. The fly, or perfect insect, deposits its eggs in the autumn, soon after the young plants appear above ground, between the lowest part of the leaf and that part which forms the main stem or straw, and as near the root as possible. "It resembles, at first, a very small white nit, and as it grows larger becomes a sluggish and almost inanimate maggot, of a white color. In this state, the proper and most natural food is the sap or juice of that kind of green wheat which has the most delicate straw."† It remains in this situation through the whole winter, apparently in the chrysalis state, without suffering any injury from the frost or snow; and in the spring, as soon as the weather becomes warm enough, and generally about the time vegetation has fairly commenced, it is transformed into the fly. In this state it performs the functions necessary for a continuation of its species. It lays its eggs between the straw or stem and the sheath which encloses it, as before described, and dies; and a new generation succeeds.

These eggs are soon hatched by the warmth of the season; and the young insects may be discovered in the form of small white maggots, within the sheath of the straw, and just above the lower joints. They here continue to feed upon the sap and tender fibres of the plant, by which it either withers and dies, or is stunted in its growth, so that the grain does not arrive at maturity. They are changed into the pupa state before harvest, and at this season, while the wheat is yet green, their presence may be readily detected by walking through the field, and pressing the heads with the fingers; those which feel soft, and unfilled with grains, are those which have been injured by the insect, and if the stalk be ex-

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* Its body is about one-ninth of an inch in length.

† Havens on the Hessian fly, in Bgric. Trans. New York, vol. 1, p. 77.

amined they will be found near the lower joints, somewhat resembling a flax seed, but smaller and slenderer, and of a dark brown color. They continue in this state until after harvest, and may be found upon the stubble in the field. Early in autumn they pass into their winged state, and lay their eggs in the young plants of wheat as before described.

When the fly is about to issue from the pupa into the state of perfect insect, it disengages itself by boring a small round hole through the brown case in which it is enclosed, and through the sheath of wheat just opposite to the place where it lodged, and this hole may be easily discovered as long as the stubble remains entire.*

With regard to the time of undergoing its final transformation the first time in the season, Judge Havens observes, "The size of the maggot when full grown, and the time necessary to complete its growth, depend in a great degree upon the quantity of nourishment it may obtain from the grain, and the number of maggots that may happen to be on one straw. This, according to the best of my observations, is somewhere between four and six weeks, which will bring the time, in which its growth will generally be completed, to the first part of June. But here the several causes of variation in the time of its being laid in the wheat, and of its completing its growth, both conspire to render this time so various, that some will be full grown, and others transformed into a chrysalis [pupa,] while others are small; and this circumstance has no doubt led many skilful observers to suppose, that there are two complete generations of the insect before harvest." The second time that the fly issues from the pupa, depends also in a great degree, on circumstances. "It generally," says Havens, "begins about the 20th or 25th of August, and continues in a greater or less degree through the whole month of September, but by far the greater part of the species are without doubt transformed into a fly, in the first part of this latter month."

By understanding the history of this insect, we are enabled to apply the means for its destruction, or for escaping its ravages. As it remains upon the stubble in the pupa state after harvest, the first means to be used, is, *to destroy the stubble soon after cutting the wheat.* This is to be done either by ploughing or burning. If by the former, the pupa is buried in the earth, and is thus prevented from changing to the fly; or if it changes, it cannot escape. Unless, therefore, the stubble be completely buried, the experiment will not succeed, consequently the deeper the ploughing the better. If by the latter, the stubble must be entirely burnt in order that the destruction may be complete, for, as the insect lies near the root, it will escape unless the fire be well applied.

But the best method of preventing the mischief occasioned by it, is to *sow so late that the wheat will not be above ground until the autumn fly has perished.* As the fly is in the state of the greatest activity early in September, the wheat which is up at that season, will be most liable to be destroyed; on the contrary, if the sowing is deferred till a month later, it will in a great measure escape. It is supposed that a single frost will destroy all the insects while in the state of the fly, and if the wheat is not up before such an occurrence, no danger whatever is to be apprehended.

In endeavoring, however, to escape one calamity, it is necessary to avoid the opposite evil. If the grain is sown too late, there will be danger, as is obvious, of its suffering from the effects of the frost of winter, or in other words, of being *winter killed.* Hence a middle course must be adopted. It may also be observed, that as there is a decided advantage in *early* sowing where wheat is not attacked by the fly, it would not be advisable where no danger of such attack is to be apprehended, as is the case in some places, to sow late in order to avoid its ravages.

The best evidence in favor of late sowing, as a means of preventing injury from the fly, is experience.. Among other instances, two are related by a correspondent of this paper in Pennsylvania, (vol. 3, p. 321;) who waited till the first autumnal frost, when his grain was sowed and covered as speedily as possible. The result was, that the next harvest he had a good crop of excellent wheat, while his neighbors on each side of him, who sowed earlier, did not reap more than one-fifth of the quantity, and that injured by the fly. The other instance was this:—One half of the wheat crop was first sown, when a heavy fall of rain took place, which retarded the sowing of the rest until dry weather with frost; when it was harvested, the first sown was scarcely worth taking into the barn, while the latter proved an average crop of merchantable wheat. In these instances, the effect of frost in destroying the parent insect, is obvious.

Although the *autumn* fly is considered as the cause of the far greater part of the mischief, much injury is often committed by the *spring* fly. This is more especially the case where the wheat is sown too *late* in the fall, and is not of sufficient vigor the next season to out-grow the effects of the injury. This is an additional reason for selecting a medium period for sowing. An instance of the efficacy of this course, will be found on page 81, of the current volume of the Genesee Farmer.

In conclusion, therefore, we would recommend, as the best general rule for escaping the ravages of the Hessian fly, to sow, if the season and circumstances will admit, immediately after the first frost, on ground which has since harvest been kept clear from all vegetable growth* which might serve as a refuge for it, and never in any case to sow before the early part of October. But as additional facts brought to light by further experiments, cannot fail to be useful, we shall close this article by repeating the suggestion of Judge Havens: "Let those who may have leisure and curiosity on this subject, and who reside in different parts of the country where the insect may prevail, sow small patches of different kinds of wheat, as often as once or twice in a month, during the whole season, adjoining to some field of wheat or stubble, where the insect may be found in greatest number; and let its progress be observed on those different patches of wheat, and the result of the observations be collected and compared with each other."

* Havens.

From the Genesee Farmer.

METHOD OF GROWING FLAX SEED ON FALLOW GROUND, WITHOUT INJURING THE WHEAT CROP.

Plough the ground as early in the spring as practicable, then drag it lengthwise. Then sow not to exceed half a bushel of flax seed to the acre, and harrow it well with a fine toothed harrow. Nothing further need be done until the seed becomes ripe—then mow it down, and when dry, it can be drawn into the barn and stamped off with horses.

The ground is then in better order for wheat than it would have been had it lain idle. The crop on rich land will be from 10 to 15 bushels to the acre.

The above statement is no visionary theory, but has been successfully practised in Seneca county some years past. My information was had from a gentleman of the first respectability, by the name of Stephen Cook, who is a practical farmer, and has cultivated the above named crop with sucoess. He resides at Fayette, Seneca county.

If this method of cultivation should succeed, I hope some of the fraternity of farmers will contrive to save the flax that grows on the stalk, by cutting it with a cradle or some other way.

It is true, the flax will be coarse in consequence of being sown so thin, but it might answer for cordage or coarse cloth.

It may be well to add, that the oil makers at Waterloo are in the habit of furnishing seed to the farmers in the spring, and receive the same quantity after it is harvested without interest. Oil makers in other parts would probably be willing to do the same.

ABNER F. LAKEY.

Palmyra, March 19, 1836.

PRESERVATION OF ANIMAL MATTER.

At a late meeting of the Asiatic Society, a human hand and a piece of beef, preserved by means of a preparation of vegetable tar, found on the borders of the Red Sea, in the vicinity of Mocha, and a specimen of the tar, were presented by Lieutenant Colonel Bagnold. In an accompanying letter, Colonel Bagnold observed—"During my residence as Political Agent on the Red Sea, a conversation with some Bedouin Arabs, in the vicinity of Mocha, led me to suspect that the principal ingredient used by the ancient Egyptians in the formation of mummies, was nothing more than the vegetable tar of those countries, called by the Arabs *katraan.* My first trials were on fowls and legs of mutton, and which, though in the month of July, and the termometer ranging 94° in the shade, succeeded so much to my satisfaction, that I forwarded some to England; and have now the pleasure to send, for the Society's information and inspection, a human hand, prepared four years ago by my brother, Captain Thomas Bagnold.—The best informed among the native Arabs think that large quantities of Camphor, myrrh, aloes, and frankincense, were used; these specimens will, however, prove that such were by no means necessary, as the tar, when applied alone, penetrates and discolors the bone. The tar is obtained from the branches of a small tree, or shrub, exposed to a considerable degree of heat, and found in most parts of Syria and Arabia Felix."—[Athenæum.]

Naval Gas-Lighting.—A steam vessel is fitting in the river, which is to be lighted with gas, on a plan suggested by Lieutenant Engledue, R. N. Two retors are placed in the fires under the boilers about two hours before dark, which will supply gas sufficient to burn the whole night, lighting the cabins, engine-room, and mast head. This may be fitted at a trifling expense, and without the least danger, the whole apparatus being on deck. Frequent accidents have occurred from steam vessels not being properly lighted at night.—[Lond. Mechanics' Magazine.]

TO CANAL CONTRACTORS.—Sealed proposals will be received at the Office of the Commissioners of the Illinois & Michigan Canal, from the 25th of May to the 6th of June next, for the construction of eight miles of the summit division of said Canal, extending from the point of commencement on Chicago River, to the Des Plains River; and also of six or eight miles of the lower end of said division, extending from the mouth of the Saganaskee Swamp down the valley of the Des Plaines.

The work consists principally of deep excavation, a considerable portion of which is rock, and is well worthy the attention of contractors.

Plans, profiles and specifications, giving all the necessary information to those wishing to obtain contracts on this line, may be examined at the Office of the Canal Commissioners, after the 25th of May next; and contractors are respectfully solicited to make a minute personal examination of the work previous to sending in proposals.

By order of the Board of Commissioners of the Illinois Canal. Attest: JOEL MANNING,
Secretary to said Board.

N. B.—Any person wishing to procure copies of the above on letter sheets, can obtain them by applying at the Canal Office.—Chicago, April 19, 1836. m6 t25

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

☞ THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.
Chicago, March 17th, 1836. 13—8t

PROSPECTUS

OF VOLUME II. OF THE

CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wildnerness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

*** All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.
Chicago, March 25, 1836.

*** Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

SMITH & VALENTINE,

STEREOTYPE FOUNDERS,

Are prepared to execute orders in their line,

at 212 Grand street, New-York.

HARTFORD AND NEW-HAVEN

RAILROAD.

From New-Haven to Meriden, eighteen miles of this Railroad is now located, and is expected to be ready for contract about the 25th of May. The attention of contractors is invited to this work. A more definite advertisement of the time when proposals are to be received, will hereafter appear.

JAMES BREWSTER, Agent.
New-Haven, April 27, 1836. m16—3t

[Editors to whom this is MARKED, are requested to give it three insertions, and send their bills to James Brewster, President Railroad Company,

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.
feb 20—ytf

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95 tons of 1 inch by ½ inch.
200 do 1¼ do ½ do
40 do 1½ do ⅜ do
800 do 2 do ½ do
800 do 2¼ do ⅝ do
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

NEW-YORK AND ERIE RAILROAD.

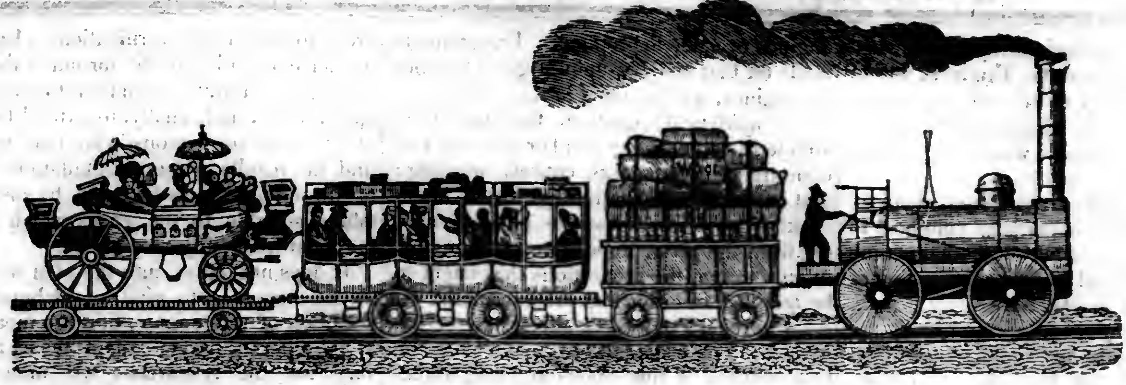
TO CONTRACTORS.—Proposals will be received at the Engineer's Office of the New-York and Erie Railroad Company, in the village of Binghampton, on and until the 30th day of June next, for grading 69 miles of the Railroad, from the village of Owego, in Tioga County, to the village of Deposit in Delaware County.

Proposals will also be received at the Engineer's Office, in Monticello, on and until the 11th day of July next, for grading 48 miles of the Railroad through the county of Sullivan, extending from the Delaware and Hudson Canal up the valley of the Neversink, and thence to the mouth of the Callikoon Creek, on the Delaware River.

Plans and profiles of the line above mentioned, staked out in convenient sections, with printed forms of the contracts, will be ready for exhibition at the said offices twenty days before the days of letting above specified.

The Company reserve the privilege of accepting only such proposals as they may deem for their advantage.

New-York, 26th April, 1836.
15—tf JAMES KING, President.



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, MAY 14, 1836. [VOLUME V.—No. 19

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 14, 1836.

HARTFORD AND NEW-HAVEN RAILROAD.

The number of workmen employed in the different cutlery manufactories in France amounts to 50,000. Fan-making employs 4,000 workmen, but this branch of manufacture is peculiar to Paris and a few villages in the environs of Beauvais.

PAMBOUR ON LOCOMOTIVES.—We referred in our last to a recent work by Chevalier de Pambour, on "*Locomotive Engines*, upon Railways." We now commence its republication in the Journal; but are compelled to defer the Engravings until our next. There are 33 distinct Figures or Engravings—which will cost over *one hundred dollars*, yet of so much importance do we consider the work, that we intend to defer most other matters for a few weeks, and republish the work entire in the Journal, and also in octavo form, and put them up in such a manner as to send them by mail to any part of the country, at $2 per copy, one half the price of the English edition, or *three* copies for $5. It will be ready for delivery in five weeks, or about the 15th of July. This work will probably lead to important investigations and experiments in this country. We bespeak for it an attentive perusal, and for this *Journal* the opportunity of publishing the result of such experiments and investigations as may be made in consequence of its publication.

INTRODUCTION.

There exists no special work on Locomotive Engines. Two writers, Wood and Tredgold,* have indeed, in England, slightly touched upon that matter, but only in a subordinate manner, in treatises on railways; and besides, they both wrote at a time when the art was scarcely beyond its birth. Consequently their ideas, their calculations, and even the experiments they describe, have hardly any relation to the facts which actually pass before our eyes, and can be of no use to such as wish to acquire a knowledge of these engines and their employ on railways.

Many questions had not even been entered into, others had been solved in a faulty manner. New researches on the subject became therefore indispensable. This work will, in consequence, be found completely different from any thing that has been published hitherto. No facts will be quoted, but such as result from actual observation; no experiments related, but those made by the author himself, on a new plan and with new aims; finally, no theory exposed but such as is derived from those experiments.

If at first sight it appear astonishing that no theory of Locomotive Engines should exist, the surprise ceases on considering that the theory of the steam-engine itself, taken in general, has not yet been explained. It was natural to suppose, that, respecting a machine at present in such universal use, and on a subject of such importance, every thing had been said, and every explanation given long ago. Far from this being the case, however, not even the mode of action of the steam in these engines has been elucidated. In the absence of such indispensible knowledge, all theoretical calculations were impossible. Suppositions were put in the place of facts. In consequence, we have seen very able mathematicians propose, on the motion of the piston in steam engines, analytical formulæ, which would certainly be exact, if all things went on in the engine as they suppose; but which not being founded on a true basis, fall naturally to the ground, in presence of facts.—From this also results that, in practice, the proportions of the engines have only been determined by repeated trials, and that the art of constructing them has proceeded hitherto in the dark, and by imitation.

Locomotive Engines being first of all steam-engines, we cannot advance in the researches we undertake, without solving at the same time the question relating to steam-engines in general. There is even a remarkable point to be observed, which is, that of all sorts of steam-engines, locomotive ones are those which in their application have to overcome the least complicated resistance, and the most susceptible of a rigorous appreciation. This circumstance renders them therefore more proper than any others, for furnishing an explanation of general facts common to all those machines.

* "A Practical Treatise on Railroads, and Interior Communication in general, by Nicholas Wood." First edition, London, 1825; 2d edition, London, 1832.

"A practical Treatise on Railroads and Carriages by Thomas Tredgold," London, 1825.

The theory once satisfactorily established in regard to Locomotive Engines, will of course, apply equally to all sorts of steam-engines, and more especially to those which, like locomotive ones, work at a high pressure.

We flatter ourselves, therefore, that our researches, although apparently confined to Locomotive Engines, may at the same time illustrate he principal points of the theory of steam-ingines in general.

However, in order to indicate clearly the design of this work, and to show in what it differs from those that have preceded it, we think proper to enter here into some particulars as to the points on which we have new researches to offer, either theoretical or experimental. It will be seen that those points embrace nearly the whole subject.

The pressure of the steam in the boiler, had been till now considered as invariable in every engine. It was calculated once for all, and by approximation, according to the weight on the valve. A great number of observations will show, however, how much it varies during the motion of the engine, and how necessary it is to take that circumstance into consideration, and to make use of a more exact mode of determination, lest the calculation should be entirely founded on an erroneous basis.

On that subject there will be found in our work, an alteration we propose making in the present disposition of the spring-balance, in order that it may show the true pressure; and also the description of a portable instrument we suggest for superceding the mercurial guage, and which may be adapted to any engine.

The friction of the wagons was, until now valued much too high. This error naturally rendered every calculation false, by misleading with regard to the true resistance overcome by the engines. A great number of experiments on wagons, with or without springs, alone or united in considerable trains, will show the real value of the friction.

The resistance of Locomotive Engines was still an unsolved question. We have endeavored to determine it by three different processes, which may serve to verify each other.

The additional friction created in the engine by the load it draws, had never yet been submitted to any investigation. We shall present numerous experiments on that subject.

The exact determination of the pressure of the steam in the cylinder, was necessary to explain the mode of action of Locomotive Engines, as well as that of steam-engines in general, and to calculate the work they perform in different circumstances. The erroneous ideas admitted in that respect, were the origin of all the faulty calculations, which experiment contradicted. We trust that the simple elucidation of that point will in a manner lay open the whole play of the engine.

The evaporating power of the engines was an element on which no experiment had yet been made, which was not even introduced in the calculations, and on which, however, definitely depends the effect these engines are able to produce. Experiments made on that subject, upon a great number of engines, will be found in this work.

An analytical equation, that might be adapted to solve the general problem of Locomotive Engines, was entirely wanting; that is to say, an equation by which might be known a *priori*, either the effects resulting from the given proportions of an engine, or, *vice versa*, the proportions that ought to be adopted, in order that predetermined effects in regard to load or speed may be obtained. The trials hitherto made to come to a solution of this question, being founded on a false principle, had produced formulæ in evident contradiction with facts. A rule had even been adopted, according to which the practical power of an engine was considered as equal to the third part only of its calculated or theoretical power; whereas, the whole applied power must evidently appear in the effect produced, and we shall see that it really does appear in it. This imaginary rule is a sufficient proof of the error of the calculations that were used, and could only lead to disappointments in practical applications. Engines were constructed, but the effect that they would produce was unknown. By the introduction of a new element of calculation, wrongly neglected until now, viz. the evaporating power of the engines, it will be seen that that question is solved in the most simple manner possible. From that equation, and simply by measures taken on the machine, the velocity and load of a Locomtive Engine may be immediately found, and *vice versa*, the proportions which ought to be given to it, to make it answer any intended purpose. A great nnmber of experiments, made in a daily practice, will show the accuracy of the formulæ. This is, at the same time, the theory of all high-pressure steam-engines.

Several secondary dispositions of the mechanism of the engines had not yet been studied. It will, however, be seen that they are apt to deprive the machine of as much as a fourth part of its power. The effects of these dispositions, and in particular of that which is called the *lead of the slide*, will be submitted to calculation, and the results verified by special experiments.

The resistance proper to the curves of the railway deserved also to fix our attention. We shall endeavor to fix accurately the form of the wheels, and the disposition of the rails, by which that resistance may most effectually be remedied.

The consumption of fuel according to the load had not been determined in a satisfactory manner, and the rule proposed was contradicted by the experiment. This question will be established in a different manner, and the results confirmed by facts.

The researches on those points were made on twelve different engines, and numerous experiments were undertaken on each branch of the subject.

The method constantly followed consists in taking, first, the primary elements of the question from direct experiment; then making use of those elements to establish a calculation in conformity with theoretical principles; and, lastly, submitting the results to fresh and special experiments, in order to obtain their verification. For the further elucidation of the formulæ, they are each time carefully submitted to particular applications, and, finally, to extend the use of the work to persons who may wish to find the results without calculations, each of these formulæ is followed by *practical* tables, suitable to the cases which occur the most frequently in practice.

It does not enter into the plan we have traced ourselves, to give an elaborate description of the engine, nor the measures of its different parts, except those necessary for the researches we undertake. Such considerations would lead us too far, and concern more particularly works on construction. In like manner, the figures added to our work, are only meant as illustrations of the text. They would be too imperfect for any other object.

The untrodden path in which we have been forced to enter, may have led us into some error. We by no means pretend to have produced a perfect work, and we claim indulgence for the mistakes which may have escaped us in so new a subject. Our chief aim was to be useful, while seeking a study congenial to our taste, and occupying the leisure of an inactive life. Early devoted to other pursuits, belonging to a family for several generations engaged in the military career, and the son of a General of Artillery, whose footsteps had naturally traced our direction, our studies would not have taken that turn, had we not been struck by the powerful effects of the moter we are going to describe, and by the important part it must necessarily act in modern civilization. We thought our work would at least have this result, to call the public attention on the subject. We shall feel happy if we have succeeded in some of our researches; and happy also if others, in correcting our errors, shall at least elucidate the facts upon which we have called their attention.

All the experiments related in the work were made by *ourselves*, with all the care and attention they required. Some were made in company with engineers of known talent and ability, as Mr. J. Loke, of the Grand-Junction Railway, and Mr. King, of the Liverpool Gas-Works. We give them in all their details, with a view that every one may judge of their accuracy; and we mention the place and date of each experiment, in order to facilitate their verification by referring to the books, on which is registered the weight of each of the trains.

In regard to the facility we had of making these numerous experiments, we must say that, having applied to the heads of the most important undertakings of the sort in England, we were permitted, without restriction, to penetrate into the workshops, to take every measure, to collect all the documents concerning the expenses, and lastly, to make any experiment that appeared necessary to us.

It is with pleasure we acknowledge in the English character the liberaltty we have found in the whole course of our investigations.

To the friendship of Mr. Hardman

Earle, one of the directors of the Liverpool and Manchester Railway, we owe in particular our warmest thanks. His obligingness never abated. Possessing all the qualities of an enlightened mind, he liked taking a part in researches which appeared to him conducive to the progress of science; and he permitted us to use all the engines and wagons of the railway. The beauty of these engines, their number, which is not less than thirty, the care with which they are kept, and the immense trade on that line, which gives the facility, without interfering with the business of the railway, to select loads for experiments as considerable and as light as one wishes, make that place the only one, perhaps, in the world, where experiments on a great scale may be made with the same precision as in general can only be obtained by a small apparatus. It is for that reason we preferred that railway to any other at present in activity, either in France or in England.

The same facilities were also offered us by the directors of the Darlington Railway. Interesting documents concerning the repairs and expenses of all sorts, incurred by that company, were obligingly communicated to us. We owe that obligation to the liberal authorisation of Mr. J. Pease, M. P., chairman of the company, and the unremitting attentions of Mr. Robert B. Dockray.

We have studied the subject with all the interest, and, we might say, with all the enthusiasm it excited in us. In fact, what a subject for admiration is such a triumph of human intelligence! What an imposing sight is a Locomotive Engine, moving without effort, with a train of 40 or 50 loaded carriages, each weighing more than ten thousand pounds! What are henceforth the heaviest loads, with machines able to move such enormous weights? What are distances, with moters which daily travel 30 miles in an hour and a half? The ground disappears, in a manner, under your eyes, trees, houses, hills, are carried away from you with the rapidity of an arrow; and when you happen to cross another train travelling with the same velocity, it seems in one and the same moment to dawn, to approach, and to touch you; and scarcely have you seen it with dismay pass before your eyes, when already it is again become like a speck disappearing at the horizon.

On the other hand, how encouraging is the evident prosperity of those fine establishments. How satisfactory it is to acquire the proof that the Liverpool Railway produces 9 per cent. interest, and the Darlington one an equal profit! With what confidence must we not anticipate the future state of such undertakings, when we know that, besides the above-mentioned annual interest, the shares of the Liverpool Railway have risen, in four years,* from £100 to £210; and those of the Darlington Railway, in eight years, from £100 to £300? What may not society at large expect in future from this new industry, which will augment, ten-fold, the capital and produce of the country, by the immense influence of speedy and economical conveyance!

* The first edition of this work appeared in French, in the beginning of 1835.

We shall in the course of the work make use of the following abbreviations:—

Ton	t.
Pound avoirdupois	lb.
Foot	ft.
Square foot	sq. ft.
Cubic foot	c. ft.
Inch	in.
Pound sterling	£.
Shilling	s.
Penny	d.

INDEX.

A PRACTICAL TREATISE ON LOCOMOTIVE ENGINES.

The plan we intend to follow in the course of this work will, we hope, render it both clear and methodical.

We shall begin by the description of a locomotive engine; and we shall acquaint the reader with the means by which the pressure of the steam may be accurately measured, so that, before we go any father, he will be able to see the elements from which the power of the mover we are to employ is derived.

Our attention will afterwards be directed towards the resistances which that mover must overcome in its motion, so that we shall successively endeavour to discover as well the resistance of the waggons, as that which belongs to the engine itself, either when it moves alone, or when it draws a load after it.

These points first established, we shall pass to the general theory of the movement of locomotive engines, and we shall lay down the formulæ by which to determine, *a priori*, either the speed the engine will acquire with a given load, the load it will draw at a given speed, or the proportions which are to be adopted in its construction to make it answer any intended purpose.

After that, we shall have to consider several additional dispositions proper to the engine, which may exercise more or less influence on the expected effect; and we shall then also treat of some external circumstances, the result of which may be of the same nature.

Lastly, we shall speak of the fulcrum of the motion, or of the force of adhesion of the wheel to the rails; and our last chapter will contain a calculation of the quantity of fuel required for the traction of given loads.

These inquiries will be sufficient to solve all the most important questions conceriug the application of locomotive engines to the draft of loads.

They will sometimes be necessarily subdivided into several branches, and require calculation and theoretical illustrations of more or less extent, though always plain and easy, and a series of experiments more or less numerous; but we shall take care to maintain, all along our work, the classification we at present lay down.

CHAPTER I.

DESCRIPTION OF A LOCOMOTIVE ENGINE.

ARTICLE. I

ENUMERATION AND DESCRIPTION OF THE PARTS.

Figure 1 represents a locomotive engine constructed on the most approved principle. Its mechanism is so simple, that a short description will be sufficient to explain its mode of acting. Whatever may appear unsatisfactory in this first sketch, will be cleared up by the particulars we shall have occasion to add in the course of the work.

The principal parts of the engine are: the fireplace and boiler, which constitute the means of raising the steam; the slides and cylinders which are the means of bringing into action the elastic force residing in that steam; and the cranks and wheels, by means of which the motion is transferred from the piston to the engine itself. When we have described those principal parts, we shall pass to some others of less importance, and then we shall fix the particular place each of those parts occupying in the engine.

§ 1. *Of the Boiler.*

Figure 3 gives a complete idea of the boiler.

It shows the body of the machine, composed of three distinct compartments. The one to the right, or fronting the machine, and which is surmounted by the chimney C, is separated from the two others by a partition tt, The two others together form the boiler. Both are filled with water to a certain height cd, but part of their internal space is occupied by the fire, as will be explained.

In the hindmost compartment is placed a square box e, which contains the fuel, or forms the fireplace of the machine. Between the sides of that box and those of the compartment in which it is contained, a space qq is left, which communicates freely with the remainder of the boiler, and which is consequently filled with water. The inner box is supported in the compartment in which it is contained, and joined to it by strong bolts, having the advantage of giving solidity to that part of the boiler which, not being rounded, offers less resistance than the cylindrical parts.

The fire-box e, being thus placed in the middle of one of the compartments of the boiler, would be surrounded on all sides with water, were it not for the aperture l, which forms the door of the fire-place, and the bottom, nn, of the box which is occupied by a grate, one of the bars of which is represented at nn. This grate is more plainly seen in fig. 4 which represents the same fire-box seen in front.

Near the door l, and in the machine, is placed a strong supporting board, represented in fig. 1, by BB. The use of this board is for the engine-man to stand upon. Directly behind the machine comes the tender carriage for coke and water, so that it is easy for the fireman to throw coke in the fire by the door l, and to let water pass in the boiler whenever it may be necessary. This supply of water takes place by means of a forcing-pump, put in motion by the engine itself, and of which we shall speak hereafter.

The lower part, nn, of the fire-place is occupied, as we have said, by a grate, and remains consequently open, admitting the external air required for the combustion of fuel. The coke thrown into the fire-box, falls on the grate and is supported by it. When the fire is lit, and the door of the fire-box shut, the flame of the combustible remains confined in the fire-box. It would have no egress, if a number of small tubes or flues $e'e'$, the disposition of which is better seen in fig. 4, were not to lead the flame to the chimney, after passing through the whole length of the second compartment or cylindrical part of the boiler.

From that construction it will easily be conceived, that the fire being shut up in the fire-box, and completely surrounded with water, none of its calorific parts are lost. Afterwards, the flame, in its way to the chimney, divides itself among all the small flues we have mentioned. It crosses thus the water of the boiler, having a considerable surface in contract with it, and only escapes after having communicated to the water as much as possible of the caloric it contained. Once arrived at the extremity e'' of the tubes, the flame is in the compartment of the chimney, and escapes freely through the chimney C.

We see thus the heat applied here in two very distinct manners. All the water which surrounds the fire-box is in immediate contact with the fuel, and consequently subject to the action of the radiating caloric; on the contrary, the water which is placed in the middle compartment, receives its heat only from the contact of the flame and heated air which escape from the fire-box, so that it is exposed only to communicative heat.

It may be necessary to observe here, that the form of a boiler, with tubes, a form to which is undoubtedly owing the surprising power of the present locomotive engines, is a French invention. This ingenious idea belongs to M. Seguin, civil engineer and manufacturer in Annonay.*

§ 2. *Of the Action of the Cylinders.*

The second important part of the engine is the apparatus of slides and cylinders. Fig. 3 is also desinged to show the disposition of this part.

In the upper part of the boiler, that is to say, in the part occupied by the steam, there is a large tube VV', which is open at one of its ends and leads out of the boiler. It is by this tube that the steam is conducted into the cylinders. At V', in the interior of the tube, is a cock or regulator, the handle T of which extends out of the machine. By turning that handle more or less, the passage for the steam may be opened or shut at will.

The steam, being thus generated in great abundance in the boiler, and being unable to escape out of it, acquires a considerable degree of elastic force. If at that moment the cock V' is opened, the steam, penetrating into the tube by the aperture V, follows it to the entrance v of the valve-box. There a sliding valve x, which moves at the same time with the machine, opens a communication to the steam successively with each end of the cylinders. These are placed horizontally at the bottom of the chimney compartment, where the passage of the flame and the sides of that compartment protect them against the condensating effect of the cold air, and keep them in a proper degree of heat.

The direction of the arrows in the figure mark the line of circulation followed by the steam, from its entrance at the aperture V, into the slide-box. In the situation in which the slide is here represented, passage 1 is open to the steam, and consequently the piston is pushed in the direction of the arrow. At the following instant, passage 2 will be open in its turn, and the piston will be pushed in the contrary way. When the steam has produced its effect, it passes in the tube v', and is conveyed by it to the chimney, through which it escapes into the atmosphere.

The introduction of the steam takes place at V, at a point purposely elevated, that the bubbling and jolting of the engine may not let the water of the boiler get in by the opening V.

§ 3. *Of the Cranks and Wheels.*

The piston-rods being set in motion according to the foregoing explanation, and sliding in guides which prevent any deviation from a rectilinear horizontal motion, communicate a rotatory movement to the axle of the two hind wheels of the engine. This transformation of the alternate motion into a circular one, takes place after the manner of the common foot spinning-wheels, by means of a crank in the axle. This effect is clearly represented in fig. 3. There the steam may be seen forcing alternately the piston backwards and forwards, and turning the crank yz, and at the same time the axle and the wheel which is fixed to it. However, as in the motion of a crank, there are two points in which the alternate force that puts the crank in motion, has no greater tendency to move it in one direction than in another, which takes place whenever the radius of the crank happens to be on the centre, that is to say, in the direction of the alternate motion; the two cranks respectively corresponding with the two pistons, are placed at right angles to each other. By that means one of the two has always its full effect whenever the other ceases to act, and the power of the engine never varies. The two cylinders being, as we have already said, placed beneath the boiler, the piston-rods communicate directly under the engine with the above-mentioned cranks as appears in the figure. The crank-axle being set in motion, the wheels, which form one body with it, turn at the same time and,

* M. Seguin's patent bears the date of the 22d of Feb. 1828; and it was not until April 25, 1829, that the committee of directors of the Liverpool Railway called the attention of the English mechanicians towards locomotive engines, by proposing a prize on the subject. On October 6, of the same year, 1829, and not before, appeared the ROCKET engine of Messrs. Stephenson and Booth, the principle and even the form of which differ in no way from M. Seguin's patent. We do not wish to detract from Mr. Booth's merit in having also conceived that happy idea. It is not the first time that two ingenious persons have had the same thought; but, by the above-mentioned dates, it will be seen that the prior claim rests, nevertheless, with the French engineer.

The fact may be easily verified in England, by looking for a description of the patent in some of the following works, which are certainly to be found in the British Museum and other chief English libraries: Annales de l' Industrie Francaise et Etrangere, ou Recueil Industriel et Manufacturier, annee 1828; Bulletin de la Societe d'Encouragement pour l' Industrie Nationale, annee 1828; Description des Machines et Procedes consignes dans les Brevets d' Invention, de Perfectionnement et d' Importation, publiee d' apres les Ordres du Ministre de l' Interieur et du Commerce. This last work we quote in advance, as it only gives the description of expired patents; M. Seguin's will not be mentioned until the year 1838.

the engine is propelled in the same manner as a carriage which would be set a-going by turning the wheels round by the spokes.

The only fulcrum of the motion being in the adhension of the wheels to the rails that support them, which adhension causes them to advance instead of slipping round, it might appear doubtful whether, on such an even surface as the rails of a railroad, the engine could advance by means of the sole rotatory movement imparted to its wheels, particually when the engine has to draw a considerable weight. But experience proves that however slight the adhesion of a wheel to a well-polished rail may appear to be, as, on the other hand, the power required to draw a load on a railroad is very small, that adhesion is sufficient, and the engine progresses, followed by its whole train.

In ordinary cases, the adhesion of two wheels is sufficient; particularly with engines, the weight of which is distributed so that the drawing-wheels bear about the two-thirds of it. When a great power of adhesion is required, the four wheels are made equal. In that case one may, if necessary, connect the two wheels of the same side together, by metallic rods placed on the outside of the wheels. One of these connecting-rods is represented in fig. 6. C is the prolongation of the axle beyond the wheel. The crank-arm Co is fastened to that prolongation of the axle, and must necessarily turn with it. The point *o* is a ball and socket joint; *m* is a cotton-wick syphon, by which the oil is fed in the joint; *nn* are keys designed to lengthen or shorten the rod, which at its opposite end is joined in the same manner to the crank-arm of the other wheel. The natural result of this is, that when the wheel or the axle C turns, it carries along with it the crank-arm Co, and thus communicates the same motion to the other extremity of the connecting-rod, and by it to the crank-arm of the second axle. Thus the power of the engine is communicated by the two hind wheels to the two others, and the engine then adheres by its four wheels.

In order that, while in motion, the engine may not slip off the rail, which, we know, are iron bars projecting above the ground, the wheels have, on the inner side, a flange that prevents any lateral motion. But as, on the other hand, that flange ought not to be in danger of constantly rubbing against the side of the rail, the tire of the wheel is not exactly cylindrical, but slightly conical. Its diameter is a little larger on the side of the flange than on the outward side; the consequence of which is, that, supposing the engine were to be for a moment pushed to the left, the left wheel, resting on its broadest part, would pass over more way than the right wheel, and by that means bring the engine back to its true place between the rails. Wheels of such a form may be seen in fig. 2.

§ 4. *Of the Safety Valves.*

The three preceding points form the foundation on which the action of the engine rests; the other parts are only secondary ones, that is to say, only designed to make the power produced by the former ones efficient. The boiler has two safety-valves E, F (fig. 1), one of which is sometimes shut up in a box, to put it out of the reach of the engine-man, and to prevent him from overcharging it, as he might be tempted to do in order to obtain from the engine a greater effect, even at the risk of damaging it. More commonly, however, that precaution is given up, on account of its inconvenience.

§ 5. *Of the Water-Gauge.*

A gauge is likewise fixed to the machine to show at what height the water stands in the boiler. This gauge is a glass tube, *mn* (fig. 7), inchased at both its ends in two verrels *aa*, with cocks communicating with the interior of the boiler and appearing outside, as may be seen in the figure. When the two cocks *rr* at the top of the tube are opened, the water penetrates into the tube and takes the same level as in the interior. The cock S is designed to let that water afterwards run off. The use of this instrument is, that the engine-man may know when it becomes necessary to let the apparatus be refilled from the tender. As, however, the tubes and other parts of the boiler begin to suffer, that is to say, are apt to crack, when the water gets too low in the machine, there are, for more safety, on the side of the boiler, two and sometimes three small cocks, placed at different heights; by opening which, one after the other, the level of the water in the interior may be still more positively ascertained. If it be necessary to know at what height the water stands in the boiler, it is not less so to be certain of the real degree of elastic force the steam possesses; for, should that force not be sufficient, the engine would be unable to accomplish its task: but as this point requires to be explained at some length, we shall at a further period make it the subject of a chapter by itself.

§ 6. *Of the Slides.*

We have another important object to clear up. We have said above, that the slide-valve admits successively the steam above and below the piston of each cylinder, the result of which is the alternate motion, source of the final progressive motion of the engine. The engine-man then having opened the regulator or cock that admits the steam into the pipes, the steam proceeds from the boiler through the tube *v*, (fig. 8) to the valve-box, and, pressing with all its force on the upper part *x* of the sliding-valve, compels it to remain in immediate contact with the plane in which it slides, while performing its motion. When the slide is in the situation in which it is represented in the figure, the steam takes the way marked 1, acts upon the piston, and pushes it in the direction of the arrow. In the meanwhile, the steam under the piston escapes through the passage 2, which then communicates with the exterior, by means of the aperture *e*. When this first effect has been produced, the slide, by means of its rod *l*, is pushed in the position marked by the dotted lines. Then, on the contrary, it is the passage 2 which is open to the steam coming from the boiler; it pushes, consequently, the piston in the opposite direction to its first motion; while the passage 1, communicating in its turn with the aperture *e*, gives free egress to the steam that has produced its effect. The alternate motion continues thus: the slide passing from one position to the other, by which it opens and shuts successively the passages, so that the steam may act alternately above and below the piston. The steam is afterwards led to the chimney, as will be explained hereafter, there to augment the current of air by which it causes the draft of the fire.

The motion of the slide is regulated so as to accompany the motion of the piston, but still to precede it by a very short instant: that is to say, that instead of opening the proper passage for the stroke of the piston just at the moment the piston is going to begin that stroke, it opens it a little beforehand. This is called giving a little *lead* to the slide. By that means, at the moment the piston begins its motion, the steam has already its full action upon it. We shall have occasion to come back to this point, when we shall see that this disposition, which is favorable to the speed of the engine, can be advantageously employed only within certain limits, beyond which it would be prejudicial to the load the engine is able to draw.

§ 7. *Of the Eccentric Motion.*

The alternate motion of the slide is performed by the steam itself. To comprehend this point requires some attention.

An eccentric wheel is fastened to the axle, and, as this turns, the eccentric, drawn along by its motion, pushes and draws alternately the rod of the slide.

This effect is represented in figs. 9 and 10. The point O is the centre of the axle, of which the section appears hatched. The point *m* is the centre of the eccentric, hatched in a contrary direction. The axle, in turning, draws the eccentric along with it, and makes, consequently, the point *m* describe a circle round the point O. In that motion the point *m*, passing successively to the right and to the left of the centre O, must necessarily, by means of the ring *nn*, which encircles the eccentric, push and draw alternately the shaft L, which acts upon the slide.

On the other hand, the point C representing the extremity or throw of the crank of the axle, which is set in motion by the piston, it will appear that when the steam-pushing the piston from one end of the cylinder to the other, makes the crank revolve half way round, the axle makes also the half of a revolution round itself; so that the point *m* describes the half of a circumference round the point O, and consequently the eccentric pushes the shaft L, and by it the slide-rod *l*, from one of their extreme positions to the other.

Thus placed, by this first operation, the slide now admits the steam on the opposite side of the piston. The piston then goes back, makes the axle revolve again half way round, whereby the slide is brought back to its original position, which suits the next stroke of the piston; and so forth.

The effect of drawing and pushing altenrately the slide-rod by means of the rotation of the eccentric, is accomplished by means of a metallic ring *nn* fixed at the end of the shaft L, and in which the eccentric-wheel turns, the surfaces which are in contact being smooth and lubricated with oil. By this arrangement, while the great radius of the eccentric passes in turning from one side of the centre to the other, it carries along with it the shaft fastened to the ring, and communicates to that shaft the alternate motion.

By this it will be seen that the eccentric wheel acts here the part of a common crank for transforming the circular motion of the axle in an alternate motion applied to the slide, on the contrary principle to that which changes the alternate motion of the piston into a circular motion applied to the axle of the engine; but the eccentric dispenses with the crank which would have been necessary in the axle.

However, as by the disposition of the engine the slide-rod is not in the same plane with the axle, the eccentric does not communicate directly the motion to the slide-rod itself; the motion is communicated to that rod by means of the cross-axle K, and the two arms KL′ and K*l*′ which are fixed to it; and the consequence is, that when the eccentric goes back, the slide-rod *l* advances, and *vice versa*, as may be seen on the figure.

A comparison between figs. 9 and 10, the difference of which is a quarter of a revolution, will make the above mentioned effects perfectly intelligible.

By examining the motion of the slide (fig. 10.,) it will be seen that, while passing from one of its situations to the other, and when it happens to be exactly in the middle position, there occurs one instant during which all the passages of the steam are shut together. This effect takes place at the moment the slide changes the passages of the steam, and corresponds with the point where the piston changes its direction. This coincidence can only take place because, setting aside the little lead of the slide, the radius of the eccentric is at right angles with the radius of the crank. In fact, the slide is necessarily thus in its middle position, that is to say, changing the communications of the steam, at the same time as the piston is at the bottom of the cylinder, ready also to alter the direction of its motion. This correlativeness of motions is clearly exhibited in the figure.

The particular advantage of the eccentric being thus placed at right angles with the crank is, that the eccentric is in full action when the crank is on its centre, or the piston at the bottom of the cylinder, that is to say, that the slide is in its most rapid motion just at the moment that it is to open or shut the passages; which circumstance is necessary to prevent time being lost in the alternate effect of the steam.

§ 8. *Of the Drivers.*

Until now we have spoken as if there were only one slide, but, having said there were two cylinders, it is clear that there must be a slide, and consequently an eccentric for each of them. On the other hand, the two pistons alternating one with the other in their motion, that is to say, acting upon two cranks perpendicular to each other, as hss been explained, the radii of the two eccentrics must necessarily stand also at right angles with each other. This disposition may be seen in figs. 11 and 12, where the piece forming the two eccentrics is represented in front. To make it more clear, it is marked by hatchings.

This piece must, as has been said, move with and be carried along by the axle.—However, if it were permanently fixed on the axle, its position might suit when the engine is to go forward, and not when it is to go backward; for it will be seen that, for these two motions, the eccentric must be fixed in two different positions.

This piece is therefore loose upon the axle like a pulley on its axis, but it can be fastened to it at will. To that effect its side-faces have two apertures or eyes, represented at O and O′; and the axle itself carries two pins *rr*′, which are called drivers. The eccentric being placed on the axle between the two drivers, it is easy to push it by means of a lever, either against one or against the other, until it enters the aperture designed for it; so that from that moment, the eccentric may be drawn along by the axle. Moreover, if these two drivers be placed in such a manner that one may suit to the progressive, and the other to the retrograde motion of the engine, we shall, by disengaging the eccentric from the one and carrying it to the other, be enabled to make the engine go either forward or backward at pleasure.

There is no difficulty in fixing the place that the eccentric must occupy on the axle either for the progressive or the retrograde motion.

Let us suppose that, by pushing the engine gently along the rails, we bring one of the pistons to be just in the middle of the cylinder, and that precisely at the same instant the crank, on which that piston acts, is in its verticle position above the axle, as in fig. 3, it is clear that, to make the engine go forward, the steam must push the piston forwards, for then the piston will carry along with it, in the same direction, both the crank and the wheels; consequently, the slide must must admit the steam by the passage No. 1, or be drawn forward as it is represented here, which, by referring to fig. 9, requires that the radius of the eccentric be horizontal, and placed at the back of the axle. This is, therefore, the point at which the driver must fix the eccentric for the progressive motion.

The engine remaining in the same position, let us suppose that we wish on the contrary, to dispose it for the retrograde motion. The steam must arrive on the opposite face of the piston, that is to say, that the passage No. 2 must be opened to it, which supposes that the slide is pushed backwards, and consequently that the eccentric is in front. It is therefore horizontally, and in the front of the axle, that the eccentric must be fixed by means of the driver.

This is exactly the position of fig. 12. By observing the right hand crank, we see that while that crank is vertical and above the axle, the driver *r* on the right side, and the aperture that receives it, are behind and hidden by the axle; consequently, the eccentric is horizontal, and in front; a position which, as we have seen, suits a retrograde motion. The driver *r* is thus placed for the retrograde motion, keeping the eccentric in that position.

If we now suppose, on the contrary, that the eccentric be pushed against the other driver *r*′, the corresponding aperture of the eccentric being at O′, that is to say, not being in front of the driver, the consequence will be that, the eccentric not stirring out of its place, the axle will be forced to turn half round before the driver can enter into the aperture. From this follows, that, if we continue to examine the right crank, it will be found to have arrived *under* the axle, while the eccentric will still be in front, which is the position that suits the progressive motion; for it is the same as the one we have explained above, of the crank being above the axle, and the eccentric behind.

Thus we see that the two driver *r*′ and *r*, in figs. 11 and 12, being placed at right angles with each other, and with the cranks of the axle, are in a proper position; one for the progressive, and the other for the retrogade motion of the engine.

These two drivers being fixed on the axle, one on one side, and the other on the other side of the eccentric, it is clear that, by pushing that eccentric, by means of a lever, either on one or on the other of the two drivers, the effect of the steam on the piston will immediately be to carry the engine either forwards or backwards, according to the driver with which it has been thrown in gear. The lever, which causes the change of position of the eccentric, is placed in such a manner as to present its handle within the reach of the engine-man, on the board on which he stands.

Besides these several dispositions, in order that the man who directs the engine may himself and of his own accord move the slides, independently of the motion of the axle, the shafts of the eccentrics are not invariably fixed to the slide rods. They are only fastened to them by a notch L′, figs. 13 and 14. By means of a lever acting on the small rod *m′ o*, the engine-man can raise the shaft of the eccentric and disengage it from the the notch, as may be seen in fig. 14; then the slides are at liberty to move independently of the axle; consequently, it is easy by means of two handles represented by PP in fig. 1, and connected with the slide-rods, to give to those slides the required motion.

§ 9. *Of the Water-Pumps.*

Under the body of the engine are two pumps *p*, fig. 1. the use of which is to replenish the boiler with water. Each of them is placed immediately under the piston-rod of each cylinder, and is worked by it. Each pump sucks a part of the water of the tender into the cylinder of the pump, and, on the other hand, forces it from the cylinder of the pump into the boiler, in the usual way. By having two pumps the replenishing of the boiler is secured, as, in case one of the two were to get out of order, the other may easily supply its place.

The valves of these pumps are ingeniously made of a small metallic sphere, resting on a circular seat, on which it exactly fits. Their action takes place by rising within a cylinder, the sides of which are pierced with four apertures for the passage of the water. One of these valves is represented in fig. 15. The water is introduced through *a* from the interior of the cylinder under the sperical ball which it raises, and is diffused in the body of the pump by the apertures *b*, *b*. This form of a valve never misses its effect; and the pumps, which, in the beginning, were continually out of order, are free from that defect, since Mr. Melling of Livepool first introduced that sort of valve.

§ 10. *Of the Steam-Regulator.*

The regulator, of which we have spoken above, and by means of which the passage leading from the boiler to the cylinders may be more or less opened, is represented in figs. 32 and 33. It simply consists of two metallic disks placed above and exactly fitting each other, both having an aperture of the same size. The inferior disk is immoveable, and shuts the pipe through which the steam escapes. The superior disk is moveable, by means of a handle T, which projects out of the engine; the stem *r* of the handle passes through the moveable disk, and enters the other in its centre, so as to keep them both in a right position over each other. In fig. 32, these two disks are distinguished from each other by hatchings running a different way. By making the superior disk K, by means of the handle T, move circularly on the inferior disk, the two apertures may be brought to correspond exactly with each other, as in fig. 32, and then the passage is entirely open. If only partially moved, as represented by the dotted lines in fig. 33, the passage is only partially opened; and when the two apertures do not correspond at all, the communication is completely intercepted: when the passage is thus shut, it is the steam itself that keeps the two disks in immediate contact with each other, by pressing with all its force on the superior disk.

This regulator may also be constructed in a different way. It is sometimes made in the form of a common two-way cock, the steam coming from above; but the preceding description is the one most commonly used.

§ 11. *Of the Joints or rubbing parts.*

In all the joints of any importance, the oil is fed without interruption by means of a cup, with a wick-syphon, placed above the joint, as at *m* in *fig.* 6. This cup is made in the form of a school-boy's inkhorn, so that the velocity of the motion may not spill the oil; and there is at the bottom of it a small tube, penetrating to the entrance of the joint. A cotton-wick dipping in the oil of the cup passes in the tube, and, sucking continually the oil out of the cup, drops it into the joint without interruption.

§ 12. *Of the Fire-Grate.*

The grate in the fire-place is not made of a single piece. It is formed of separate bars (fig. 31), which are placed next to each other at the bottom of the fire-place, where they are supported by their two ends. The advantage of this arrangement is, the facility it affords of replacing them individually by new ones, when they are worn out by the intensity of the fire. Besides, if any accident should happen to the boiler, and make the water run off unexpectedly, thus endangering the engine, one may, by means of a crooked poker, easily turn the bars upside down, and consequently extinguish immediately the fire by letting it fall on the road, with the bars that supported it. It is also thus that every evening the fire-box is emptied, after the engine has finished its work.

§ 13. *Of the places occupied by the different parts.*

We shall complete this description, by showing on the whole engine, as represented in figs. 1 and 2, the places occupied by the different parts of which we have spoken.

A, Part of the boiler containing the fire-box.

BB, Stand for the engine-man and his assistant.

C, Chimney of the engine.

D, Place of the cylinders.

E, First safety-valve, with lever and spring-balance, as will be explained hereafter.

F, Second safety-valve, constructed in the same manner.

G, Glass-tube.

H, Gauge-cocks.

I, End of the eccentric-rod.

J, Horizontal guides for the head of the piston-rod, so as to ensure its motion in the exact direction of the axis of the cylinder.

K, Cross-axle, communicating the motion of the eccentric-rod to the slide-rod, by means of the arms KL′ and Kl′, which are fixed upon it (see figs. 9 and 10.)

L′, Notch for throwing in gear the eccentric-rod with the cross-axle which works the slide-rods.

MM, Rod by means of which the engine-man can raise the eccentric-rod, and throw it out of gear with the cross-axle which works the slides. This is performed by means of the arms *m* and *m′* connected together. When the engine-man pulls the rods MM, he causes the arm *m′* to raise, and with it the small rod *m′o′*, which lifts the eccentric-rod out of gear with the arm KL.

N, Handle by means of which the engine-man pulls the rod MM, so as to produce the aforesaid effect.

PP, Handles to move the slides when they are thrown out of gear with the eccentrics. These handles, acting upon the cross-axle Q, move the cross-heads RR which are fixed to it. This motion is communicated by means of the rods SS to the cross-heads *rr*, which act upon the axle working the slides.

T, Handle of the regulator, to open more or less the aperture through which the steam passes from the boiler to the cylinders.

V, Steam-chamber, or reservoir, in which the steam is confined till it can escape through the aperture of the regulator, and penetrate into the cylinders.

U, Man-hole, or aperture, closed by a strong iron plate, and large enough to admit a man into the interior of the boiler, when necessary.

XX, Iron knees, by which the boiler is fixed to the frame of the carriage.

ZZ, Springs resting at *aa* on the chairs of the wheels, by means of vertical pins passing through holes in the frame of the engine. One end of the pin resting on the back of the spring, and the other on the upper side of the chair; the whole weight of the machine is thus supported by the wheels, but through the intermediate action of the springs.

bb, Guides for the chair of the wheel to slide up and down, according as the spring bends more or less under the weight of the engine. The upper part of the chair is scooped out to form a small reservoir for oil. This reservoir, as well as the above-mentioned contains a tube and a syphon-wick, for feeding constantly the oil upon the axle, at its rubbing-point with the axle-box.

c, Flexible tube made of hemp-cloth, bu supported within by a spring, and throug which the water arrives from the tendr to the pump of the engine, when a cok fixed to the tender is opened.

p, Water-pump of the engine, whic' is constantly set in motion by a conneion with the piston-rod of the correspoing cylinder, but which cannot force an water into the boiler, unless a cock vhich lets the water come in from the ender be opened. The cock is not larked on the figure.

p′, Handle and rod of the safetycock of the pump, serving to ascertaiwhether the water really arrives in th cylinder of the pump. This cock leas without, so that when it is open an the pump has its proper effect, a smallet of water may be seen issuing from it, hich shows that the pump works right.

ee, Pad, stuffed with horse-haj and covered with leather, to deaden th shocks the engine may give or receiv.

f, Cock, by means of whichthe water that is sometimes carried frm the boiler to the cylinder may be foced out by the effect of the steam.

g, Opening made in the louble casing of the fire-box, and closed hy a screw-bolt. In withdrawing this bolt, a cleaning-rod may be introduced into the double-casing; and, by means of a forcing pump, water may be injected with force, to cleanse out the clay sediment left by the boiling of the water. This cleaning is usually performed once a-week.

h, (fig. 2.) Moveable plate or door, opening the interior of the chimney compartment, by which the end of the tubes of the boiler, the cylinders, the slides, and the steam-pipes leading from the boiler to the slide-boxes, or from the slide-boxes to the chimney, are visible. This door is opened when it is necessary to regulate the slides, as we shall see hereafter.

Wood Polishing.—The Persians have introduced an entirely new mode of polishing, which is to wood precisely what plating is to metal. Water may be spilled on it without staining, and it resists scratching in the same degree with marble. The receipt for making it is as follows:—

To one pint of spirits of wine, add half an ounce of gum shellack, half an ounce of gumlack, half an ounce of gum sundrick, placing it over a gentle heat, frequently agitating it until the gums are dissolved, when it is fit for use.

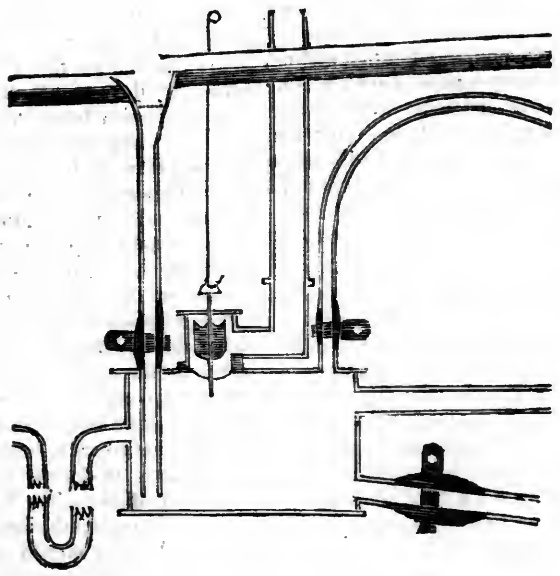
Make a roller of list, put a little of the polish upon it, and cover that with a soft linen rag, which must be slisghtly touched with cold drawn linseed oil. Rub them in the wood in a circular direction, not covering too large a space at a time, till the pores of the wood are sufficiently filled up. After this, rub in the same manner spirits of wine with a small portion of the polish added to it, and a most brilliant polish will be produced. If the outside has been previously polished with wax, it will be necessary to clean it off with glass paper.

Connecticut Manufactures.—A correspondent informs us that the village of New Britain, in Berlin, Conn., is as famous for the manufacture of *nick nacks* as any other portion of the land of steady habits. He says there is $1,300,000 worth of little indispensibles—such as stocks, suspenders, brass castings of all kinds, &c.—turned out there annually—of the article of stocks, above $100,000 worth. The suspender factory employs 200 persons, who manufacture $150,000 worth per annum. Connecticut may safely challenge the universal Yankee nation to compete with her in the manufacture of small things—from wooden nutmegs to wooden clocks upwards. We would give a sixpenee for a statistical table exhibiting the items and amount total of her productions in this line—doubting not that it would astonish even the natives.—[Greenfield Gazette.]

The plates mentioned in the following article must be of exceeding beauty. We are glad to see that the ladies, with their customary good taste, have sanctioned the use of the article:—

New and elegant article of Glassware.—The Boston Gazette says—"The New England Glass Company are now manufacturing plain fire-polished dishes, a rich and beautiful article, resembling at night polished silver—adapted for fruit, blanc mange, &c.; and, what is more, receiving the approbation of the ladies."

M. Marchal displayed his new vehicle on the Boulevards at Brussels on the 23d inst. This vehicle invented by himself, carries with it its own Railroad, and can travel upon all sorts of roads. The experiments made with it have answered most completely and the vehicle, with 22 persons in it, after having gone along the Boulevards, passed before the King's Palace.



METHOD OF EMPLOYING THE ESCAPE STEAM OF A STEAM-ENGINE FOR DISTILLING AND OTHER PURPOSES. INVENTED AND PATENTED BY CAPTAIN DAVIS EMBREEE, OF NEW RICHMOND, OHIO.

The cut is intended to represent the heater (or, as it is sometimes called, condenser,) of a steam-engine. This is laid down 45 inches in diameter, and 30 inches high. It matters not what shape it has, but its contents ought to be greater than the contents of the cylinder; three or four times as large would be no disadvantage: part of an old steamboat boiler would make a good one. At the top is an opening of 5 inches diamter—over this there is a cast-iron pipe 8 inches diameter in the clear, and 12 inches high: a valve seat at the bottom with 4¾ inches opening, and a guide for the stem of the valve of the same casting. At the top of the pipe there is a common cap with a hole and stuffing-box as a guide for the upper end of the valve-stem; an arm and elbow is cast to this pipe, 5 inches in diameter, to which a copper pipe of the same diameter may be attached to carry off the waste steam. The valve ought to weigh about forty pounds, and be cast with a hollow at the top to receive lead to regulate the weight. The size of the valve might be 5½ inches in diameter, and 6 or 6½ high. If it be made to weigh 45 pounds on a 4¾ inch opening, it will be about 2½ pounds to the inch. The stem of the valve should be wrought-iron; a screw should be cut on the top of the stem; there should be a small bail or handle to screw on it, so as to hook it up, and allow the steam a free passage when not in use. The lower pipe to the right hand, with a cock, is the supply-pipe from the heater to the force-pump 2½ inches diameter, placed within 4 inches of the bottom of the heater; the next above it is the scape-pipe from the cylinder to the heater, 5 inches in diameter. The next (or bent) pipe carries the steam from the heater to the stills; this should be 2½ inches in diameter, with a large cock affording the same vent. This pipe and cock will not answer with less vent than 2 inches in diameter. The next is an open wooden spout, from the top of the flake-stand to a pipe that descends into the heater; through this, there must be kept a constant stream of water to supply the engine. The pipe into the heater should be of copper, 2 inches in diameter, 87 inches long, descending within two inches of the bottom of the heater, with a cock in it to regulate the supply. At the top of this pipe there should be a kind of funnel 6 or 8 inches in diameter, in which a strainer ought to be placed; this funnel can have a lip that will let off any surplus water into a wooden spout, to be carried off. The bent-pipe to the left hand is the waste-pipe, to carry off any surplus water that may be let into the heater. This must descend (into the ground, if necessary) 87 inches, and rise again to the same level. It ought to be 2 inches in diameter, and be placed 7 inches from the bottom of the heater.

The principles upon which the machinery herein described operates, are as follow:

Water, and many other fluids, weigh 8 lbs. per gallon; the gallon contains 231 cubic inches; therefore a vessel containing water, or other fluids of equal weight, to the depth of 58 inches, will be about 2 lbs. to the inch. Hence, a valve placed on the heater of an engine, which weighs 2½ lbs. to the inch, will force steam from the body of the heater, through a pipe or tube to the bottom of such vessel and boil it. The quantity wanted can be regulated by a stop-cock, and the remainder will pass off through the valve.

In order to pass water into the heater of an engine under this press of steam, there must be a head raised of greater weight than the valve, say 87 inches high, which will be about 3 lbs. to the inch.

If a surplus of water be let into the heater, it can be carried off by a waste-pipe, which should descend 87 inches, and then rise to the same level; by this means a column of water will be preserved in the pipe, which will prevent the steam from escaping, and, at the same time, let off any surplus water. The shape and size of machinery can be varied at pleasure, taking care to preserve the principles mentioned.

By this operation, there will be a *back lash* or counter pressure on the head of the piston, of say, $2\frac{1}{2}$ lbs. to the inch. Several months experience, however, at the Richmond steam-mill, has proved, that this is more than over-balanced by the *additional* heat the water acquires in the heater, in consequence of the pressure of the steam. The water is thrown into the boilers of the engine in a *boiling* state. It therefore takes less fuel to drive a mill with stills, in this way, than it does to drive the mill without the stills in the usual way. The *power* required is trifling; it is the great body of *heat* contained in the scape-steam, that is brought into use by this invention.

In distilling with this weight of valve, care ought to be taken to have the depth of the beer in stills, and the depth of sing lings in the doubler, added together, less than 58 inches. Some inches are frequently added to the depth by the condensatoin of steam, particularly in boiling cold charges at the commencement of the work. The quantity of beer made use of as a charge, ought to be kept as nearly the same, at every charge, as possible. A tube should be fixed in the vessel used as a heater, at the proper height to hold a charge, with a spout from it into the cistern where the beer pump stands, to carry back what may be pumped over the requisite quantity. It is also necessary to double at every charge, so as to keep the same *weight* in the stills at all times, or the running will not be regular.

In using the scape-steam, there is a complete system of balancing; the columns of water in the pipes at the heater are slightly kept in motion, swelling and sinking as they outweigh the valve; the valve may be said to float in steam, gently touching its seat, then rising at every new impulse; while the still pours out a stream of condensed liquor with a *regularity* that can scarcely be surpassed by any thing in nature.

The following report will be found interesting to many of our readers—and therefore we give it entire, with the proposed new organization of the department:—

THE SELECT COMMITTEE APPOINTED TO TAKE INTO CONSIDERATION THE STATE AND CONDITION OF THE PATENT OFFICE, AND THE LAWS RELATING TO THE ISSUING OF PATENTS FOR NEW AND USEFUL INVENTIONS AND DISCOVERIES, SUBMIT THE FOLLOWING REPORT:

The promotion of the arts and the improvement of manufactures, are the objects aimed at in granting patents for inventions. All civilized nations have provided in some form for the encouragement of inventive genius. England, from whom we derived, originally, most of our notions of national polity, and who has hitherto been considered the "queen of arts," is in no small degree indebted for the distinction, to the liberality with which she has always rewarded genius and science for their inventions and discoveries. Individual munificence and the patronage of wealthy associations, have there, as in France and Germany, done much to supply whatever was wanting in the liberality of the Government. But such patronage is necessarily partial in its operation. It is limited to particular objects, if not to particular individuals. There appears to be no better way of measuring out appropriate rewards for useful inventions, than, by a general law, to secure to all descriptions of persons, without discrimination, the exclusive use and sale, for a given period, of the thing invented. In this way they will generally derive a just and appropriate encouragement proportioned to the value of their respective inventions. It is not at this day to be doubted that the evil of the temporary monopoly is greatly overbalanced by the good the community ultimately derives from its toleration.

The granting of exclusive privileges was in England originally assumed as a prerogative of the Crown, from which it derived a revenue. It was at first limited to the introduction of manufactures from other countries. Afterwards like privileges were granted for new inventions made within the realm. Like all other regal prerogatives, it was subject to abuse, and Parliament found it necessary to limit and restrain it. This was done by the famous statute of monopolies, passed in the reign of James I, which defined the King's prerogative in respect to the description of grants which might legally be made, and among them were patents for inventions and new manufactures. The very brief reservation of right in the Crown contained in that statute, and the judicial decisions in cases arising under the grants of privileges made pursuant to it, constituted the whole of the English law on the subject up to 1835, when a law was passed by Parliament giving the right to file a disclaimer in certain cases, and containing some other less material provisions.

It is from those judicial decisions that we have derived most of the principles on which our laws on the subject are founded, and which have entered into and influenced the judicial expositions given to them. But the decsions of our courts have been characterized by a more enlightened and liberal application of equitable principles to cases of this description, in a just endeavor to sustain patents for meritorious inventions, instead of seeking to find, in the technicalities of law, a pretext for setting them aside.

Prior to the adoption of the Federal constitution, the States, within their narrow limits, could give very little encouragement to inventors by grants of exclusive privileges; and up to that time the arts had made very little progress on this side of the Atlantic. By the constitution of the United States that power was wisely vested in Congress.

The first act of Congress on the subject was passed in 1790. It authorized the Secretary of State, Secretary of War and the Attorney General, or any two of them, on application, to grant patents for such new inventions and discoveries as they should deem "*sufficiently useful and important.*" Under that act the board so constituted exercised the power of refusing patents for want of novelty in the invention or of sufficient utility and importance.—This act extended the same privilege to aliens as to citizens. In 1793, it was repealed, and another act passed, authorizing patents to citizens of the United States only, to be granted by the Secretary of State, subject to the revision of the Attorney General. In 1800, the privilege to take out patents was extended to aliens who have resided two years in this country, and made oath of their intention of becoming citizens of the United States.

The act of 1793, which is still in force, gives, according to the practical construction it has received, no power to the Secretary to refuse a patent for want of either novelty or usefulness. The only inquiry is whether the terms and forms prescribed are complied with. The granting of patents, therefore, is but a ministerial duty. Every one who makes application is entitled to receive a patent by paying the duty required, and making his application and specification in conformity with the law. The necessary consequence is, that patents have, under the act of 1793, been daily granted, without regard to the question of novelty, or even utility in the ordinary sense; for it has been settled that the term useful, as used in this statute, is only in contradistinction to hurtful, injurious, or pernicious. This construction (that no right is conferred to refuse a patent) has been given to the law by the Department charged with the duty of granting patents, not so much probably from any necessary and unavoidable import of the terms of it, as from a disinclination to exercise a power of so much importance, in cases where it is not clearly and distinctly granted. And it may be reasonably doubted whether it was the intention of Congress to confer such a power on the Secretary of State alone, since no provision is made for an appeal or other remedy for an incorrect decision adverse to the applicant. Besides, any person occupying that station might be supposed as little qualified by an acquaintance with the appropriate branches of science or of the arts, to decide such questions, as any other officer of the Government. And were he to undertake the task of such an examination as would be necessary to a decision in each case, he would have little time for other official duties.

Under the act referred to, the Department of State has been going on for more than forty years, issuing patents on every application, without any examination into the merit or novelty of the invention. And the evils which necessarily result from the law as it now exists, must continue to increase and multiply daily, till Congress shall put a stop to them. Some of them are as follows:

1. A considerable portion of all the patents granted are worthless and void, as conflicting with, and infringing upon one

another, or upon public rights not subject to patent privileges; arising either from a want of due attention to the specifications of claim, or from the ignorance of the patentees of the state of the arts and manufactures, and of the inventions made in other countries, or even in our own.

2. The country becomes flooded with patent monopolies, embarrassing to bona fide patentees, whose rights are thus invaded on all sides; and not less embarrasssing to the community generally, in the use of even the most common machinery and long-known improvements in the arts and common manufactures of the country.

3. Out of this interference and collision of patents and privileges, a great number of lawsuits arise, which are daily increasing in an alarming degree, onerous to the courts, ruinous to the parties, and injurious to society.

4. It opens the door to frauds, which have already become extensive and serious. It is represented to the committee that it is not uncommon for persons to copy patented machines in the model-room; and, having made some slight immaterial alterations, they apply in the next room for patents. There being no power given to refuse them, patents are issued of course. Thus prepared, they go forth on a retailing expedition, selling out their patent rights for States, counties, and townships, to those who have no means at hand of detecting the imposition, and who find, when it is too late, that they have purchased what the vendors had no right to sell, and which they obtain thereby no right to use. This speculation in patent rights has become a regular business, and several hundred thousand dollars, it is estimated, are paid annually for void patents, many of which are thus fraudulently obtained.

In this collision and interference of patents, the original and meritorious inventor sees his invention, to the perfection of which he has devoted much time and expense, pirated from him, and he must forego the reward which the law was intended to secure to him in the exclusive right it grants; or he must become involved in numerous and expensive lawsuits in distant and various sections of the country, to protect and confirm his rights. If he be wise, he will generally avoid the latter, and submit to the former alternative of injustice, to which the Government, as the law now is, makes itself accessary. The practice is scarcely less reprehensible, of taking out patents for what has been long in public use, and what every one has therefore a right to use. The patentee in such cases being armed with the apparent authority of the Government, having the sanction of its highest officers the seal of state, scours the country, and by threats of prosecution, compels those who are found using the thing patented, to pay the patent price or commutation tribute. This exaction, unjust and iniquitous as it is, is usually submitted to.

The extent of the evils resulting from the unrestrained and promiscuous grants of privileges, may be imagined, when it is considered that there are now issued, since this year commenced, at the rate of more than a thousand a year; a considerable portion of which are doubtless void for want of originality in the inventions patented, either in whole or in some of the parts claimed as new.

A necessary consequence is, that patents even for new and meritorious inventions are so much depreciated in general estimation, that they are of but little value to the patentees, and the object of the patent laws, that of promoting the arts by encouragement, is in a great measure defeated.

To prevent these evils in future is the first and most desirable object of a revision and alteration of the existing laws on this subject. The most obvious, if not the only means of affecting it, appears to be to establish a check upon the granting of patents, allowing them to issue only for such inventions as are in fact new and entitled, by the merit of originality and utility, to be protected by law. The difficulty encountered in effecting this, is in determining what that check shall be; in whom the power to judge of inventions before granting a patent can safely be reposed, and how its exercise can be regulated and guarded, to prevent injustice through mistake of judgment or otherwise, by which honest and meritorious inventors might suffer wrong.

It is obvious that the power must, in the first instance, be exercised by the department charged with this branch of the public service. But as it may not be thought proper to intrust its final exercise to the department, it is deemed advisable to provide for an occasional tribunal to which an appeal may be taken. And as a further security against any possible injustice, it is thought proper to give the applicant in certain cases, where there may be an adverse party to contest his right, an opportunity to have the decision revised in a court of law.

The duty of examination and investigation necessary to a first decision at the Patent Office is an important one, and will call for the exercise and application of much scientific acquirement and knowlecge of the existing state of the arts in all their branches, not only in our own, but in other countries. Such qualifications in the officers charged with the duty, will be the more necessary and desirable, because the information upon which a rejection is made at the office, will be available in the final decision. It becomes necessary, then, to give the Patent Office a new organization, and to secure to it a character altogether above a mere clerkship. The competency and efficiency of its officers should correspond with their responsibility, and with the nature and importance of the duties required of them. When the existing organization was adopted, the granting of patents was a matter of little importance, compared with with what it now is. The arts in this country were but little understood, and but little cultivated. Agriculture and commerce constituted our principal business. We had few manufactures, except those of a domestic character, adapted to ordinary domestic wants. Our work-shops were in Europe. Enterprise, in this country, ran in other channels. The war of 1812 gave it a new direction, and a new impulse, by creating an occasion for work-shops of our own. Necessity became the mother of invention, and American manufactures sprang into existence as by enchantment. Their rise and progress may be dated from that period; and a more rapid advancement in the arts, and a more astonishing development of human ingenuity, have never taken place in any other age or country. This remark will appear far from extravagant to every one who will take the trouble to examine the subject. This awakening of dormant genius to a practical and active existence, next to the arousing of the political and patriotic energies of the Union, was one of the great results of that contest.—It opened to the country a new era. The nation entered upon a new existence. And since that period, American industry and enteprise, guided by American ingenuity and intellect, have achieved what would have taken Europe a century to accomplish. She has become all at once a manufacturing, as well as an agricultural and commercial nation. The useful arts have been cultivated with a success before unexampled, and have contribnted, in no small degree, to the wonderful improvements which have spread themselves over our whole country. Who can predict the results, even in a few years, of that spirit of enterprise which pervades the Union, when, aided by the Genius of Invention, and propelled onward by powers which she alone can bring into exercise? The very elements are submissive to her will, and all the endless combinations of mechanism are subservient to her purposes. She participates in almost every business and employment of man. Agriculture itself might as well dispense with fertility of soil, as with her aid in its cultivation.

The greatly increasing number of patents granted, affords some indication of the improvements which have been going on in the useful arts from year to year. The average number issued annually, from 1790 to 1800, was but 26; from 1800 to 1810, the average number was 91; from 1810 to 1820, it was 200; and, for the last ten years, the average number has been 535. During the last year, there were issued 776; and there have been granted in the first quarter of the present year 274, being more in three months than were issued in the whole of the first period of ten years. In the 22 years preceding the war of 1812, the average annual number was 73. The first quarter of the present year indicates an aggregate for the year, of 1,096; the amount of the duties on which, will be upwards of $32,000. The whole number issued at the Patent Office, under the laws of the United States, up to the 31st of March last, is 9,731. This is more than double the number which have been issued either in England or France, during the same period. In England for ten years preceding 1830, the average number of patents granted in one year was 145.

Whoever imagines that, because so many inventions and so many improvements in machinery have been made, there remains little else to be discovered, has but a feeble conception of the infinitude and vastness of mechanical powers, or of the unlimited reach of science.—Much as has been discovered, infinitely more remains unrevealed. The ingenuity of man is exploring a region without limits, and delving in a mine whose treasures are exhaustless. "Neither are all the mysteries of nature unfolded, nor the mind tired in the pursuit of them."

The first conceptions of ingenuity, like the first suggestions of science, are theories which require something of experiment and practical exemplification to perfect. Mechanical inventions are at first necessarily crude and incomplete.—Time is required to develope their imperfections and to make the improvements necessary to their adaption to practical uses. Inventors generally obtain patents before they venture upon those experiments which only can test their inventions. They are apprehensive of being forestalled in their discoveries, and see no other means of protecting themselves against piracy and fraud, than by securing patents at once.

A remedy for this may be easily had in a provision authorizing caveats to be filed in the office, giving security to the right of discovery for a time sufficient for making the necessary experiments, inquiries and improvements.

Heretofore aliens not resident in this country, have not been admitted to the privileges of our patent laws. But, as American citizens are allowed to take out patents in England and in other countries, a principle of reciprocity would seem to require that foreigners should have similar privileges here, on paying a similar duty or amount of fees that is exacted of our citizens abroad. The fees payable in England, on taking out a patent, amount to \$585. If a patent be taken out for the three kingdoms of England, Ireland, and Scotland, they amount to \$1,680.—In France they are \$309; in Spain \$292; Austria, \$208.

A power in the Commissioner of the Patent Office to reject applications for want of novelty in the invention, it is believed, will have a most beneficial and salutary effect in relieving meritorious inventors, and the community generally, from the serious evils growing out of the granting of patents for every thing indiscriminately, creating interfering claims, encouraging fraudulent speculators in patent rights, deluging the country with worthless monopolies, and laying the foundation for endless litigation.

In nineteen cases out of twenty, probably, the opinion of the Commissioner, accompanied by the information on which his decision is founded, will be acquiesced in. When unsatisfactory, the rights of the applicant will find ample protection in an appeal to a board of examiners, selected for their particular knowledge of the subject-matter of the invention in each case.

By this means, without danger to actual and honest inventors, the number of patents would be somewhat diminished. But there would be more confidence in those which should be granted, and as those which have been heretofore issued, should be daily expiring by their limitation, the community would begin to feel and realize the advantages of such a change. The present law waits till infringements and frauds are consummated —nay, it even aids them; and then it offers an inadequate remedy for the injury, by giving an action for damages. It ought, rather, by refusing to grant interfering patents, to render prosecutions unnecessary. Instead of sanctioning the wrong by granting the privilege to commit it, it should arrest injury and injustice at the threshold, and put an end to litigation before it begins.

Important and interesting as the Patent Office is now considered, it is believed that, under such new organization as is contemplated by the bill presented herewith, it will contribute largely to the great interests of the country, and bear no small part in elevating our national character. American ingenuity has obtained much consideration on the other side of the Atlantic. Even the manufactures of England are not a little indebted to it for some of their most valuable improvements. Her woollen manufactures, especially, have, within a few years, undergone an entire change, by the adoption of American inventions, by which wool has been made as yielding and submissive to the power of machinery as any material whatever. Cotton machinery has also been greatly improved in the hands of our mechanics; and while England receives from us three-fourths of the cotton she uses in raw material, we furnish her also with some of the most valuable improvements in the means of manufacturing it. Indeed, what mechanism or manufacture has, for the last twenty years, been brought across the Atlantic, that has not, on being returned, borne the distinguished marks of the superior ingenuity of American mechanists? Formerly, we borrowed and copied much that was valuable from Europe. Now, Europe is borrowing and copying, with no little advantage, from us; and she must not be too much surprised if she shall soon find a formidable balance against her.

To carry fully into effect the objects which have been had in view, it will be necessary to provide larger and more commodious rooms for models, &c., than those now occupied for that purpose.—They are insufficient for the models of machinery and other inventions now deposited there, and the number will be increasing several hundred, perhaps a thousand, every year. A great number, supposed to be about five hundred, from a want of room for them elsewhere, have been stowed away in a dark garret.—Those which occupy the rooms designed for them, are crowded together in a manner unfavorable for exhibition or examination. In such a situation, it is impossible to give them any systematic or scientific arrangement. This disorder and confusion must necessarily be increased by the addition of those hereafter furnished, or they must be consigned to the garret, the common receptacle, where, instead of promoting a taste for, and facilitating the study of, the useful arts, they will only afford evidence of the improvidence of the Government. In addition to this, the present building is too much exposed to destruction by fire. The loss of records and drawings and of the several thousands of interesting and valuable models now preserved there, would be, in a great degree, irreparable. There is no additional room to be had in the building they now occupy. The Post Office Department, in the same building, instead of having any room to spare which is now appropriated to it, requires a considerable extension of accommodations, from its increased and increasing business. It needs the whole building. The only way, therefore, of providing the necessary extension of room for the accommodation of the Post Office Department, and the city post office, and of providing the requisite accommodation for the Patent Office, is to erect a suitable fire-proof building for the latter on some one of the public lots. There are ample funds arising from duties on patents, heretofore paid into the Treasury, to the account of clerk hire in that office, which remain unexpended. A portion of that surplus fund, being now about \$152,000, may well be appropriated to the construction of a building which should be commodious and comparatively safe from fire.

Such a building as this branch of the public interests requires, would do honor to the Government and the country. The Patent Office, with such accommodations, containing the records of this age of inventions, displaying in its halls and galleries numberless models of igenious and useful mechanism, and contrivances in almost infinite variety, adapted to the mechanic arts, to manufactures, to husbandry, to navigation, steam power, horse power, water power, Railroad transportation, and, in fine, to all the common trades and mechanical pursuits of life, as well as to our rapidly multiplying and magnificent public works, would present an object of interest, and tend not a little to elevate our national character. It has been justly remarked that we can go into no mechanic shop, into no manufactory of any description, upon no farm or plantation, or travel a mile on our Railroads or in our steamboats, without seeing the evidence of our originality, and witnessing the fruits and effects of our ingenuity and enterprise. All the inventions and improvements in mechanism which have done so much towards advancing the useful arts and manufactures, should, as far as practicable, be exhibited in one view in the halls of the Patent Office.—Such a display would attract the attention of the many thousands who annually visit the capital of the Union from all quarters

of the country, and all parts of the world. No other nation has yet any thing to be compared with it; neither England nor France has ever required models to be deposited of patented machinery. Collection of models and drawings have sometimes been made by private associations, but they are small in number compared with those we possess.

In addition to the models of machinery, it is proposed to embrace an exhibition of specimens of useful and elegant fabrics and of works of art, which manufacturers and artificers may place there for that purpose. It might, too, embrace a cabinet of interesting minerals, which may be received from time to time from the various parts of our widely-extended country, with polished specimens of its beautiful marbles from their different locations, illustrating the geology and many of the natural resources of the country; and, also, a collection of Indian curiosities and antiquities, many of which are now in the possession of one of the Departments, boxed up for want of some suitable place for their exhibition.

In short, the halls of the Patent Office should present a national museum of the arts, and be a general repository of all the inventions and improvements in machinery and manufactures, of which our country can claim the honor; together with such other objects of interest as might conveniently and properly be placed under the superintendence of the Commissioner. Such an institution, while it would be an object of just pride to every American, would have scarcely less influence in advancing and accelerating the progress of the useful arts and the improvement of our manufactures, than would even the encouragement afforded by granting patents for inventions or establishing high tariffs of protection.

With these views, the committee cannot hesitate to recommend an entire reorganization of the Patent Office, and several material alterations in our law of patents, suiting it to the present condition of the arts and the altered circumstances of the country.

A bill in conformity with our views is herewith submitted.

A BILL TO PROMOTE THE PROGRESS OF THE USEFUL ARTS, AND TO REPEAL ALL ACTS AND PARTS OF ACTS HERETOFORE MADE FOR THAT PURPOSE.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That there shall be established, and attached to the department of State, an office to be denominated the Patent Office; the chief officer of which shall be called the Commissioner of Patents, to be appointed by the President, by and with the advice and consent of the Senate, whose duty it shall be under the direction of the head of the department, to superintend, execute, and perform, all such acts and things touching and respecting the granting and issuing of patents for new and useful discoveries, inventions, and improvements as are herein provided for, or shall hereafter be, by law, directed to be done and performed, and shall have the charge and custody of all the books, records, papers, models, machines, and all other things belonging to said office. And said Commissioner shall receive the same compensation as is allowed by law to the Commisioner of the Indian Department.

SEC. 2. *And be it further enacted,* That there shall be, in said office, an inferior officer, to be appointed by the said principal officer, with the approval of the Secretary of State, and to be called the Chief Clerk of the Patent Office; who, in all cases during the necessary absence of the Commissioner, or when the said principal office shall become vacant, shall have the charge and custody of the seal, and of the records, books, papers, machines, models, and all other things belonging to the said office. And the said Commissioner may also, with like approval, appoint two other clerks, an examiner of patents, a draughtsman, a mechanist, and a messenger. The said chief clerk shall receive the annual salary of seventeen hundred dollars; two other clerks, twelve hundred and fifty dollars each; examiner, fifteen hundred dollars; draughtsman, twelve mechanist, one thousand dollars; and the messenger five hundred dollars.

SEC. 3. *And be it farther enacted,* That the said principal officer, and every other person to be appointed in the said office, shall, before he enters upon the duties of his office, or appointment, make oath or affirmation truly and faithfully to execute the trust committed to him. And the said Commisioner, and the chief clerk shall also, before entering upon their duties, severally give bonds with sureties, to the Treasurer of the United States, each in the sum of ——— dollars, with condition to render a true and faithful account to him, or his successor in office, quarterly, of all moneys which shall be by them respectively received for duties on patents, and for copies of records and drawings, and all other moneys received by virtue of such office.

SEC. 4. *And be it further enacted,* That the said Commissioner shall cause a seal of office to be made and provided for the said office, with such device as the President of the United States shall approve; and copies of any records, books, papers, or drawings, belonging to said office, under the signature of the said Commissioner, or when the office shall be vacant, under the signature of the chief clerk, with the said seal affixed, shall be competent evidence in all cases in wh ch the original records, books, papers, or drawings, would be evidence. And any person making application there for, may have certified copies of the records, drawings, and other papers deposited in said office, on paying, for the written copies, the sum of ten cents for every page of one hundred words; and for copies of drawings, the reasonable expense of making the same.

SEC. 5. *And be it further enacted,* That all patents issuing from said office, shall be issued in the name of the United States, and under the seal of said office, and be signed by the Secretary of State, and countersigned by the Commissioner of said office, and shall be recorded, together with the descriptions, specification, and drawings, in the said office, in books to be kept for that purpose. Every such patent shall contain a short description of the invention or discovery, and in its terms grant to the applicant or applicants, his or their heirs, administrators, executors, or assigns, for a term not exceeding fourteen years, the full and exclusive right and liberty of using, and vending to others to be used, the said invention or dicsovery, referring to the specifications for particulars thereof, a copy of which shall be annexed to the patent, specifying what the patentee claims as his invention or discovery.

SEC. 6. *And be it further enacted,* That any person or persons having discovered or invented any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement on any art, machine, manufacture, or composition of matter, not known or used by others before his or their discovery or invention thereof, and not, at the time of his application for a patent, in public use or on sale, with his consent or allowance as the inventor or discoverer; and shall desire to obtain an exclusive property therein, may make application in writing to the Commissioner of Patents, expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor. But before any inventor shall receive a patent for any such new invention or discovery, he shall deliver a writen description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of any machine, he shall fully explain the priciple, and the several modes in which he has contemplated the application of that principle, or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery. He shall, furthermore, accompany the whole with a drawing, or drawings, and written references, where the nature of the case admits of drawings, or with specimens of ingredients, and of the composition of matter, sufficient in quantity for the purpose of experiment, where the invention or discovery is of a composition of matter; which descriptions and drawings, signed by the inventor, and tested by 2 witnesses shall be filed in the patent office; and he shall, moreover, furnish a model of his machine, in all cases which admit of a representation by model, of a convenient size to exhibit advantageously its several parts. The applicant shall also make oath or affirmation that he does verily believe that he is the original inventor or discoverer of the art, machine, composition, or improvement, for which he solicits a patent, and that he does not know or believe that the same was ever before known or used; which oath or affirmation may be made before any person authorized by law to administer oaths.

SEC. 7. *And be it further enacted,* That,

on the filing of any such application, description, and specification, and the payment of the duty hereinafter provided, the Commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the Commissioner that the same had been known and used prior to such alledged discovery thereof by the applicant, or had been in public use, or on sale, with his consent or allowance prior to the application, if he shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examation, it shall appear to the Commissioner that the applicant was not the original inventor or discoverer thereof, or that any part of that which is claimed as new had before been known and used as aforesaid, or that the description is defective and insufficient, he shall notify the applicant thereof, giving him, briefly, such information as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new. In every such case, if the applicant shall elect to withdraw his application, he shall be entitled to receive back—— dollars, part of the duty required by this act, on filing a notice in writing of such election in the Patent Office, a copy of which, certified by the Commissoner, shall be a sufficient warrant to the Treasurer for paying back to the applicant the said sum of ——— dollars. But if the applicant in such case shall persist in his claim for a patent, with or without any alteration of his specification, he shall be required to make oath or affirmation anew, in manner as aforesaid. And if the specification and claim shall not have been so modified as, in the opinion of the Commissioner, shall entitle the applicant to a patent, he may, on appeal, and upon request in writing, have the decision of a board of examiners, to be composed of three disinterested persons, who shall be appointed for that purpose by the Secretary of State, and to be selected for their knowledge and skill in the particular art, manufacture, or branch of science to which the alleged invention appertains; who shall be furnished with a certificate in wri ing, of the opinion and decision of the Commissioner, stating the particular grounds of his objection, and the part or parts of the invention which he considers as not entitled to be patented. And the said board shall give reasonable notice to the applicant, as well as to the Commissioner, of the time and place of their meeting, they may have an opportunity of furnishing them with such facts and evidence as they may deem necessary to a just decision; and it shall be the duty of the Commissioner to furnish the board of examiners with such information as he may possess relative to the matter under their consideration. And on an examination and consideration of the matter by such board, it shall be in their power, or of a majority of them, to reverse the decision of the Commissioner, either in whole or in part; and their opinion being certified to the Commissioner, he shall be governed thereby, in the further proceedings to be had on such application; *Provided, however,* That before a board shall be instituted in any such case, the applicant shall pay to the Commissioner the sum of ——— dollars, which shall be in full compensation to the persons who may be so appointed, for their examination and certificate as aforesaid.

SEC. 8. *And be it further enacted,* That whenever an application shall be made for a patent, which, in the opinion of the Commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the Commissioner to give notice thereof to such applicants, or patentees, as the case may be; and if either shall be dissatisfied with the decision of the Commissioner on the question of priority or right of invention, he may appeal from such decision, on the like terms and conditions as are provided in the preceding section of this act: and the like proceedings shall be had to determine which, or whether either of the applicants is entitled to receive a patent as prayed for.

SEC. 9. *And be it further enacted,* That before any application for a patent shall be considered by the Commissioner as aforesaid, the applicant shall pay into the Treasury of the United States, or into the Patent Office, or into any of the deposite banks, to the credit of the Treasury, if he be a citizen of the United States, or an alien and shall have been resident in the United States for one year next preceding, and shall have made oath of his intention to become a citizen thereof, the sum of forty dollars; if a subject of the King of Great Britain, the sum of five hundred dollars; and all other persons the sum of three hundred dollars; for which payment duplicate receipts shall be taken, one of which to be filed in the office of the Treasurer. And the moneys received into the Treasury under this act shall constitute a fund for the payment of the salaries of the officers and clerks, herein provided for, and all other expenses of the Patent Office, and to be called the patent fund.

SEC. 10. *And be it further enacted,* That where any person hath made, or shall have made, any new invention, discovery, or improvement, on account of which a patent might by virtue of this act be granted, and such person shall die before any patent shall be granted therefor, the right of applying for and obtaining such patent shall devolve on the executor or administrator of such person, in trust for the heirs at law of the deceased, in case he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limitations, and restrictions, as the same was held, or might have been claimed or enjoyed by such person in his or her lifetime; and when application for a patent shall be made by such legal representatives, the oath or affirmation provided in the third section of the beforementioned act, shall be so varied as to be applicable to them.

SEC. 11. *And be it further enacted,* That every patent issued in pursuance of this act shall be assignable in law, either as to the whole interest, or any undivided part thereof, by any instrument in writing; which assignment shall be recorded in the Patent Office within three months from the execution thereof, for which the assignee shall pay the Commissioner the sum of ——— dollars.

SEC. 12. *And be it further enacted,* That any citizen of the United States, or alien, who shall have been resident in the United States one year next preceding, and shall have made oath of his intention to become a caveat setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his right, till he shall have matured his invention; which caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person within one year from the time of filing of such caveat, for a patent of any invention with which it may in any respect interfere, ti shall be the duty of the Commissioner to give notice to the person filing the caveat, of such application and of such supposed interference, who shall, within two months after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, spifications, drawings, and model; and if, in the opinion of the Commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects, as are in this act provided in the case of interfering applications: *Provided, however,* That no opinion or decision of any board of examiners, under the provisions of this act, shall preclude any person interested in favor of or against the validity of any patent which has been or may hereafter be granted, from a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may file in the Patent Office the right to contest the same in any judicial court, having jurisdiction of the subject-matter.

SEC. 13. *And be it further enacted,* That whenever any patent which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patententee claiming in his specification as his own invention, more than he had, or shall have a right to claim as new; if the error has, or shall have arisen by inadvertency, accident or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the Commissioner, upon the surrender to him of such patent, and the payment of a further duty of fifteen dollars, to cause a new patent to be issued to the said inventor, for the same invention, for the residue of the period then unexpired for which the original patent was granted, in accordance with the patentee's corrected decription and specification. And in case of his death, or any assignment made by him of the original patent, a similar right shall vest in his executors, administrators, or assignees. And the patent, so re-issued, together with the corrected description and specification, shall have the same effect and operation in law, on the trial of all actions

relative to the violation of such invention, as though the same had been originally filed in such corrected form, before the serving out of the original patent. And whenever the original patentee shall be desirous of adding the description and specification of any new improvement of the original invention or discovery which shall have been invented or discovered by him subsequent to the date of his patent, he may, like proceedings being had in all respects, as in the case of original applications, and on the payment of fifteen dollars, as hereinbefore provided, have the same annexed to the original description and specification; and the Commissioner shall certify, on the margin of such annexed description and specification, the time of its being annexed and recorded; and the same shall thereafter stand on the same footing to all intents and purposes as though it had been embraced in the original description and specification.

SEC. 14. *And be it further enacted,* That whenever in any action for damages for using or selling the thing whereof the exclusive right is secured by any patent heretofore granted, or by any patent which may hereafter be granted, a verdict shall be rendered for the plaintiff in such action, it shall be in the power of the court to render judgment for any sum above the amount found by such verdict as the actual damages sustained by the plaintiff, not exceeding three times the amount thereof, according to the circumstances of the case; and such damages may be recovered by action on the case, in any court of competent jurisdiction.

SEC. 15. *And be it further enacted,* That the defendant in any such action shall be permitted to plead the general issue, and to give this act and any special matter in evidence of which notice in writing may have been given to the plaintiff or his attorney, thirty days before trial, tending to prove that the description and specification filed by the plaintiff does not contain the whole truth relative to his invention, or discovery, or that it contains more than is necessary to produce the described effect; which concealment or addition shall fully appear to have been made for the purpose of deceiving the public; or that the thing patented was not originally discovered by the patentee, or had been in use, or had been described in some public work anterior to the supposed discovery thereof by the patentee, or had been in public use or sold with the consent and allowance of the patentee before his application for a patent; or that he had surrepticiously or unjustly obtained a patent for that which was in fact invented or discovered by another; or that the patentee if an alien at the time the patent was granted, had failed and neglected, for the space of eighteen months from the date of the patent, to put in operation and use in the United States, and put on sale to the citizens thereof, on reasonable terms, the invention or discovery for which the patent issued; or in case the same, for any period of eighteen months after it shall have been put in operation and use, shall cease to be so used or put on sale; in either of which cases judgment shall be rendered for the defendant with costs; *Provided, however,* That whenever the plaintiff shall fail to sustain his action on the ground that, in his specification of claim is embraced more than that of which he was the first inventor, if it shall appear that the defendant had used or violated any part of the invention justly and truly specified and claimed as new; it shall be in the power of the court to adjudge and award as to costs as may appear to be just and equitable.

SEC. 16. *And be it further enacted,* That whenever there shall be two interfering patents, or whenever a patent on application shall have been refused on an adverse decision of a board of examiners on the ground that the patent applied for would interfere with an unexpired patent, previously granted any person interested in any such patent, either by assignment or otherwise, in the one case, and any such applicant in the other case, may have remedy by bill in equity; and the court having cognizance thereof, on notice to adverse parties and other due proceedings had, may adjudge and declare either of the patents void in the whole or in part, and may also adjudge that such applicant is entitled, according to the principles and provisions of this act, to have and receive a patent for his invention as specified in his claim, or for any part thereof, as the fact or priority of right or invention shall in any such case be made to appear. And such adjudication, if it be in favor of the right of such applicant, shall authorize the Commissioner to issue such patent, on his filing a copy of the adjudication and otherwise complying with the requisitons of this act. *Provided, however,* that no such judgement or adjudication shall effect the rights of any person except the parties to the action and those deriving title from or under them subsequent to the rendition of such judgment.

SEC. 17. *And be it further enacted,* That all actions, suits, controversies, and cases arising under any law of the United States granting or confirming to inventors the exclusive right to their inventions or discoveries, shall be originally cognizable, as well in equity as at law, by the circuit courts of the United States, or any district court having the powers and jurisdiction of a circuit court, which courts shall have power, upon bill in equity filed by any party agrieved in any such case, to grant injunctions according to the course and principles of courts of equity, to prevent the violation of the rights of any inventor as secured to him by any law of the United States, on such terms and conditions as said courts may deem reasonable; *Provided, however,* That from all judgments and decrees of any such court rendered in the premises, a writ of error or appeal, as the case may require, shall lie to the Supreme Court of the United States, in the same manner and under the same circumstances, as is now provided by law in other judgments and decrees of circuit courts, and in all other cases in which the court shall deem it reasonable to allow the same.

SEC. 18. *And be it further enacted,* That there shall be provided for the use of said office, a library of scientific works and periodical publications, both foreign and American, calculated to aid and facilitate the discharge of the duties hereby required of the chief officers therein, to be purchased under the direction of the Committee of the Library of Congress. And the sum of ——dollars annually is hereby appropriated for that purpose, to be paid out of the patent fund.

SEC. 19. *And be it further enacted,* That it shall be the duty of the Commissioner to cause to be classified and arranged, in such rooms or gallaries as may be provided for that purpose, in suitable cases, when necessary for their preservation, and in such manner as shall be conducive to a benficial and favorable display thereof, the models and specimens of compositions and of fabrics and other manufactures and works of art, patented or unpatented, which have been or shall hereafter be deposited in said office. And said rooms or galleries shall be kept open during suitable hours for public inspection.

SEC. 20. *And be it further enacted,* That all acts and parts of acts heretofore passed on this subject be, and the same are hereby, repealed: *Provided, however,* That all actions and processes in law or equity sued out prior to the passage of this act, may be prosecuted to final judgment and execution, in the same manner as though this act had not been passed, excepting and saving the application to any such action, of the provisions of the fourteenth and fifteenth sections of this act, so far as they may be applicable thereto.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

TO CANAL CONTRACTORS.

SEALED PROPOSALS will be received at the Office of the Commissioners of the Illinois and Michigan Canal, from the 25th of May to the 6th of June next, for the construction of eight miles of the summit division of said Canal, extending from the point of commencement on Chicago River, to the Des Plaines River; and also of six or eight miles of the lower end of said division, extending from the mouth of the Saganaskee Swamp down the valley of the Des Plaines.

The work consists principally of deep excavation, a considerable portion of which is rock, and is well worthy the attention of contractors.

Plans, profiles, and specifications, giving all the necessary information to those wishing to obtain contracts on this line, may be examined at the Office of the Canal Commissioners, after the 25th of May next; and contractors are respectfully solicited to make a minute personal examination of the work previous to sending in proposals.

By order of the Board of Commissioners of the Illinois Canal. Attest:

JOEL MANNING, Secretary to said Board.

N. B.—Any person wishing to procure copies of the above, on letter sheets, can obtain them by applying at the Canal Office.

Chicago, April 19, 1836. m6 t25

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS

OF VOLUME II. OF THE

CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

⁂ Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

⁂ All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

⁂ Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

SMITH & VALENTINE,

STEREOTYPE FOUNDERS,

Are prepared to execute orders in their line, at 212 Grand street, New-York.

HARTFORD AND NEW-HAVEN RAILROAD.

From New-Haven to Meriden, eighteen miles of this Railroad is now located, and is expected to be ready for contract about the 25th of May. The attention of contractors is invited to this work. A more definite advertisement of the time when proposals are to be received, will hereafter appear.

JAMES BREWSTER, Agent.

New-Haven, April 27, 1836. m16—3t

[Editors to whom this is MARKED, are requested to give it three insertions, and send their bills to James Brewster, President Railroad Company,

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.

feb 20—ytf

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95 tons of 1 inch by ½ inch.
200 do 1¼ do ½ do
40 do 1½ do ⅜ do
800 do 2 do ½ do
800 do 2½ do ½ do
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

NEW-YORK AND ERIE RAILROAD.

TO CONTRACTORS.—Proposals will be received at the Engineer's Office of the New-York and Erie Railroad Company, in the village of Binghampton, on and until the 30th day of June next, for grading 69 miles of the Railroad, from the village of Owego, in Tioga County, to the village of Deposit in Delaware County.

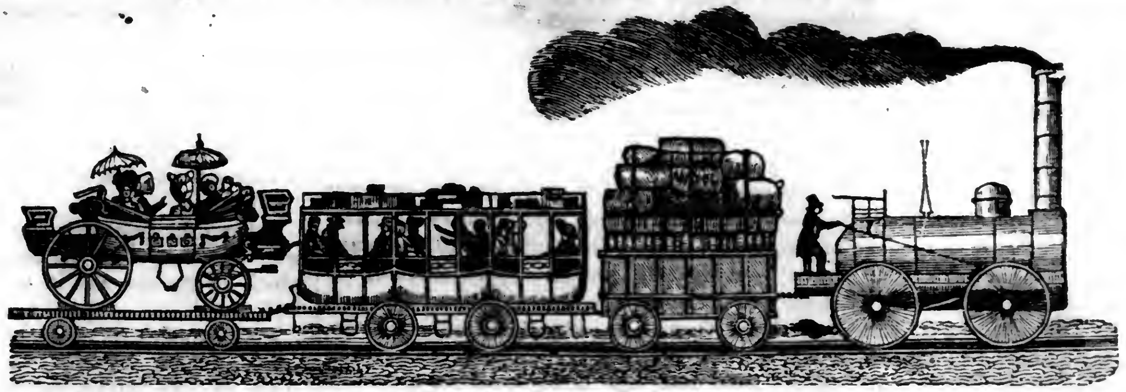
Proposals will also be received at the Engineer's Office, in Monticello, on and until the 11th day of July next, for grading 48 miles of the Railroad through the county of Sullivan, extending from the Delaware and Hudson Canal up the valley of the Neversink, and thence to the mouth of the Callikoon Creek, on the Delaware River.

Plans and profiles of the line above mentioned, staked out in convenient sections, with printed forms of the contracts, will be ready for exhibition at the said offices twenty days before the days of letting above specified.

The Company reserve the privilege of accepting only such proposals as they may deem for their advantage.

New-York, 26th April, 1836.

15—tf JAMES KING, President.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, MAY 21, 1836. [VOLUME V.—No. 20

CONTENTS:

JAMES RIVER AND KANAWHA CANAL.—We ask the attention of our readers to the following advertisement of the *James River* and *Kanawha* Canal Company. There is a fine opportunity for some of our enterprising contractors.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. C. E. Jr.

20—ta18

We contiuue in this number, PAMBOUR ON LOCOMOTIVES ON RAILROADS. To Engineers it needs no recommendation—nor will our mechanical readers require much persuasion to induce them to read it.

NEW-YORK AND ALBANY RAILROAD.—We publish at length in this number of the Journal, the original and the amendmeat to the original, charter of this important Railroad. We also give the Attica and Buffalo, called the *Pattern* Bill, for the numerous charters granted for Railroads by the late legislature. We shall take an early opportunity of referring particularly to this charter.

SHIP CANAL.

The importance of more ample communications from the Hudson to the upper Lakes, is daily claiming the attention of our own citizens and adjacent States. The Baltimore American noticing the projected *Ship Canal* from Oswego, by Utica and the Mohawk to the Hudson says:—

"If this splendid project is feasible, *and it is said by eminent engineers to be so*, the vigorous and enterprizing state of New-York will accomplish it, and thereby secure beyond the reach of competition, the control of the trade of the vast west." That this work is feasible, and at a moderate expense in proportion to its importance, *to the whole Union*, as well as the Ship Canal around the Niagara Falls—no one can doubt, who has read the able report of engineer E. F. Johnson, (Assembly December, No. — of 1835.) or has had the opportunity to inspect the maps, and scientific report of Capt. Wm. G. Williams of the U. S. Top. Corps in relation to the work around the Falls. Capt. W. very justly considers it a *national work* of the first importance, for the defence of our frontiers connecting two inland seas and the whole west, with the sea board. This work is now as much called for at the hands of the present Congress, by memorials and petitions, as the Erie Canal was when first projected, to open the trade with the interior of this State—then more of a wilderness, than are now the new States of Ohio, Illinois, Indiana and Michigan.

A glance at the map of the United States will dispell the idea that the enlargement of of the Erie Canal, to 7 feet by 70, with locks 18 feet by 110, even were it practicable, *without interruption to the trade upon it*,—can secure and retain to our great commercial centre of the Union, the rapidly increasing trade beyond our own State, even with the assistance of the Southern and Northern line of Railroads.

The present barrier of the Niagara, can be overcome according to the report of Capt. Williams, by $7\frac{3}{4}$ miles of canal, lockage 320 feet, and at the cost of only $2,568,899. This estimate is predicated on the calculation, for a canal on the magnificent scale of 110 feet surface—locks of stone 200 feet long by 50 feet wide. This size, will carry through a frigate in ballast, and the largest class of steamboats, that floats. In the unfortunate event of a war with England,

steam frigates would be the only means of offence and defence. France has 15 afloat, and 11 of 160 horse power building!! A consideration of the utmost importance, when we view the increase of steamboats on these inland seas, and their successful use as packets on our sea board from Main to New-Orleans. The entire tonnage of the Lakes, may be transferred, at the close of navigation to the sea board, to cheapen the transportation of our sugar, cotton, &c. from the south, whilst 5 months loss of capital in the schooner and ship capital on the lakes will be saved, and a still more important considertion gained, our fresh water sailors will become *able bodied seamen*, not laid up in ordinary during the winter, and fearful as they now are to breast the storms of the lakes at the risk of life and loss of cargo to enter any port.

The apathy with which many of our citizens have viewed this subject, has surprized me. The extract from the Baltimore paper at the head of this article shows the importance of the Ship Canal, to the enterprizing citizens of that State, who are so nobly contending with us for a part of the rich dowery of the west. So far our State Legislature have done nothing to investigate this subject and we are indebted to the persevering labors of a few individuals for procuring the survey by the general government around the Falls, as also the map profile. Estimates for the Ship Canal, from Oswego to Utica, distance 92 miles, 57 natural waters—at a cost of $———

The map, profiles and estimates of this work, with the able report of E. F. Johnson, Esq., Civil Engineer, now employed by the Erie Railroad Company, are placed in the Exchange for the inspection of the public. There is little doubt, but that a canal 8 feet by 90 in continuation, from Utica along the Mohawk to the Hudson,—say 100 miles,—can be executed within the cost of four millions of dollars, and from Lake Erie to the city of New-York, within the sum of eight millions of dollars. If these positions are correct, and their consideration and examination, under respectable scientific authority has often been courted, it appears to the writer of this article the extreme of folly to attempt to enlarge the Erie Canal to a Ship Canal, 363 miles, at the certain expense of some 15 to 20 millions of dollars, if damages are added to the estimate of the State Engineer's, of cost 12½ millions, when for half of either of these sums, *we can have another*, and a better work, with only 150 miles of new canal, and this too without interrupting the trade on the Erie Canal, and its increasing tolls, which, at the present very low rates, now give us one and a half million of dollars per annum, gross income. It is idle to talk of the rights of the cities and villages, or the rent of the Erie Canal, to monopolize the entire carrying trade to and from the far west to this city, and to confine it to the present channel; with the noble Ontario laying parallel to it.

The State of New-York has a high duty to perform to this city, the West and the New-England States, who are our customers, for $\frac{3}{10}$ths of their breadstuff,—and give us in return their manufactures in cotton, *produced from the slave labor of the South*, —it is by the immediate construction of the Ship Canal around the Falls of Niagara, and from Oswego by Utica to the Hudson, thereby to cheapen transporation so as to draw upon the fertile West for additional supplies of breadstuff and provisions. The experience of this and past years has taught us the lesson, that the progress of *Agriculture in the United States is behind Manufactures and Commerce*, that is, there are more engaged in the latter branches than are supplied by the former, with all the exertions of our own State, at high prices, and great profits to the farmer, yet so inadequate have been our supplies the last winter that we have actually had to resort to Europe, for wheat, butter, rye, oats, potatoes, &c.!!

The Erie Canal has now been open for more than a month, yet wheat and flour maintains prices that would pay a handsome profit on their importation from Europe and Canada!! even with the present objectiontionable duties. HARLÆM.

CHAPTER I.

DESCIPTION OF A LOCOMOTIVE ENGINE.

—

ARTICLE II.

OF THE PROPORTIONS OF THE ENGINES.

§ 1. *Of the Dimensions of the parts from which the power of the Engine is derived.*

Such is the construction of the locomotive engines employed on the Railway between Liverpool and Manchester. We have made use for our experiments of no other engines but those. To give a complete idea of them, we have now only to state the dimensions of some of the parts, on which the power of the engine more especially depends, as will be seen further down.

The engines on the Liverpool Railway may be ranked in five different classes, as follows:—

Classes.	Diameter of the cylinder.	Stroke of the piston.	Wheels.		Weight.	Effective pressure per sq. in. in the boiler.
	inches.	inches.	ft.	in.	tons.	lbs.
1 - -	14	16	4	6	12	50
2 - -	15	16	5		12	50
3 - -	11	16	5		8 to 9	50
4 - -	11	18	5		8 to 9	50

In the fifth class come the first engines used by the company at the opening of the railway; their cylinders are ten inches in diameter, and under; the stroke of the piston, the wheels, and the weight of the engine, vary accordingly. But at present they have nearly ceased to be used on the railway; they scarcely ever undergo any repairs, and none of them will figure in our experiments. We need therefore not enter into any particulars concerning them.

Among the thirty-two engines that have been constructed for the company, and of which thirty are still in their possession, there are

2 of 14 inches, (diameter of the cylinder.)
4 of 12 do.
16 of 11 do. with a sixteen inch stroke.
2 of 11 do. with an eighteen inch stroke.

The eight others are of inferior proportions, and rank in the fifth class which we mentioned above.

They are all at the *effective* pressure of 50 pounds per square inch on the boiler,

In proportion as we shall make use of the engines, we shall state more particularly their names, weight and power.

§ 2. *Of the expression of the power of Locomotive Engines.*

It is by these dimensions that it is customary to express the power of locomotive steam-engines. We shall see in the course of this work, that to render that expression complete, and really sufficient to show the effect of the engine, under all circumstances, two other elements ought still to be added to them, viz. the friction of the engine, and the evaporating power or extent of heating surface of the boiler. However, such as they are, they give a tolerably exact idea of the power of locomotive engines.

As to the mode used for stationary steam-engines, which consists in expressing their power by the effect produced, and comparing it to the work a horse would perform, it is easy to conceive such a mode which is very deficient in all cases, as we shall see, is at all events not applicable to locomotive engines, for the following reasons:—

1. Because the power of a locomotive engine does not depend alone on the force residing in the steam; it depends also on the weight of the engine, which produces a greater or less adhesion of the wheels to the rails, and consequently the locomotion of a more or less considerable load.

2. Because the engine must move at different rates of speed. Now, besides the weight of the load, the engine must also move itself along by overcoming its own friction. That friction, entering therefore as an invariable quantity in the resistance, from which it must always be first of all deducted, it limits, according to each velocity, the final power remaining in the engine as applicable to the load. The consequence of this is, that, if we were to express the power of the engine by the effect produced, we would find that measure different at each degree of speed at which we would consider the engine.

3. Because locomotive engines moving three or four times quicker than horses can do, it would be but an unintelligible fiction to pretend to assimilate them to horses,

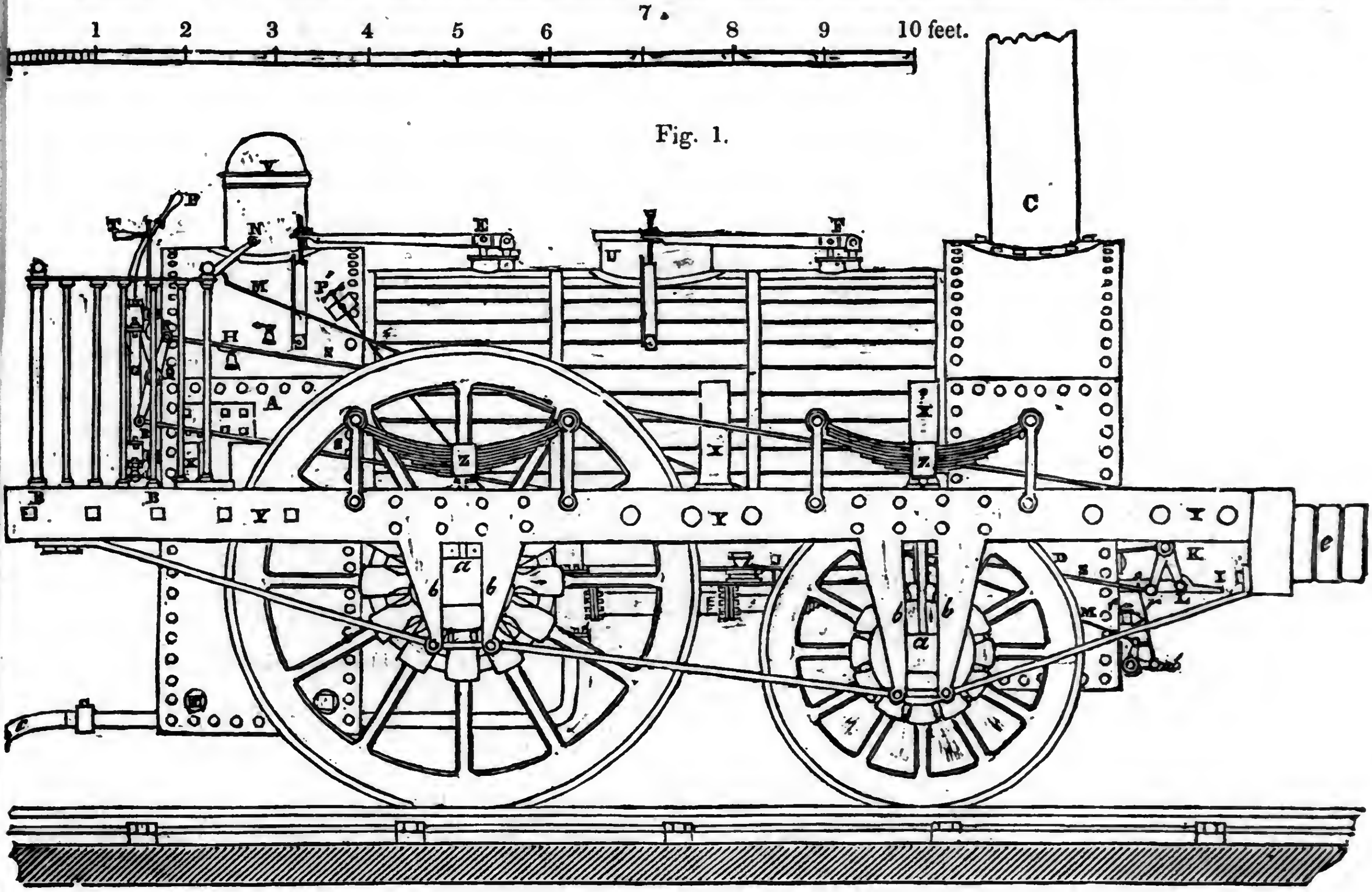


Fig. 1.

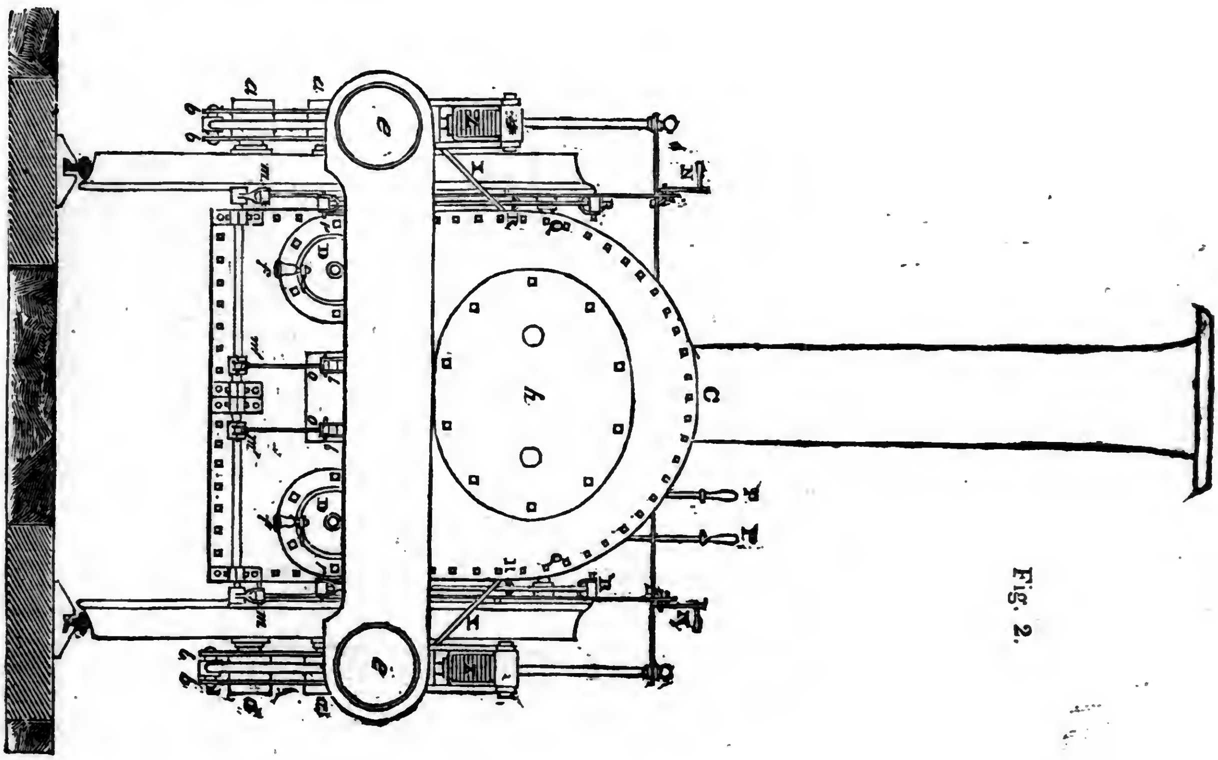


Fig. 2.

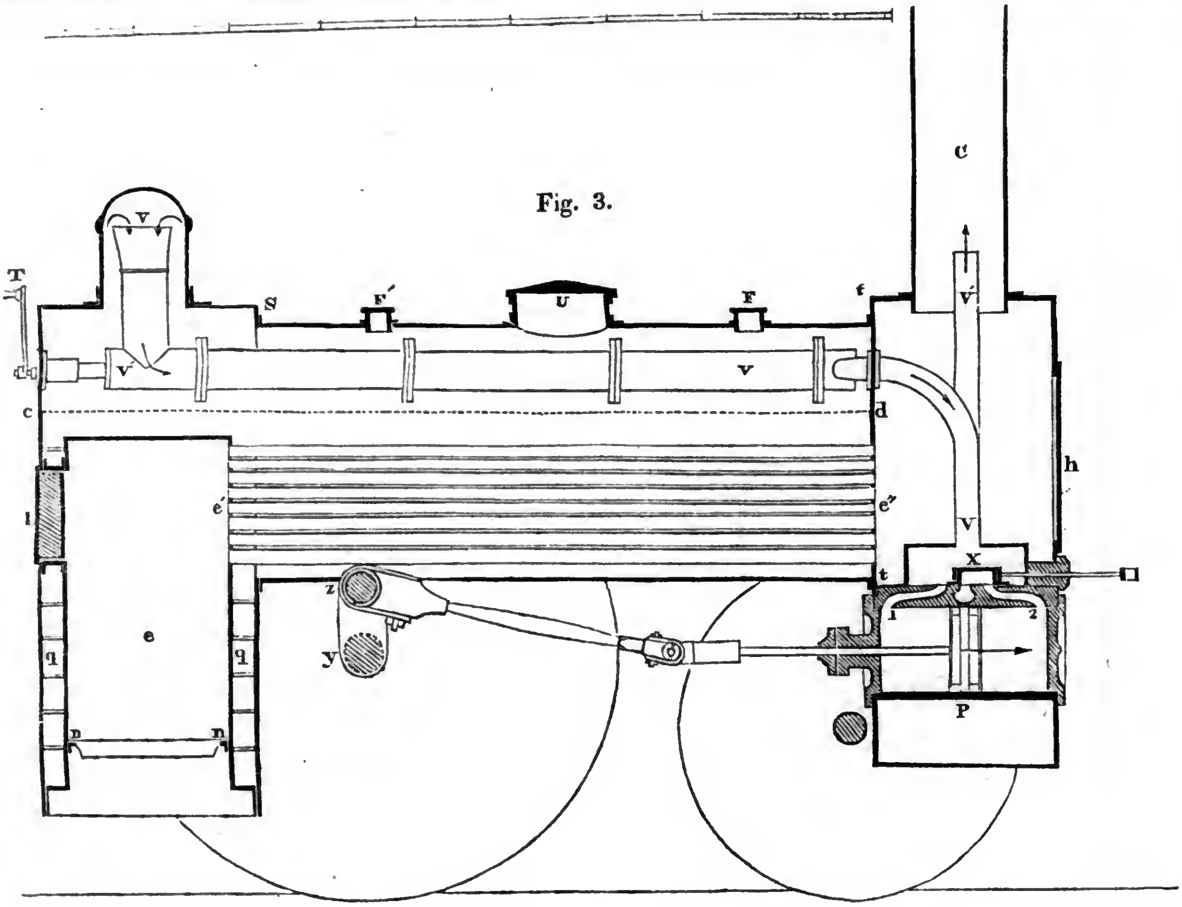


Fig. 3.

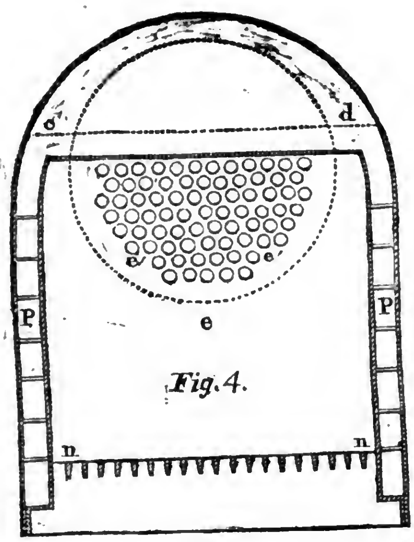


Fig. 4.

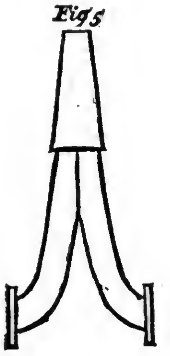


Fig. 5

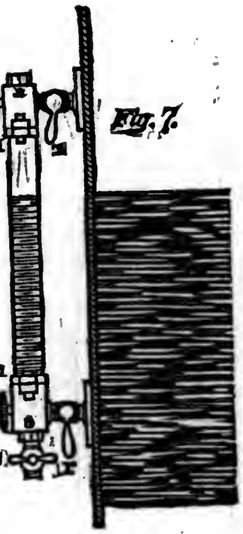


Fig. 7.

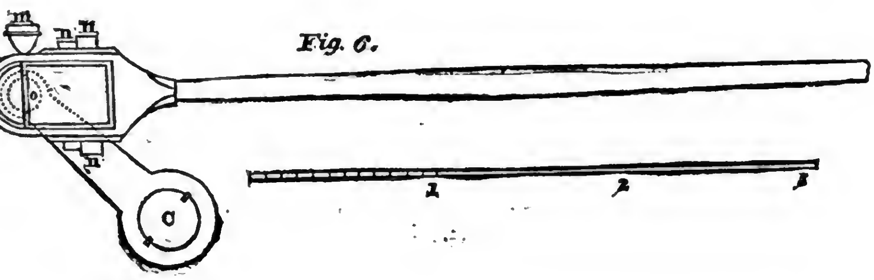


Fig. 6.

§ 3. *Dimensions of the Fire-box and Boiler in twelve of the best Locomotive Engines of the Liverpool and Manchester Railway.*

According to the remark we have made here above, and which will be confirmed in the course of this work, any expression of the power of a locomotive engine becomes imaginary, unless its evaporating power, or the extent of the heating surface of its boiler, be given at the same time. It is, in fact, in the fire-box and boiler that resides the real source of the power of the engine. From thence results all the effect produced. The cylinder and other parts are the means of transmitting and modifying the power; but what could be their effect, if that power itself did not exist?

To complete, therefore, the proportions already given above, we shall add here a table of the dimensions of the fire-box and boiler in the different engines to which we shall have occasion to refer. At a future period, our experiments will enable us to replace this complex expression by the simple expression of the evaporating power of those same engines.

The two most important columns of this table, are those which show the extent of surface exposed to the radiant heat of the fire, and to the communicative heat of the flame.

DIMENSIONS OF THE FIRE BOX AND BOILER OF TWELVE OF THE BEST LOCOMOTIVE ENGINES OF THE LIVERPOOL AND MANCHESTER RAILWAY.

Name and number of the engine.	Diameter of the cylinder.	Length of stroke of the piston.	Diameter of the boiler.	Length of the boiler and tubes.	Number of tubes.	Diameter of the tubes.	Area of the fire-box or surface exposed to the radiating caloric.	Area of the tubes, or surface exposed to the contact of the flame and heated air.	Area of the fire-grate.	Quantity of fuel contained in the firebox to the hgt. of the lowest row of tubes.	Diameter of the chimney.	Remarks.
	inches.	inches.	feet.	feet.		inches.	sq. ft.	sq. ft.	sq. ft.	cub. ft.	inches.	
SAMSON . . No. 13	14	16	3.50	7	140	1 5/8	40.20	416.90	7.50	10.87	12.50	This engine is now being reconstructed.
JUPITER . . " 14	11	16	2.75	6.50	79	do.	36.06	226.80	6.08	11.12	12	
GOLIATH . . " 15	14	16	3.50	7	132	do.	40.31	407	7.50	10.87	12.50	
VULCAN . . . " 19	11	16	3	6.50	107	do.	34.45	307.38	6.50	7.64	13.50	
FURY . . . " 21	11	16	3	6.50	107	do.	32.87	307.38	6.12	8.13	13.50	The tubes of this engine are very thin.
VICTORY . . " 22	11	16	3	6.75	97	do.	37.63	278.53	6.27	11.47	13.50	
ATLAS . . . " 23	12	16	3	7.88	65	do.	57.06	217.88	9.20	13.06	12	
VESTA . . . " 24	11 1/8	16	2.75	7	80	do.	46	256.08	7.06	11.72	1.150	
LIVER . . . " 26	11	16	3	6.50	97 { 70, 27 }	1 3/4, 1 5/8	39.66	284.01	8.11	12.48	13.50	
AJAX . . . " 29	11	18	2.75	6.66	63	2	32.64	228.14	6.08	8.32	13.50	
LEEDS . . . " 30	11	16	3	6.50	107	1 5/8	34.57	307.38	6.19	8.23	13.50	
FIREFLY . . " 31	11	18	3	7.50	110	do.	43.91	362.60	7.16	14.30	13.50	The fire-box of this engine is at present being altered.

It will be seen hereafter, that with a boiler of those dimensions and of such a form, the engines are able to evaporate about a cubic foot of water per minute, or a pound of water per second, at the effective pressure in the boiler of 50 lbs. on the square inch.

Comparing with each other the extent of surface exposed in each engine to the action of the heat, a great distinction must be made between the surfaces exposed to the immediate and radiating action of the fire, and those which only receive the heat by communication, during the passage of the hot air from the fire-place to the chimney. An experiment made by Mr. Robert Stephenson is mentioned in Wood's work, p. 403, from which it appears that the two effects stand to each other in a ratio of three to one. Circumstances did not allow us to repeat the experiment.

It was made with a boiler similar to those described above, but the upper part of which had been taken off, and the water exposed to the direct action of the fire, separated from that which receives only the communicative heat; the water was put into ebullition, and, after it had boiled for some time, the water that had been evaporated in each compartment was measured. It was then ascertained that each square foot of surface exposed to the heat of the radiating caloric, had evaporated three times as much water as the same extent of surface exposed to the hot air. This proportion may be considered as sufficiently established by the experiment, in so far at least as regards a boiling apparatus, similar to those described above.

§ 4. *Of Locomotive Engines of a different construction.*

The description given above is applicable to the most powerful engines constructed until the present time. That form is exclusively adopted on the Liverpool and Manchester Railway.

On other lines, engines of different constructions are to be found. The Railroad from Stockton to Darlington being used for a different service, that is to say, for a more moderate speed, it may be proper to give here an idea of the engines used on that line.

The company possess twenty-three locomotive engines of different models, from the oldest to the most recent ones.

In some of them the fire passes through the boiler in a single tube, which serves as a fire-box, and communicates directly with the chimney. In some others the tube bends round in the boiler before it reaches the other end, and comes back to the chimney, which, in that case, is placed next to the door of the fire-box. In others, the tube or flue, when it reaches the end of the boiler, divides and returns towards the chimney, as two smaller tubes. In some, the fire being still placed in an internal flue, the flame returns to the chimney by means of about 100 small brass tubes, on a principle similar to that of the Liverpool engines. Lastly, three of them are constructed on the same model as those of Liverpool.

The company carries both passengers and goods. The first travel with a speed of twelve miles, and the second of eight miles an hour. Of the different forms of boilers, those only with a set of small tubes suit for carrying passengers; the others

cannot generate a sufficient quantity of steam. But when a speed of eight miles per hour only is required, and for an average train of twenty-four wagons, which, in going up the line empty, are equal to a load of about sixty tons on a level ground, the most convenient boilers have been found to be those with one returning tube. They generate a sufficient quantity of steam for the work required of them, and have the advantage of being cheap in regard to prime cost and repairs, as their form is simple, and they are entirety made of iron, whilst the tube boilers require the use of copper.

Besides the difference in the form of the boilers, the other parts of the engine differ also. The cylinders are placed on the outside, and in a vertical position. The motion is not communicated from the piston to the engine by a crank in the axle, but by a rod on the outside of the wheel, resting upon a pin fixed in one of the spokes. Those engines have in general six equal wheels, of four feet diameter each. Two of the wheels are worked by the cylinders, as has been just explained; and the four others are attached to the first by connecting rods, that cause them to act all together.

The weight of these engines varies. Setting aside the three which we have mentioned as being on the model of the Liverpool ones, and which weigh only about five tons and a half, the average weight of the others is from ten to twelve tons.

All those engines are supported on springs. In some of the older ones, the water of the boiler, pressing upon small moveable pistons, and pressed itself by the steam contained in the boiler, was intended to supersede the springs; but though that system displayed a great deal of ingenuity, the spring it formed was found in practice to be too variable, and the system was given up.

The usual proportions adopted for the engines on that railway are the following:

Cylinder	- -	14½ inches.
Stroke	- -	16 —
Wheels	- -	4 feet.
Weight	- -	11 tons.
Effective pressure	-	48 lbs. per sq. in.

The pressure, however, varies according to the ascertained solidity of the boiler. When the sheets of which it is formed begin to grow very thin, the pressure is sometimes reduced to 36 lbs. only per square inch; in other circumstances, it is, on the contrary, increased to 60 lbs.

CHAPTER II.

OF THE PRESSURE IN STEAM-ENGINES.

ARTICLE I.

OF THE PRESSURE CALCULATED ACCORDING TO THE LEVERS AND THE SPRING-BALANCE.

§ 1. *Of the principle on which that calculation is founded.*

When an elastic fluid is confined in a closed vessel, it produces in every direction on the sides of the vessel a pressure, which is the result of its elastic force, and which gives the exact measure of that force. If, the vessel being already filled with steam, a fresh quantity is continually added, the elastic force of the steam will augment more and more, and consequently also the pressure it produces on every square inch of the surface of the vessel. Now, if at one point of the vessel there be an aperture, closed with a moveable piece supporting a certain weight, it is clear that, as soon as the steam contained in the vessel produces upon the moveable plate a pressure equal to that of the weight which holds it down in the opposite direction, the plate will begin to be lifted up; the passage will then be opened, and the steam escaping through the aperture, will show that its pressure was equal to the weight that loaded the plate or valve.

It must, however, be observed, that the resistance which opposes the egress of the steam does not consist only in the weight that has been placed on the valve. Besides that weight, the atmosphere produces also on the valve a certain pressure, as well as upon every other body with which it comes in contact. That pressure is known to be equal to 14.7 lbs. per square inch. It is therefore the weight, added to the pressure of the atmosphere, that gives the real measure of the elastic force of the steam; while the weight alone represents only the surplus of the pressure over the atmospheric pressure, or what is called the *effective* pressure of the steam. Consequently, when a valve has a surface of five square inches, and supports a weight of 250 lbs., which, divided between the five square inches, gives a resistance of 50 lbs. per inch, that amount of 50 lbs. expresses the *effective* pressure of the steam, a valuation frequently made use of on account of its convenience for calculation, whereas, 64.7 lbs. is the real resistance opposed, and therefore the real pressure of the steam.

This is the principle on which are established the means of judging the amount of pressure in locomotive engines. However, as those engines are required to work with at least 50 lbs. effective pressure per square inch, and as, in order to give passage, if necessary, to all the steam generated in the boiler, a valve must not have less than 2½ inches diameter, or 5 square inches surface, it follows of course that if a weight is to be applied directly upon the valve, it must be equal to 250 lbs. Such a weight would afterwards render it very difficult to lift up the valve with the hand, which frequently becomes necessary in the working of the engine, and particularly to ascertain whether the valve may not have contracted an adhesion to its seat which would make it useless.

It was therefore necessary to produce the pressure by means of a lever; for, if we suppose the lever divided in the proportion of 5 to 1, a weight of 50 lbs. suspended at the end will be sufficient to produce the required pressure without the disadvantage of having a considerable weight to move. But, on the other hand, as, in the rapid motion of the engines, a weight suspended at the end of a lever was found to be continually jerking, and consequently opening and shutting continually the valve, the weight was replaced by a spring, and that is the manner in which the valves are at present constructed.

§ 2. *Of the Levers and Spring-Balance.*

It will easily be conceived that no exact calculation can be established of the power of locomotive engines, without knowing exactly the pressure of steam in the boiler, which is the intenseness of the propelling force of the motion. If we were to depend on the *nominal* pressure of the engine, that is to say, the pressure declared by the constructor, great mistakes might be incurred: for it sometimes happens that, with a view to give to a locomotive engine the appearance of executing more than others, though at the same pressure, its pressure is declared to be 50 lbs. per square inch, whilst it really is 60 or 70 lbs. Moreover, the calculation of the pressure is generally so incorrectly made, that scarcely any dependance can be placed upon it.

We have therefore been obliged to make a particular study of that part of our subject.

We shall first give the manner of ascertaining the pressure by weighing and measuring the different parts of the valve apparatus, in case one should have no mercurial gauge. We shall afterwards show the cause of some mistakes which may be incurred by that mode of calculation, and which are avoided by using the mercurial steam-gauge. Lastly, we shall point out the uncertainty to which also that instrument is liable, and we shall propose another to be used instead of it.

We have said, that, to produce on the valve a great pressure without being encumbered with a considerable weight, a lever is employed. M (fig. 16) being the boiler, and S the valve, C is a fixed point to which is fastened one of the ends of the lever BC. The lever presses at the point A on the valve by means of a pin, and at the point B it supports a weight, or to speak more accurately, it is drawn by a spring equal to a given weight.

The diameter of the valve, the proportions of the lever, and the weight suspended at the point B, or at least the weight represented by the tension of the spring being given, it will be easy to deduce from them the pressure resulting on each square inch of the surface of the valve. And, *vice versa*, it will also be easy to know what weight ought to be applied to the point B, in order to produce at A a given pressure. For, if P represent the weight suspended at B, that weight will produce on A a pressure $P \times \frac{BC}{AC}$ which will consequently be the whole pressure produced on the valve; and if S represent the surface of the valve in inches $\frac{P \times \frac{BC}{AC}}{S}$ will be the pressure produced on each square inch of the surface of the valve.

The levers and valves used by the different constructors of engines vary con-

siderably in their proportions. But, among those proportions there is one, first used by Mr. Edward Bury, of Liverpool, which possesses an uncontested advantage over all other combinations of that sort. It consists in taking for the proportions between the two branches of the lever the ratio of the area of the valve to the unit of surface. By that means the weight P suspended at B gives immediately the pressure produced on the valve per unit of surface. Supposing it should be required to establish a valve of 2½ inches diameter, which make very nearly 5 squre inches surface, and that in consequence, the ratio between the two branches of the lever has been taken as 5 to 1, that is to say, that $\frac{BC}{AC}=\frac{1}{5}$; P expressing the weight suspended at B, it is clear that the pressure produced at A will be $P \times \frac{BC}{AC} = 5P$. This will, therefore, be the total weight on the valve, and the surface of the valve being 5 square inches, the weight or pressure per inch will be $\frac{5P}{5}=P$. The same would take place if, having a valve 3 inches in diameter, which gives 7 square inches for the surface, the ratio between the branches of lever were to be taken as 7 to 1.

We have said that, to the weight which ought to be snspended at the end of the lever at B, is substituted the equivalent pressure of a spring. This spring is a spiral, which by being more or less compressed, is able to support in equilibrium, and consequently to represent larger or smaller weights. In other words, it is a spring balance, such as is used for weighing in daily occurrences.

This balance consists of a rod T (fig. 16) which is held in the hand, and to which is fastened a plate with a narrow oblong aperture in it. Behind this plate, and in a cylindrical tube, is a spring, the foot of which rests on the basis L, which is fixed to the plate. At its other end, this same spring is pressed by a moveable transverse bar *mn*. At the bottom of the aparatus is a rod P, to which are fastened the objects that are to be weighed. The prolongation of the bar *mn* projects through the aperture of the plate, and is terminated by an index which appears on the outside, and which slides up and down the aperture, in proportion as the spring is more or less compressed. Divisions are engraved along that same aperture. In order to mark them, known weights of 1 lb., 2 lbs. &c., are successively suspended at P, and according as those weights, by pressing on the spring, cause the index to rise, the corresponding divisions are marked. The consequence of this is, that when an object of unknown weight is suspended at P, and makes the index rise to the point marked 10, that is to say, to the same point to which a known weight of 10 lbs. made it rise, we conclude that that object also weighs 10 lbs. This is the sort of balance which is used for measuring the pressure in locomotive engines. We see that, by taking it off from the engine, and suspending known weights to it, the divisions may easily be verified, after the balance is graduated.

When on the engine, the foot P of the balance, where the object to be weighed would be suspended, is fixed in a solid manner to the boiler; and the rod T, which would be held in the hand in common weighing, is fastened to the end of the lever. This rod passes through an aperture cut through the end of the lever, and is fixed above it by a screw which rests upon the lever. When it is required that this balance shall produce a pressure of 10 lbs., nothing more is necessary than to lower the screw until the spring rises to the point marking 10 lbs., and the same for any other weight.

Vice versa, the steam being in the boiler at an unknown degree of pressure, if we loosen gradually the screw until the steam begins to raise the valve, that is to say, until its pressure stands in equilibrium with the pressure of the spring, the pressure of the steam will be known, for the degree then marked by the index will show the weight which is equal to it.

§ 3. *Of the corrections to be made to the Weight marked by the Spring-balance.*

The mode we have just explained is the one commonly used to calculate the pressure on the valve. However, it will easily be conceived, by the manner in which the spring-balance acts upon the valve, that, to know the pressure which really opposes the egress of the steam, it is not sufficient to read the degree where the index stops, and to calculate the effect produced at the end of the lever, as we have done above. In fact, first, besides the weight represented by the spring, and which would be suspended at the end of the lever, it is clear that the weight of the lever itself causes a certain degree of pressure; for before the steam is able to raise an ounce of the spring, it must raise the whole weight of the lever. The same takes place in regard to the disk of the valve, which must be raised before the steam can have any action on the balance. 2. When any object is weighed with the hand, that object is suspended at the bottom of the balance, but then the hand supports the upper part, that is to say, the rod, with the spring to which it is fastened; and that effort is not taken into account, because it does not make a part of the weight. Here, on the contrary, the rod, the screw, and the spring, are an additional weight really suspended at the end of the lever, over and above the pressure marked by the spring; they must all be raised before the spring can be pressed upon in any way, and can register any effort; they must therefore be taken into account. The true pressure which takes place on the valve will consequently not be known, until are added to the weight marked in the balance: 1. The pressure produced by the weight of the lever at the place of the valve: 2. The pressure produced at the end of the lever by the weight of the rod and spring of the balance.

1. To know the effect of the lever on the valve, the lever must be unfastened from the balance; a string must be wound round the pin A, or passed through the aperture of the lever at that place, and then, with another spring-balance, the lever must be weighed by means of the string. It is clear that the weight marked by the second balance will be the pressure produced by the lever at the place of the valve; to that must be added the weight of the disk of the valve, which must also be weighed separately, by putting it into the basin of a common pair of scales. When the levers have a total length of 3 feet with the usual thickness, they commonly weigh 27 lbs. or 28 lbs. at the place of the valve. The disk of a valve of 2½ inches diameter, and half an inch thick, weighs in general about 10 ounces. There is therefore a weight of 28½ lbs. to be divided on the whole surface of the valve; so that if that surface is equal to 5 square inches, it makes 5¾ lbs. per square inch. When the levers are only 15 inches long, they generally weigh 7½ lbs. at the place of the valve, which makes, together with the disk, 8 lbs. 8 oz., and divided between the 5 square inches, a little more than 1½ lbs. per inch.

2. To know the weight of the part of the balance supported by the lever, the balance ought to be taken to pieces, and the spring with its rod weighed separately. However, this operation may be avoided by taking the balance in one's hand, and suspending it in the contrary direction in which it is placed in the common act of weighing, that is to to say, with the foot above and the rod below; the weight marked by the index will then be equal to the difference between the weight of the rod and spring, and the weight of the foot. If, therefore, the total weight of the balance be known, which is easy, by placing it in the basin of a common pair of scales, the weight of each of its parts may easily be calculated, and consequently also the weight of the rod and spring.

In fact, the degrees having been marked on the balance when in its usual situation, zero was inscribed at the point where the index stood when the spring bore no weight at all, or more exactly when it only bore the weight of the foot. Afterwards fresh weights were successively added, and for each of them the corresponding number was inscribed on the plate, always omitting the weight of the foot, which in fact ought not to be reckoned. The numbers inscribed on the plate represent, consequently, the real tension of the spring, less the weight of the foot of the balance. Now, by turning the balance upside down, the spring is drawn by the weight of the rod and spring which it then bears. If it had borne a weight equal to that of the foot, it would have marked zero; if, therefore, it marks 2 lbs. or 3 lbs., the rod and spring weigh 2 lbs. or 3 lbs. more than the foot.

Supposing thus: B to be the total weight of the balance, T the weight of the rod and spring, and P′ the weight of the foot; if the balance turned upside down shows *m* weight, we shall have

$$m = T - P';$$

but, on the other hand, the weight of the balance is equal to the weight of its two parts, or

$$B = P' + T:$$

adding therefore together these two equations, we find

$$B + m = 2\,T, \text{ or } T = \frac{B+m}{2}.$$

When the valves have a lever of 15 inches only, the balance used weighs generally 4 lbs., and when turned upside down, it marks $1\frac{1}{2}$ lb.; so in that case the weight, of the rod and spring is

$$T = \frac{4+1.5}{2} = 2.75 \text{ lbs.},$$

which is the weight to be added at the end of the lever; that is to say, to the weight already marked by the balance.

When the valve has a lever of 3 feet, the balance requires smaller divisions. It usually weighs only 2 lbs., and turned upside down, marks $1\frac{1}{2}$ lbs., which gives in that case for the weight of the rod and spring

$$T = \frac{2+1.5}{2} = 1.75 \text{ lbs.}:$$

adding therefore those weights to those marked by the index of the balance, and taking besides into the account the weight of the lever, as mentioned above, we shall then have the real pressure produced by the whole apparatus on the valve. Dividing it by the area of the valve, the result will be the pressure effected upon each unit of surface.

From this we see that, with a long lever, the error of pressure per square inch may amount to 7 lbs. or 8 lbs., and that, even with a short lever, it may be 3 lbs. or 4 lbs., which is still considerable.

Keeping the preceding notation, that is to say, P being the weight shown by the index, T the weight of the rod and spring, L the weight of the lever, weighed as mentioned above, and D the weight of the disk, lastly BC and AC being the arms of the lever, and S the surface of the valve in square inches, the pressure produced per unit of surface will be

$$\frac{(P+T)\frac{BC}{AC} + L + D}{S}.$$

It is for not having taken these considerations into account that we find so often on locomotive engines spring-balances, which are supposed to be fixed at 50 lbs. pressure per inch, but which are really fixed at 55 lbs. or 60 lbs. We shall soon have frequent occasion to apply and verify these principles, which by that means will be rendered perfectly clear.

§ 4. *Of the Miter of the Valves.*

These are not the only causes from which errors may result. There are two others which are frequently met with in the valuation of the pressure of locomotive engines, and which are not so easy to correct as those we have just mentioned.

In order that the valves may exactly close the opening to which they are applied, without being subject to contract an adhesion with the seat that supports them, it is necessary to make them slightly conical, or at last with a slanting border. When these valves rest upon their seat, which they completely fill, it is very clear that the steam can only act upon their inferior surface; consequently, the area we have here above expressed by S, must be taken after the *inferior* diameter of the valve. By calculating in that manner, the exact pressure will indeed be found for every case in which the valve still touched the seat, or, if raised at all, was only so for an instant, or in a very small degree; but whenever the steam, being generated in greater quantity than it is expended by the cylinders, escapes with force through the valve, it raises considerably the disk of the valve; the consequence then is, that, instead of acting on the inferior surface of the valve, it evidently acts on a greater surface, and which is the greater the more the valve is raised. For instance, in fig. 20 it acts on the surface ***cd*** instead of acting on ***ab***. In that case the area S ought to be calculated on ***cd***, and not on ***ab***. But how are we to know ***cd***, unless we calculate it by the rising of the valve, which is a very difficult, if not an impossible, operation? Moreover, the difficulty is complicated by the circumstance that, from ***a*** to ***b*** the pressure of the steam acts directly to raise the valve; but from ***c*** to ***a*** and from ***b*** to ***d*** the action of the steam takes place only in a lateral direction, and according to an angle, which varies in proportion as the valve is more or less raised.

The effect of this alteration in the diameter of the valve, which at first sight appears to be of very small consequence, is in fact very considerable. Let us suppose, for instance, that we have a valve of 2.50 inches diameter at the bottom, and 3 inches at the top, of which we shall find several examples hereafter. Let us further suppose that, by the effect of the blowing of the steam, the valve has been raised so as to have increased its real diameter only by one-eighth of an inch; that is to say, that it is become $2\frac{5}{8}$ inches instead of $2\frac{1}{2}$ inches, or 2.625 inches, instead of 2.50 inches. The surface of the circle being expressed by $\frac{1}{4}\,\pi\,d^2$, where d stands for the diameter and $\pi = 3.1416$, the proportion of the circumference to the diameter, the surface of the valve, which was at first

$$\tfrac{1}{4} \times 3.1416 \times \overline{2.5}^2 = 4.91 \text{ sq. inches,}$$

has become

$$\tfrac{1}{4} \times 3.1416 \times \overline{2.625}^2 = 5.41 \text{ square inches.}$$

Consequently, if we suppose the total weight supported by the valve, including the levers, rod, disk, &c., to be 245 lbs., that weight, when the valve is shut, will represent a pressure per square inch of

$$\frac{245}{4.91} = 50 \text{ lbs.};$$

and when the valve is raised, that same weight will only represent a pressure of

$$\frac{245}{5.41} = 45.27 \text{ lbs.};$$

by which we see that the same weight marked by the balance corresponds to very different pressures of steam, when the valve is shut or when it is raised.

Continuing, in the case of a blowing-valve, to calculate upon what is called the diameter of the valve, that is to say, on its inferior diameter, an error will thus be committed of 5 lbs. pressure per inch, which error might be still greater if the raising of the valve should happen to be more considerable. Moreover, as there is no practical means by which to learn by how much the diameter of the valve is augmented by the raising, the consequence will be that the mode of calculation explained here above, even with the corrections we have made, will apply exactly only to those cases where the valve just begins to be raised, or lets scarcely any steam escape; but the greater the raising the more the calculated amount will surpass the real pressure. We shall see hereafter examples of this.

But still this is not all. If the pressure of the steam in the boiler must be deduced from maasurements taken on the engine, it must also be observed that it frequently happens, in order to make the construction more easy, that the miter of the valve is made to join the sides of its seat only within a certain breadth, as may be seen in fig. 21. The consequence is, that the surface ***ab***, or the inferior part of the valve, which has been measured, is not the surface upon which the pressure is divided. The real diameter in this case is ***cd***, If therefore there be between ***ab*** and ***cd*** a difference, for instance, of one-eighth of an inch, this difference may produce, as well as in the case of the raising of the valve, a difference of 4 to 5 lbs. in the pressure. Mistakes may be avoided in that respect, by measuring not only the inferior diameter of the valve, but also the diameter of its seat. There still, however, remains the blowing of the valve, the exact appreciation of which escapes all manner of calculation.

The mercurial gauge, which we are going to describe, is the means of avoiding both causes of error; but that instrument is expensive, and as yet so scarce, that in all the factories and on all the railways, except the Liverpool one, there is at present no other mode of ascertaining the pressure than those explained above.

ARTICLE II.

OF THE MERCURIAL STEAM-GAUGE.

§ 1. *Construction and use of the Mercurial Steam-gauge.*

The calculations we have made may be sufficiently exact for a great number of cases. Still they present some degree of complication that makes them inconvenient; besides, they cannot be made without measuring and weighing different parts of the engine, which operations require time and care, and can only take place when the engine is at rest. We may therefore easily conceive the great utility of an instrument which at first sight, and by its bare inspection, will give the oxact measure of the pressure of the steam. By means of such an instrument, all cases, even those of the raised valve, present no longer any difficulty, and the necessity of calculation itself may be dispensed with. The only thing required is, the possibility of submitting the engine to the proof.

The instrument used with that view is, the mercurial steam-gauge, constructed on the same principle as the common barometer. M *bm* (fig. 18) is a tube containing mercury, which ought not to rise above the two points M and *m*. FG is the water reservoir. It must not contain water above the cock E, the use of which is to get rid of the surplus of water that may have been produced by condensation on some former experiment. R is an opening closed by a cock, and through which mercury or water may, when wanted, be introduced into the instrument. Lastly, C is an ajutage on which a tube is screwed, the other end of which reaches the boiler of the engine. This tube is flexible, and usually made of tin; it forms the communication of the mercurial gauge with the engine. At the point where it reaches the engine, it is screwed on an ajutage fixed to the boiler, and kept close by a cock.

To prepare the instrument for use, an additional quantity of mercury is poured into it by the aperture R, in order to be sure that the instrument contains mercury at least to the height M*m*. After this the screwbolt M is unscrewed, so that if there happen to be too much mercury it may run off. When this is done the screwbolt is replaced, and an additional quantity of water is also poured through R into the reservoir FG, and, should there be too much, it also runs off through the cock E. Then the instrument is put in communication with the boiler. The steam, arriving through the tube C in the upper part of the reservoir FG, presses on the water by virtue of its elastic force; it consequently presses the mercury down in the branch *mb* which is open at the top, until the weight of the mercury, thus raised, is equal to the pressure of the steam issuing from the boiler. A float borne on the surface of the mercury, at the point *m*, rises in proportion as that surface in the tube; and an index suspended to a thread which passes over a communication-pulley *p*, falls between the two tubes in proportion as the mercury rises in the branch *bm*, and shows upon a graduated scale the variations that occur in the level of the mercury in the different experiments. Supposing the length of the instrument from M to *b* be $6\frac{1}{2}$ feet, or 78 inches, the ascending column may, if necessary, contain 156 inches of mercury; and as a column of 156 inches of mercury with a basis of 1 square inch weighs about 80 lbs., such a column may serve to measure an effective pressure amounting to 80 lbs. per square inch.

The reservoir FG is a cylinder 3 inches in diameter and 6 inches high. The use of the water it contains is to keep the branch M*b* constantly full of water, in proportion as the mercury descends in that branch. This is the reason why that reservoir is a great deal larger than the tube, and its capacity is calculated so as to be able, in case of need, to fill the whole branch. If this precaution were to be omitted, the water formed by condensation in the instrument during the experiment would fall in the tube, which being very narrow, having, for instance, no more than one-half square inch area, the water would immediately rise in it to a considerable height, and cause by that means a surplus of pressure which would make the result false. But by means of the reservoir FG, the condensation-water, in proportion as it is formed, is divided over a surface of 7 square inches, on which, consequently, it produces an imperceptible difference in height. As it is known that the pressure of the water on the unit of surface depends solely on its height, the consequence of this arrangement of the instrument is, that the surplus of pressure caused by the condensed steam is so small, that it may be neglected without any inaccuracy.

To graduate the scale of the instrument, we may begin by marking, first, the point zero. For this, the mercury and the water being poured in, as said above, the two branches must be left to communicate freely with the atmosphere, and the point where the index stops will be the point sought, for that is the position which the float naturally takes when the branch M*b* bears no more than the atmospheric pressure. If the two branches of the bent tube were to contain nothing but mercury, it is clear that the point corresponding to zero in the rising branch would be at *m*, as the mercury would in that case stand on a level in the two branches. Instead of that, the mercury in the branch M supports a certain weight of water, that is to say, the weight of the column EM; it will consequently tend to descend in that branch and to rise in the other. However, if the float is made to weigh as much as the column of water, the level will remain the same as if there were only mercury in both the branches.

The other extreme point of the scale must afterwards be marked. Let ϖ be the pressure we want to equilibrate; supposing the equlibrium established, let x be the height at which, by virtue of that same pressure ϖ, the mercury will stand above its natural level in the branch *m*. The mercury having risen in the branch *m* to the height x, it must have fallen by an equal quantity in the other branch; for the mercury added on the one side can only proceed from what has been taken off on the other. The mercury in the branch M will therefore at the same time be at the point x', and the whole part of that branch from the point x' to the point M will be filled by the water from the reservoir. If through the point x' we draw an horizontal plane, the mercury which is under that plane will equilibrate itself in two branches; we have therefore nothing to do with it, and need only consider the conditions of equilibrium for those parts which are above the plane in the two branches. Now, we have on the one side the pressure ϖ more the weight of a column of wate rhigh $Mx'=x$; and on the other side, we have a column of mercury high $2x$ more the weight of the atmosphere. P being thew eight of the column of mercury, P′ that of the column of water, and ρ that of the atmosphere, we shall have, there being an equilibrium,

$$\rho + P = P' + \varpi, \text{ or } P = P' + (\varpi - \rho).$$

$(\varpi - \rho)$, which is the surplus of the real pressure of the steam over the atmospheric pressure, is called the *effective* pressure; and all high-pressure steam engines it is this which is to be considered. The column of mercury, the weight of which we have expressed by P, having for its basis the basis of the tube which we shall express by b, and for its height the height $2x$, its volume will be $2bx$; δ representing the density of the mercury, $2\delta bx$ will be the mass of the whole column, and g expressing the accelerating force of gravitation, $2g\delta bx$ will be weight; that is to say, that we shall have

$$P = 2g\delta bx.$$

By the same reason δ' being the density of the water, the weight P′ of the column of water will be expressed by $g\delta' bx$, its basis being also b, and its height $Mx' = x$. But the density of the water being expressed by 1, that of the mercury is expressed by 13.568; thus we have

$$\frac{\delta'}{\delta} = \frac{1}{13.568} \text{ or } \delta' = \frac{\delta}{13.568}.$$

and consequently

$$P' = \frac{g\delta bx}{13.568}.$$

On the other side, the effective pressure $(\varpi - \rho)$, in whatever manner it be expressed, may be replaced by the weight of a column of mercury, that would produce the same pressure on the basis b. If then h be the height of that column, which it is easy to calculate, we shall have

$$\varpi - \rho = g\delta bh;$$

and the equation of equilibrium will thus be

$$2g\delta bx = \frac{g\delta bx}{13.568} + g\delta bh,$$

or

$$x\left(2 - \frac{1}{13.568}\right) = h.$$

This equation gives

$$x = h \times \frac{13.568}{26.136} = h \times 0.51913.$$

The height h of a column of mercury, which may represent a given pressure, is easily found; for we know that a column of mercury, one inch high, presses on its basis at the rate of 0.4948 lb. per square inch. The height of any other column may thus be proportionably calculated. If, for instance, we wish it to represent a pressure of 70 lbs., its height will be found by the following proportion:

$$\overset{\text{lb.}}{0{\cdot}4948} : \overset{\text{in.}}{1} :: \overset{\text{lbs.}}{70} : h = \frac{70}{0.4948} \times \overset{\text{in.}}{1} = \overset{\text{in.}}{141.47};$$

so, that by this value of h, x will be

$x = 141.47$ in. $\times\ 0.51913 = 6$ ft. $1\frac{1}{2}$ in.;

that is to say, that to correspond to an effective pressure of 70 lbs., the height of the mercury must be 6 feet $1\frac{1}{2}$ inches.

The same calculation is applicable to any intermediate point that may be sought, but it would be unnecessary trouble; for, knowing the point corresponding to zero, and that which corresponds to the *maximum* pressure of the instrument, we have only to divide the interval into equal parts, and the scale will be suitably graduated, having seen that the general value of x depends solely on the corresponding value of h, and is proportional to it.

This mercurial gauge being once constructed and graduated, whenever any doubt may be entertained in regard to the pressure of an engine, nothing more is ne-

cessary than to bring it under the instrument, and by that means the pressure may be ascertained, in whatever state the valve may be at the time, whether blowing or not.

§ 2. *Of the pressure of the Steam in Locomotive Engines while travelling.*

When we make use of the mercurial gauge to discover the pressure during an experiment, attention must be given to a circumstance we are going to describe. If, the valve once regulated, the engine were to keep an equal pressure of steam during its whole journey, nothing more would be wanting than to try it once for all before starting. Having fixed the valve at the point at which we wish to work, the engine might be brought under the instrument; and the pressure being determined that corresponds to that point, provided no other alteration be made to the spring-balance of the valve, the pressure of the engine for every instant of the journey would be known.

It is thus that many persons calculate, whether or not use has been made of the mercurial gauge. When they have found that an engine lifts up its valve exactly at 50 lbs. effective pressure per square inch, that very moment the valve is considered as giving a free egress to the steam, and it is concluded thence that the steam will never rise above 50 lbs., unless the valve undergoes an alteration. Experience, however, proves that this reasoning is false.

If we observe a locomotive engine with some attention, we shall very soon see that nothing is more variable than the pressure of steam in its boiler, although the valve has undergone no alteration. If the engine runs rapidly with a moderate train, and comes to a slight inclination of the road, however small that inclination may be, it immediately produces a considerable increase of traction, because the gravity of the whole mass on the inclined plane becomes an additional resistance for the engine; and the effect of this increase of traction will be so much the more perceptible on the engine, the less the resistance was which the train offered when on the level parts of the road. It is thus that a load of one ton, which on a level road requires a traction of 8 lbs. only, presents nearly four times as much if it has to ascend an aclivity of $\frac{1}{100}$, the gravity of one ton or 22.40 lbs. on that inclination being $\frac{2240}{100} = 22.40$ lbs. The consequence of that sudden increase of resistance is therefore that the engine, as soon as it arrives at the foot of the inclined plane, must diminish considerably its velocity. Supposing that in its preceding course it spent 480 cylinders of steam per minute, and in consequence of the accidental obstacle it must overcome, it is obliged to reduce its velocity to one-third of what it was before, it will evidently spend no more than 160 cylinders per minute; nevertheless, the fire violently excited by the preceding course will continue to generate the same quantity. That steam, it is true, will be spent at a greater pressure; but experience shows that the surplus of pressure does not balance what is generated too much. The valve will therefore begin to emit an enormous quantity of superfluous steam, which in order to escape will raise the valve; but if we observe that the valve cannot rise without pressing on the spring, and consequently without augmenting the tension of the spring, we will find that the steam can only escape by increasing its pressure; and, in fact, the pressure will immediately rise on the balance several pounds per square inch, in proportion to the violence of the fire and the construction of the engine. How great then is the error committed by continuing to calculate the effective pressure at 50 lbs., because we suppose that the valve giving way at that point cannot suffer the steam to rise above it.

When the steam, in escaping, raises the valve to a given height, the greater the balance-lever is, the more the index will be displaced on the scale, and consequently, the greater will be the increase of tension of the spring; thus, in engines with a long lever, the augmentation of the pressure will be, *cæteris paribus*, more considerable than in those where the lever is shorter.

We shall soon see that the Atlas engine, which has a short lever, with a valve of 2½ inches diameter, is able, while overcoming difficult obstacles, to raise its pressure from 53 lbs. to 56 lbs.; and that the Fury engine, which has a long lever, with a valve of 3 inches in diameter, is able, in the same circumstances, to raise its pressure from 53 lbs. to 62½ lbs. These variations in the pressure depend, in each engine, in the first place, on the augmentation of the resistance created by the obstacle or the diminution of the speed; and, in the second place, on the dimensions of the valves, levers, and balances, and the evaporating power, that is to say, the quantity of steam generated by the engine.

This increase of pressure in locomotive engines, when they meet obstacles that compel them to diminish their velocity, gives the engines with long valve-levers considerable advantage over those with short levers, whenever it is necessary to ascend an inclined plane. This advantage, it is true, is only gained by submitting the engine to a higher pressure, and might also be acquired with short lever engines by lowering the screw of the spring-balance, so as to increase the pressure in the boiler in the same proportion; but the fact itself would evidently seem the proof of a superior working, and would even be inexplicable, were we to look upon the pressure as never passing 50 lbs.

The variations in the pressure which we have just mentioned, take place while the engine is travelling, that is to say, while it is separated from the mercurial gauge. Therefore, if an engine has been working in a given circumstance, or with a known load, and that we want to ascertain at what pressure it was then working, we must write down exactly, during the experiment, the degrees successively inscribed on the balance; then, when the engine has left off working, we bring it under the mercurial gauge, and by animating the fire sufficiently to make the balance repass through all the same degrees through which it rose during the work, and by observing at the same time the mercurial gauge, we find for each of those degrees the corresponding pressure. That is the means we employed in our experiments.

We brought successively under the instrument all the engines we had made use of, and for each of them, as they all differ in some point from one another, we determined the corresponding degrees of the mercurial gauge with the divisions of the spring-balance.

Railroad to Cincinnati.—The following from the Charleston Courier of Thursday last, should incite our citizens to meet and send delegates to the Knoxville Convention.

The Charleston Courier—"We are informed that General Hayne, Chairman of the Commissioners charged with the direction of the survey of a route for the proposed road, left the city yesterday morning by the railroad, for the mountains, where Captain Williams and his brigade of engineers are now engaged in making the surveys. We also understand that Lieutenant Colcock, late of the army, who has just returned from surveying the route of a rail road from Branchville to Columbia, has been engaged by the Commissioners as an Assistant Engineer, and will proceed immediately to the mountains to join Captain Williams. Colonel Brisbane, also, who returned from the Florida campaign the day before yesterday, will, we understand, engage in the work as soon as he can make the necessary arrangements. Of the services of Col. Gadsden, the Commissioners have been deprived by his military engagements in Florida. It is still hoped, however, that he may be able to join the Commissioners in time to give them the benefit of his judgment and experience at the meeting to be held at Flat Rock on the 20th June, or, at all events, that he will be able to attend the Knoxville Convention, on the 4th July, as one of the delegates from this city. In consequence of the information given by Gen. Hayne to the meeting of citizens on Saturday last, of the astonishing performance of locomotive engines on the Baltimore and Ohio Railroad—overcoming (as stated in the public prints) *acclivitiss of upwards of 200 feet*—it has been determined to request some of our delegates to proceed to Baltimore, to obtain the necessary information to be laid before the Convention at Knoxville, on the 4th July. We believe that one or two of the gentlemen composing the delegation, have consented to perform this important and interesting duty, and we have no doubt that others will unite in it, if it should be deemed necessary.

The following interesting article on iron railroads in France, is extracted from the *Journal de l Industriel et du Capitaliste*:—

"Three grand undertakings especially occupy at this moment the attention of speculators, namely, iron railroads from Paris to Rouen and the sea, from Paris to Orleans, and from Paris to Lille. Several lines have been proposed to join Paris to Rouen and the sea. The line surveyed by the administration passes by the side of Pontoise, traverses Gisors, goes from thence to the Bosc-le-Hard, and from that point proceeds on the right by the valley of la Saye to the Dieppe, and from the same point on the left to Havre. A branch passing by Blainville would reach Rouen near

the Boulingrin, after having passed through a tunnel of 2,796 metres. M. Mellet had proposed, before the engineers of the Ponts-et-Chausees, a line to Rouen, which like the preceding, would pass by Gisors and Charleval, but which from that point would follow the valley of the Andelle, and afterwards run along the Seine to Rouen.—Lastly, Messrs. Polonceau and Bellange, propose a line quite different from the former two, which would keep on the left bank of the Seine, and after passing by Poissy, Mantes, and Vernon, would pass the river at two points, Criquebœuf and Oissel, and arrive at Rouen in the Place de St. Sever. After having quitted Rouen, where it would again cross the Seine, the railroad would take the valley of Deville, as far nearly as Houlme, where it would divide into two parts; the one would proceed to the valley of Arques, near Rosay, in order to reach Dieppe; the other would rejoin the Seine at Duclair, by the valley of Austraberthe, and would then follow the right bank of the river to Havre. Lines not less different from each other, have been presented for the railroad from Paris to Orleans. A first, by the valleys of the Seine and the Essone; a second by the valley of the Seine, la Ferte-Aleps, Artenay, and Gidy; a third by the valleys of the Seine, the Orge, and the Renarde, Anton, and Toury; and a fourth by Versailles, St. Hubert, the wood of Ram bouillet, the hamlet of Therinille, the forests of Ivelines and Souchamp, and Artenay. As to the Lille railroad, two lines have been surveyed by M. Vallee, chief engineer of the Ponts et Chausses, the one by Amiens, and the other by St. Quentin, with branches to Valenciennes, Boulogne, and Calais. We may add that other lines less extended are in contemplation. The iron railroad from Alais to Beaucaire is on the point of being commenced.. A grant of permission for another, from Cette to Montpellier, has been applied for. The projected road from Bourg to Lyons, as laid down by M. Hageau, is about to be again taken into consideration. It is also said that a road from Elbeuf to Louviers is about to be undertaken, a part of the funds being already subscribed."

AN ACT

TO INCORPORATE THE NEW-YORK AND ALBANY RAILROAD COMPANY:

Passed April 17, 1832.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows:

§ 1. Nicholas Fish, Elisha Tibbits, Samuel Swartwout, Benjamin Wright, William C. Redfield, James B. Murray, William M. Price, David D. Field, Alexander E. Hosack, Henry Hone, Samuel G. Wheeler, Campbell P. White, Jesse Oakley, Isaiah Townsend, John T. Norton, John P. Cushman, William Aikin, Abraham P. Holdridge, James Vanderpoel, Joel Benton, Albro Aikin, Robert Sedgwick, Charles Henry Hall, John Townsend, Benjamin Knower, Abraham Bockee, Townsend McCoun, John Hone, Cornelius Harsen, Lynde Catlin and Gideon Lee, with such other persons as shall associate with them for that purpose, are constituted a body politic and corporate by the name of "The New-York and Albany Railroad Company," with power to construct a single, double, or treble railroad or way betwixt the cities of New-York and Albany, commencing on the island of New-York where the Fourth avenue terminates at the Harlæm river, and passing through the counties of Westchester, Putnam, Dutchess. Columbia and Rensselaer, and ending at some point on the said river Hudson, opposite or near the city of Albany, with power to continue and extend the same to the city of Troy; and with power also to construct a branch or branches to the eastern limits of each or any county or counties, within this State, into which the said Railroad may enter, where such branch or branches shall be necessary to connect said main road with any Railroad already or hereafter to be constructed in either of the States of Massachusetts or Connecticut, to transport, take and carry property and persons upon the same, by the power and force of steam, of animals, or of any mechanical or other power, or of any combination of them, for the term of fifty years from the passage of this act, and the whole of the said road shall be made within this State.

§ 2. If the corporation hereby created, shall not, within three years from the passage of this act, commence the construction of said Railroad or way, and spend at least the sum of two hundred thousand dollars thereon, and shall not, within ten years from the passage of this act, construct, finish and put in operation, the said single, double or treble Railroad or ways, then the right of the said corporation shall be null and void: and if a sufficient amount of the stock of the said company shall be subscribed within the county of Rensselaer to construct and continue the Railroad from the village of Greenbush to the compact part of the city of Troy, then the said company shall construct and continue said Railroad to the said city of Troy, within four years after said amount of stock shall be subscribed therefor.

§ 3. The capital stock of the said company shall be three millions of dollars, and shall be divided into shares of one hundred dollars each, and shall be deemed personal property, and transferable in such manner as the said corporation shall by by-laws direct.

§ 4. Daniel Le Roy, Walker Todd, Enos Hopkins, Thomas Taber, 2nd., Cornelius Harsen, James B. Murry, Jess Smith, William Jay, John Townsend, John T. Norton, Benjamin Knower, Townsend McCoun, Gideon Tucker, William Aikin, Abraham P. Holdridge, Rufus Reed, Albro Aikin, Elisha Tibbits, Samuel Swartwout, John Hone, Lynde Catlin, John Lozier, Gideon Lee, John Snyder, Augustus Tremain, Walter Cunningham, and Elias Pattison shall be commissioners; the duty of whom it shall be, within the period of six months after the passing of this act, at some suitable place in the cities of New-York, Albany and Troy, and in the town of Amenia, in the county of Dutchess, to open books to receive subscriptions to the capital stock of the said corporation; and twenty days public notice shall be given by the said commissioners of the time and place of the opening of such books in one of the public newspapers in each of the said cities, and in the county of Dutchess; and as soon as the same shall be subscribed, to give a like notice for a meeting of the stockholders at such time and place as the said commissioners shall appoint, to choose seventeen directors; and such election shall be then and there made by such of the stockholders as shall attend for that purpose, either in person or by lawful proxy; each share of the capital stock entitling a stockholder to one vote; and the said commissioners shall be inspectors of the first election of directors of the said corporation, and shall certify, under their hands, the names of those duly elected, and deliver over the subscription books to the said directors, and the time and place of holding the first meeting of directors shall be fixed by the said commissioners; and the said directors shall have power to appoint an engineer, and to cause such examinations and surveys for the said Railroad to be made, as may be necessary to the selection by them of the most advantageous line, or lines for the location of the road; and the said directors shall, after such examinations and surveys shall be made, select, and by certificates under their hands and seals, designate the line, course or way which they may deem most advantageous for the said Railroad; one of which certificates shall be filed in the office of the Register of the city of New-York, and one in the office of the clerk of each of the counties through which the said road shall pass; which line, course or way so selected and certified shall be deemed the line, course or way, on which the said corporation shall construct, erect, build or make their single, double, treble Railroad or ways, as hereinafter mentioned, the expenses of all which surveys and examinations, and all manner of incidental expenses relating thereto, shall be paid for by the said corporation.

§ 5. If within three days after opening the subscription books as aforesaid, a sum exceeding three millions of dollars shall be subscribed, the commissioners shall proceed to apporeion the stock among the subscribers, and shall complete the apportionment within sixty days after the opening of said subscription, and if the full amount of capital be not subscribed within three days as aforesaid, then it shall be the duty of the commissioners to open the subscription books from time to time, until the whole amount shall have been subscribed. The commissioners shall receive no subscription unless five dollars on each share subscribed be paid at the time time of subscription.

§ 6. The said directors to be chosen at such meeting, or at such annual election, shall, as soon as may be, after every election, choose out of their own number one President, and one other person to be Vice-President; and in case of the death, resignation or absence of the President, the Vice-President shall preside until the next annual election thereafter, or until another President shall be chosen; and in case of the death or resignation of the President or Vice-President, or of any director, such vacancy or vacancies may be filled for the remainder of the year by the board of directors; and in case of the absence of the President and Vice-President, the board of directors shall have power to appoint a President pro tempore, who shall have and exercise such powers and functions as the by-laws of the said corporation may provide.

§ 7. In case it should at any time happen that an election of directors shall not be made on any day, when pursuant to this act it ought to have been made, the said corporation shall not, for that cause, be deemed to be dissolved; but such election may be held at any other time within sixty days thereafter.

§ 8. The directors shall have full power to make and prescribe such by-laws, rules and regulations as to them shall seem needful and proper, touching the management and disposition of the stock, property, estate and effects of the said corporation, the transfer of shares, and touching the duties and conduct of their officers, servants, and election of directors, and all other matters whatsoever which may appertain to the concerns of the said corporation; and also shall have power to appoint a Secretary and as many clerks and servants as to them shall seem meet, and to establish and fix such salaries and allowances to them, and also to the President and Vice-President, as to the said board shall appear proper. The said corporation is hereby empowered to purchase, receive and hold such real estate as may be necessary and convenient in accomplishing the objects for which this incorporation is granted, and may, by their sgents, surveyors and engineers, enter upon such route, place or places, to be designated as aforesaid by the said directors as the line, course, road or way, whereon to construct the said Railroad or ways; and it shall be lawful for the said corporationtto enter upon, and take possession of, and use all such lands and real estate as may be indispensable for the construction and maintenance of the said single, double or treble Railroad or ways, and the accommodations requisite and appertaining unto them; and may also receive, hold and take all such voluntary grants and donations of land and real estate as shall be made to the said corporation, to aid in the construction, maintenance and accommodation of the said Railroad or ways; but all lands or real estate thus entered and taken possession of, and used by the said corporation, and which are not donations, shall be purchased by the said corporation, of the owner or owners of the same, and at a price to be mutually agreed upon between them; and in case of a disagreement of price, and before the making of any portion of the road upon said land, the directors of the said corporation may present their petition to the Chancellor or Vice-Chancellor of the circuit in which such lands are situated, setting forth the necessity of such lands for making said Railroad or ways, and of the attempt and failure to purchase the same, with the name and residence of the owner, and the reason why the purchase cannot be made; and the Chancellor or Vice-Chancellor shall direct such notice to the owner or owners of such land as he shall deem proper and reasonable, of the time and place of hearing the parties; and upon proof of due service of such notice, and upon hearing the parties, the Chancellor or Vice-Chancellor shall appoint three competent and disinterested freeholders of the county in which the lands are situated, to be commissioners to appraise said lands. The said commissioners shall appraise said lands, and shall award to the owner or owners thereof what they shall deem to be the full value of the same; and shall be authorized to examine the lands, to administer oaths, and hear testimony; and shall make their appraisement in writing without delay, under their hands, with a minute and accurate description of the lands appraised, with a map thereof, and shall report the same, with the testimony taken, to the Court of Chancery. The Chancellor or Vice-Chancellor shall examine the report and shall hear the parties, if desired, and may increase or diminish the amount awarded, if he shall be satisfied injustice has been done. Upon proof to the Chancellor or Vice-Chancellor, within thirty days after his determination, of payment to the owner, or of the depositing to the credit of the owner in such bank as the said Chancellor or Vice-Chancellor shall direct, of the amount of such appraisement, and the payment of all expenses attending it, the said Chancellor or Vice-Chancellor shall make a decree or order, particularly deseribing the lands and reciting the appraisement and the mode of making it, and all other facts neceesary to a compliance with this [section] of this act; and when the said decree or order shall be recorded in the office of the clerk of the county in which the land is situated, whose duty it shall be to record the same, the said corporation shall be possessed of all such lands, for the purpose of the said road, and may enter upon and take possession, and use the same. In case any married woman, infant, idiot, insane person, or non-resident, who shall not appear after such notice, shall be interested in any such land, the said Chancellor shall appoint some competent and disinterested person to appear before the said commissioners, and act for and in behalf of such married woman, infant, idiot, insane person, or non-resident.

§ 9. The said corporation is hereby authorised to construct, erect, build, make and use, a single, double or treble Railroad or ways, of suitable width and dimensions, to be determined by the said corporation, on the line course or way designated by the directors as aforesaid, as the line, course or way whereon to construct, erect, build and make the same; and shall have power to regulate the time and manner in which goods and passengers shall be transported, taken and carried on the same, and shall have power to erect and maintain toll-houses and other buildings for the accommodation of their concerns as they may deem suitable to their interests.

§ 10. Whenever it shall be necessary for the construction of their single, double or treble Railroad or way, to intersect or cross any stream of water or water courses, or any road or highway betwixt the places prescribed by the first section of this act, it shall be lawful for the said corporation to construct their way or ways across or upon the same; but the corporation shall restore the stream or water course, or road, or highway thus intersected, to its former state, or in a sufficient manner not to have impaired its usefulness.

§ 11. It shall be lawful for the owners of the land over which said Railroad shall be constructed, to cross the said Railroad with his or her servants, cattle, teams and carriages, for the purpose of using and managing their respective farms, over which the said Railroad shall pass, doing no unnecessary damage to said Railroad.

§ 12. It shall be lawful for the company hereby incorporated, from time to time to fix, regulate and receive the tolls and charges by them to be received for transportation of property or persons on the single, double or treble Railroad or ways aforesaid, hereby authorised to be constructed, erected, built, made and used.

§ 13. If any person shall wilfully do or cause to be done, any act or acts whatever, whereby any building, construction or work of the said corporation, or any engine, machine or structure, or any matter or thing appertaining to the same shall be stopped, obstructed, impaired, weakened, injured or destroyed, the person or persons so offending shall be deemed guilty of a misdemeanor, and shall forfeit and pay to the said corporation double the amount of damages sustained by means of such offence or injury, to be recovered in the name of the said corporation, with costs of suit, by action of debt.

§ 14. It shall be lawful for the directors to require payment of the sums to be subscribed on the capital stock, at such times, and in such proportions, and on such conditions, as they shall deem fit, under the penalty of the forfeiture of all previous payments thereon; and shall give notice of the payments thus required, and of the place and time when the same are to be paid, at least thirty days previous to the payment of the same, in a public newspaper published in the cities of New-York, Hudson, Albany and Troy, and in the villages of Poughkeepsie and Newburgh, and also in one of the public newspapers in the county of Westchester.

§ 15. The said corporation shall possess the general powers, and be subject to the general restrictions and liabilities prescribed by such parts of the eighteenth chapter of the first part of the Revised Statutes, as are not repealed.

§ 16. The directors of said company shall make an annual report, in detail, of their proceedings and expenditures, verified by the affidavit of at least two of them, which report shall be filed in the office of the Secretary of State; and in like manner shall, at the expiration of each year, for the term of fifteen years after the completion of said road, file in said office a detailed statement of tolls received on such Railroad, and of all monies expended by said company, for repairs or otherwise, for the purpose of said Railroad.

§ 17. If the Legislature of this state shall, at the expiration of ten and within fifteen years from the completion of said Railroad, make provision by law for the re-payment to the said corporation of the amount expended by them in the construction of said Railroad, together with all monies expended by them for permanent fixtures for the use of said Railroad, with interest on such sums, at the rate of fourteen per centum per annum, together with all monies expended by said company, for repairs or otherwise, for the purposes of said road, after deducting the amount of tolls received on said road, then the said Railroad, with all fixtures and appurtenances, shall vest in and become the property of the people of this State.

§ 18. For the purpose of continuing the branches of said Railroad into the States of Connecticut and Massachusetts, the corporation shall have and possess, with the consent of the Legislatures of those States, the same powers, privileges and authority, as have by this act been given for the construction and management of the main Railroad.

§ 19. The Legislature may at any time alter, amend, modify or repeal this act.

AN ACT TO AMEND AN ACT ENTITLED "AN ACT TO INCORPORATE THE NEW-YORK AND ALBANY RAILROAD," PASSED 17TH APRIL, 1832,

Passed May 9, 1836.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows:

§ 1. The time for commencing the construction of the New-

York and Albany Railroad is hereby extended for two years from the passage of this act.

§ 2. Charles Henry Hall, Gideon Lee, Isaac Adriance, Benson McGowan, John Harris, Francis Fickett, Lewis Morris, Jeremiah Anderson, Albro Aikin, Taber Belden, Ebenezer Foster, Stephen Warren, James Van Schoonhoven, Thomas W. Olcott, and Samuel Cheever shall be commissioners for opening books to receive subscriptions to the capital stock of said company, instead of those named in the act of incorporation, but with the like powers and subject to the like duties.

§ 3. It shall and may be lawful for the said commissioners, within six months after the passage of this act, giving the notice required by said act of incorporation, to open books to receive subscriptions to the capital stock of the said company; and as soon as one million of dollars shall be subscribed, and the first instalment thereon paid in, to give like notice for a meeting of the stockholders for the purpose of electing directors.

§ 4. The said company are hereby authorised, after they shall have completed not less than thirty miles of said road in the county of Westchester, to commence the said road upon the island of New-York, with the consent of the corporation of the city of New-York, and to construct the same in such sections as they may deem most eligible, and as fast as they may obtain means for so doing; and such portion of said Railroad as may be so constructed shall be vested in said company, for and during the period allowed in the original act of incorporation; and nothing in this act shall be so construed, as to infringe such rights and privileges as the Harlæm bridge company possess, by virtue of any statute of this State, nor shall any construction be given to this act to confer any rights or privileges on said Harlæm bridge company, other than it now has.

§ 5. The corporation hereby created shall possess and enjoy all the privileges and provisions which are granted to and made in favor of the corporation created by the act entitled "An Act to provide for the construction of a Railroad from Attica to Buffalo," passed May 3d, 1836, and shall be subject to all the conditions and restrictions which by the act aforesaid are imposed upon the corporation therein referred to. except as herein provided.

§ 6. Any application to be made to a Vice-Chancellor under this act, shall be made to the Vice-Chancellor of the circuit in which the land proposed to be taken shall be situated. All notices and meetings required in the act above referred to, shall be published and held in one of the counties through which the said Railroad hereby authorised, is to be made.

§ 7. The said corporation is hereby authorised to construct a single, double or treble Railroad, of suitable width and dimensions, to be determined by the said corporation, on the course designated by the dierctors as aforesaid, and shall have power to regulate the time and manner in which goods and passengers shall be transported, taken and carried on the same; and shall have power to erect and maintain toll-houses, and other necessary buildings for the accommodation of their concerns. The said corporation shall not charge or receive a greater sum than at the rate of five cents per mile for the transportation of any passenger and his ordinary baggage.

§ 8. Whenever it shall be necessary, for the construction of their said road, to intersect or cross any stream of water or water courses, or any road or highway between the places prescribed by this act, it shall be lawful for the said corporation to construct their road across, or upon the same; but the corporation shall restore the stream or water courses, or road or highway thus intersected, to its former state, or in a sufficient manner not to have impaired its usefulness; and shall, moreover, erect and maintain sufficient fences upon the sides of the route of their said road; but nothing in this act, or the act hereby amended, shall be so construed as to authorise the construction of a bridge across the Hudson river.

§ 9. Whatever damages the Canaan and Union Village turnpike road company may sustain by the depreciation of their stock in said road, or otherwise, in consequence of the making and using the said Railroad, may be appraised as prescribed by the seventh section of the act herein above referred to, upon the application of the said Railroad company; and they may enforce the collection of the said damages so appraised against the said Railroad company in any court of law or equity. The said damages shall not be appraised as aforesaid until eighteen months after the said Railroad shall be made and put in operation.

§ 10. The second section of the act hereby amended shall be so modified as to read as follows, viz: If the corporation hereby created shall not, within three years after the passage of this act, commence the construction of said Railroad or ways, and expend at least the sum of two hundred thousand dollars thereon, then the right of said corporation shall be null and void. Such parts of the act hereby amended as may be inconsistent with the provisions of this act are hereby repealed.

§ 11. The Legislature may at any time alter modify or repeal this act.

State of New York, }
Secretary's Office, }

I have compared the preceding with an original act of the Legislature of this State, on file in this office, and do certify, that the same is a correct transcript therefrom, and of the whole of said original. ARCH'D. CAMPBELL,
Dep. Secretary.

Albany, May 11, 1836.

AN ACT

TO PROVIDE FOR THE CONSTRUCTION OF A RAILROAD FROM ATTICA TO BUFFALO.

Passed May 3d, 1836.

The People of the State of New-York, represented in Senate and Assembly, do enact as follows:

§ 1. All persons who shall become stockholders pursuant to this act, shall be, and they are hereby constituted a body politic and corporate, for the term of fifty years, by the name of "The Attica and Buffalo Railroad Company," for the purpose of constructing and maintaining a Railroad between the village of Attica, in the county of Genesee, and the city of Buffalo, in the county of Erie, commencing in the village of Attica at the termination of the Tonawanda Railroad, and running thence to the city of Buffalo, on such route as a majority of the directors of said company shall determine to be best adapted to the public accommodation, and take, transport, carry and convey property and persons upon the same, by the power and force of steam, of animals, or any mechanical power, or of any combination of them.

§ 2. If the said corporation shall not, within two years from the passage of this act, commence the construction of the said road, and expend at least the sum of twenty-five thousand dollars thereon, and shall not within four years from the passage of this act, finish the said road and put the same in operation, then the said corporation shall thenceforth forever, cease, and this act shall be null and void.

§ 3. The capital stock of the said corporation shall be three hundred and fifty thousand dollars, which shall be divided into shares of fifty dollars each: which shares shall be deemed personal property, and be transferred in such manner as the said corporation shall in its by-laws direct.

§ 4. George Cooley, James Douglass, Alden S. Stevens, Pierre A. Barker, John W. Clark, James Stryker, Moses Disbrow, Robert Earll, Guy H. Goodrich, Israel T. Hatch, Charles Gardner, Morgan L. Faulkener, and Elijah Ford, shall be commissioners, whose duty it shall be, within one year after the passage of this act, at some suitable place in the village of Attica and in the city of Buffalo, and in such other places as they, or a majority of them shall direct, to open books to receive subscription to the capital stock of the said corporation; and thirty days' public notice shall be given by the said commissioners of the time and place of the opening of such books, in one of the public newspapers in the said village and city, and in the state paper; and the said commissioners shall, at the time of any subscription, require the payment to them by the person or persons subscribing, of ten dollars towards and upon every hundred dollars so subscribed; and unless the same shall be paid, the subscription shall be invalid: and in case a greater amount in the whole shall be subscribed, than three hundred and fifty thousand dollars, the said commissioners shall distribute the stock in such manner as a majority of them shall deem most advantageous to the public interest: but in case the capital stock of said corporation shall not all be subscribed, then the said commissioners shall be authorized to re-open the said books, at such other times and places, and in such manner, and after such notice, as they, or a majority of them, shall direct; and whenever the said capital stock shall have been subscribed, and distribution made as aforesaid, or as soon thereafter as practicable, it shall be the duty of the said commissioners to give thirty days' notice, in a public newspaper, in each of the counties aforesaid, and in the state paper, for a meeting of the stockholders, at such time and place as the said commissioners, or a majority of them, shall appoint, to choose thirteen directors; and such election shall be then and there made by such of the stockholders as shall attend for that purpose, either in person or by lawful proxy; each share of the capital stock owned by a citizen of the United States, entitling a stockholder to one vote: and the said commissioners shall be inspectors of the first election of directors of the said corpora-

tion, and shall certify, under their hands, the names of those duly elected, and deliver over the subscription money and books to the said directors; and the time and place of holding the first meeting of the directors shall be fixed by the said commissioners. And the said directors shall cause such examinations and surveys for the said Railroad to be made, as may be necessary to the selection by them of the most advantageous course for the said road, from the village of Attica to the city of Buffalo; and the said directors shall, after such examinations and surveys shall have been made, select, and by certificates under their hands and seals, designate the course which they shall deem most advantageous for the said road; one of which certificates shall be filed in the office of the clerk of each of the counties aforesaid, through which the said road shall pass; and the course so selected and certified, or as altered in the manner hereinafter provided, shall be deemed the course on which the said corporation shall construct the said road as hereinafter mentioned. But any person through whose lands the line of said road shall be designated, who may consider himself the aggrieved thereby, may, within thirty days after receiving written notice of the filing of the certificate as aforesaid, apply to the Vice-Chancellor of the eight circuit, setting forth the nature of his grievance and his objections to the route designated; and it shall be the duty of the said Vice-Chancellor, if he considers sufficient cause therefor to exist, to appoint three disinterested persons, one of whom shall be a practical engineer, as commissioners. The said commissioners, or a majority of them, including said engineer, shall have power, after the examination thereof, and hearing of the parties, to affirm or alter the course of the said road through the said lands, as they may deem consistent with the just rights and interests of the said parties and the public. The determination of the said commissioners shall, within thirty days after their appointment, be made and certified by them, and the certificate filed in the office of the clerk of the county as aforesaid. The said Vice-Chancellor shall be entitled, in each case, on receiving the application for his services in the premises, to a fee of five dollars; and the said commissioners shall be entitled to a compensation of three dollars each, per day, for their services, to be paid by the person making the application: and in case the said course thus previously designated, shall be altered by said commissioners, the said company shall refund to said applicant, the fees and compensation paid by him as aforesaid, to be recovered in an action for money had and received, in any court having cognizance of the same.

§ 5. The first directors to be chosen shall hold their offices until the first Monday in June, in the year next succeeding their election, and until others shall be chosn; and every election of directors thereafter, shall be annually on the first Monday in June in each and every year, at such time and place in either of the counties aforesaid, as the said directors shall appoint, giving thirty days previous notice in the manner prescribed for giving notice by the commissioners for the opening of the books. Every such election shall be held under the inspection of five stockholders not being directors, who shall be previously appointed by the board of directors. All elections shall be by ballot, and a plurality of the votes shall constitute a choice: one at least of said directors shall reside in each of the counties before mentioned. In case of an equal number of votes for any two or more directors, the directors shall by ballot determine who shall be entitled to a seat at the board; every stockholder, being a citizen of the United States, shall be entitled to one vote, personally or by proxy, on every share held by him thirty days previous to such election.

§ 6. In case it should at any time happen that an election of directors shall not be made on any day when pursuant to this act it ought to have been made, the said corporation shall not for that cause be deemed to be dissolved; but such election may be subsequently made; and the directors chosen for the year preceding, shall hold their seats at the board until such election shall be made.

§ 7. The said corporation is hereby authorized to construct a single or double road, of suitable width and dimensions, to be determined by the said corporation, on the course designated by the directors as aforesaid; and shall have power to regulate the time and manner in which goods and passengers shall be transported, taken and carried on the same; and shall have power to erect and maintain toll-houses and other necessary buildings for the accommodation of their concerns. The said corporation shall not charge or receive a greater sum than at the rate of three cents per mile for the transportation of any passenger and his ordinary baggage.

§ 8. In case any married woman, infant, idiot, or insane persons, or non-resident of the State, who shall not appear after such notice, shall be interested in any such land or real estate, the said judge shall appoint some competent and disinterested person to appear before the said commissioners, and act for and in behalf of such married woman, infant, idiot, insane person or non-resident.

§ 9. The corporation is hereby empowered to purchase, receive and hold such real estate as may be necessary for accomplishing the objects for which it is granted; and may, by their agents, surveyors and engineers, enter upon and take possession of and use, all such lands and real estate as may be indispensable for the construction and maintenance of their single or double Railroad or way, and the erection of buildings necessary for the stationary engines; and may also receive, hold and take, all such voluntary grants and donations of land and real estate, for the purpose of said road, as shall be made to the said corporation, to aid in the construction, maintenance and accommodation of the said road; but all lands or real estate thus entered upon, which are not donations, shall be previously purchased by the said corporation of the owner or owners of the same, at a price to be mutually agreed upon between them; and in case of any disability on the part of the owners of such lands, to contract or sell the same, on account of insanity, infancy or otherwise, refusal to sell, or disagreement as to price, and before making any portion of said road on said land, the said corporation shall present a petition to the first or senior judge of the county in which such land may lie setting forth the necessity of such land for the making of said road, and the failure to obtain the same by agreement, with the reasons thereof, and the name and residence of each owner, if known, together with a map, plan and profile of the road, and praying for the appointment of a jury of appraisers. The said judge shall thereupon direct reasonable notice in writing to be given to the owners of such lands, of the time of drawing such jury, which shall be at the clerk's office in the county where the lands are situate, and upon due proof thereof, and hearing the parties, or such of them as may attend and object to the regularity of the proceedings on the part of the said corporation, such judge, together with the clerk of said county, shall draw from the grand jury box of the county, the names of twelve competent and disinterested jurors, who, by an order to be made by such judge and entered in the common rule book of the court of common pleas, shall be appointed appraisers of the damage to be sustained by such owners in the construction of such road; and should any person or persons so designated, refuse or neglect to serve on said jury, or be disqualified, the vacancy or vacancies shall be filled by the said judge in manner aforesaid.—Said appraisers shall, before entering upon the duties of their office, take the oath prescribed by the sixth article of the constitution. The said judge shall appoint a time and place for said appraisers to meet, and shall cause due notice in writing to be served upon such owners, or in case of absence, to be left at their usual place of residence, if within the county, and if not to be put up in some conspicuous place on the premises, of the time and place of meeting for the purpose of completing said appraisement, and shall also cause due notice to be given to the said appraisers of the time and place of meeting; and said appraisers shall at such time proceed to view the premises; they shall have power to examine witnesses under oath, which oath any one of the said appraisers is hereby authorised to administer, and shall, without fear, favor or partiality, assess the value of the land taken, and the damages such owners may sustain by the taking of their lands, by injury to buildings, and in the construction of such road, without any deduction on accouut of any real or supposed benefit or advantage which such owners of such lands may derive by the construction of such road. They shall make an inquisition or certificate of their appraisement, specifying the items appraised, which shall be signed by a majority of them, and contain a minute and accurate description of the land appraised, with a map thereof, and shall present the same, with the testimony taken, to the county clerk, who shall file them in his office. The ballots drawn from the jury box shall be replaced by the county clerk. Upon proof to the said judge, within thirty days after the filing of the inquisition of the jury, of payment to the owner or owners, or of the depositing to their credit, in such bank as the judge shall direct, of the amount of such appraisement, and of all costs and expenses attending it, including reasonable counsel fees, (to be taxed and certified by said judge,) the judge shall make an order particularly describing the land, and reciting the appraisement and the mode of making it; which order shall be recorded in the office of the clerk of the county in which the land is situated, in like manner as if the same were a deed of conveyance; and the said corporation shall thereupon become possessed of such land, during the continuance of the corporation and may use the same for the purpose of said road. This section shall not be so construed as to prevent any individual through whose land said road may run, from the right of crossing the same at suitable and convenient places, for farming and other necessary purposes, nor to authorise the said corporation to take, except by agreement with the owner thereof, any timber, stone, or other

materials on any land, except that on which the said Railroad or way shall be constructed. Nor shall the corporation hereby created, enter upon or take possesson of lands belonging to any association of individuals formed under the act of the last session of the legislature, whose lands have been purchased for the purpose of constructing a Railroad thereon,except such as is hereinafter provided. The compensation of the appraisers shall be determined by the said first or senior judge at a sum not exceeding two dollars per day, in addition to their reasonable disbursements, to be paid by the said corporation. Whenever the verdict of the appraisers shall not exceed the sum tendered by the corporation for the lands proposed to be taken, in such case the corporation shall not be compelled to pay any costs or expenses to the owner of the property appraised, except to such owners as named in the eighth section.

§ 10. The said directors may make and establish such by-laws, rules and regulations as shall from time to time appear necessary for the good government of the said corporation, and the preservation and due management of their property, interest and affairs.

§ 11. Whenever it shall be necessary for the construction of their said road to intersect or cross any stream of water or water courses, or any road or highway, between the places prescribed by the first and fourth sections of this act, it shall be lawful for the said corporation to construct their road across or upon the same; but the corporation shall restore the stream or water course or road or highway thus intersected, to its former state, or in a sufficient manner not unnecessarily to have impaired its usefulness; and shall moreover, erect and maintain sufficient fences upon the sides of the route of their said road.

§ 12. It shall be lawful for the said company, from time to time, to fix, regulate and receive the tolls and charges by them to be received for transportation of property or persons on the said road, subject to the restrictions before mentioned.

§ 13. If any person or persons shall wilfully do or cause to be done, any act or acts whatever, whereby any building, construction or work of the said corporation, or any engine, machine or structure, or any matter or thing appertaining to the same, shall be stopped, obstructed, impaired, weaked, injured or destroyed, the person or persons so offending shall be guilty of a misdemeanor, and shall forfeit and pay to the said corporation treble the amount of damages sustained by means of such offence or injury, to be recovered in the name of the said corporation, with costs of suit, by action of debt.

§ 14. It shall be lawful for the directors to require payment of the sums to be subscribed to the capital stock, at such times, and in such proportions, and on such conditions, as they shall see fit, under the penalty of the forfeiture of their stock, and of all previous payments thereon; and they shall give notice of the payments thus required, and of the place and time, when and where the same are to be paid, at least thirty days previous to the payment of the same, in the paper published by the state printer, and in one newspaper in each village and city herein mentioned.

§ 15. The said corporation shall possess the general powers, and be subject to the general liabilities and restrictions prescribed by such part of the eighteenth chapter of the first part of the Revised Statutes, as are not repealed.

§ 16. The directors of said company shall make an annual report in detail of their proceedings and expenditures, verified by the affidavits of at least two of them; which report shall be filed in the office of the Secretary of State; and in like manner shall, at the expiration of each year after the completion of said road, file in said office a detailed statement of tolls received on such road, and of all moneys expended by said company for repairs or otherwise for the purposes of said road.

§ 17. If the Legislature of this State shall, after the expiration of ten, and within fifteen years from the completion of said road, make provision by law for the repayment to the said company of the amount expended by them in the construction of said road, together with all moneys expended by them for permanent fixtures for the use of said road, with interest on such sums, at the rate of ten per cent per annum, together with all moneys expend-by said company for repairs or otherwise, for the purposes of said road, after deducting the amount of tolls received on said road, then the said road, with all its fixtures and appurtenances, shall vest in, and become the property of, the people of this State.

§ 18. It shall be lawful for the company hereby incorporated, to cross, intersect, join or unite with any Railroad company, canal company, or private company, when associated under any law of this State, for the purpose of constructing a Railroad on lands purchased for that purpose, at any point which the directors of the said companies may think advisable, on such terms as the directors of the two companies respectively may agree upon: and in case of disagreement between the directors of said companies, then at such point, and upon such terms, as the court of chancery of this State shall determine to be equitable and just between the said companies.

§ 19. The said company shall, at regular times, when they start or run their cars, be required to supply sufficient accommodation for public convenience, and shall carry and transport all the passengers and their property, or either, for those who may demand the same at the place of starting, within a reasonable time previous thereto, or when the car or cars shall pass at the junction of any other Railroad, or at any point where a siding shall be constructed for the accommodation of any part of the country, on the due payment of the customary tolls provided for by this act and the bye-laws of said corporation: and in case the said company or its agents shall refuse or neglect so to do, the said corporation shall then be liable to the person or persons aggrieved, for such amount of actual damage as may have been sustained by him or them, to be recovered by suit at law with costs.

§ 20. It shall be the duty of the said company, when applied to by the postmaster-general, to convey the mails of the United States on the said road, and in case they shall not agree with him as to the rate of compensation therefor, and as to the time, manner and condition of carrying the same, it shall be lawful for the Governor of this State to appoint three commissioners, who, or a majority of them, after fifteen days notice in writing to said company, shall determine and fix the prices, terms and conditions aforesaid.

§ 21. If consequential damages shall happen after the construction of said road, not foreseen by the appraisers, and not taken into the estimate on the first appraisal, or in the amount paid by the said company where the lands have been purchased, any person whose lands or buildings shall be injured by such consequential damages, may apply for and have the same appraised under the ninth section of this act, in the manner provided therein.

§ 22. The legislature may at any time alter, modify or repeal this act.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted. MOSES LONG.

General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,

Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS

OF VOLUME II. OF THE

CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wildnerness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

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THOS. O. DAVIS.

Chicago, March 25, 1836.

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NEW-YORK AND ERIE RAILROAD.

TO CONTRACTORS.—Proposals will be received at the Engineer's Office of the New-York and Erie Railroad Company, in the village of Binghampton, on and until the 30th day of June next, for grading 69 miles of the Railroad, from the village of Owego, in Tioga County, to the village of Deposit in Delaware County.

Proposals will also be received at the Engineer's Office, in Monticello, on and until the 11th day of July next, for grading 48 miles of the Railroad through the county of Sullivan, extending from the Delaware and Hudson Canal up the valley of the Neversink, and thence to the mouth of the Callikoon Creek, on the Delaware River.

Plans and profiles of the line above mentioned, staked out in convenient sections, with printed forms of the contracts, will be ready for exhibition at the said offices twenty days before the days of letting above specified.

The Company reserve the privilege of accepting only such proposals as they may deem for their advantage. JAMES G. KING, President.

New-York, 26th April, 1836. 15—tf

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, MAY 28, 1836. [VOLUME V.—No. 21

CONTENTS:

HARLAEM CANAL.—The original and amended charters of the Harlaem Canal, will be found in the Journal this week. We shall give, at an early date some account of that contemplated work.

To the Editor of the Railroad Journal.

Dear Sir—I noticed not long since a communication in your paper of Feb. 13, 1836, signed S. D., also another in that of April 30th, 1836, signed C. R. W.

These gentlemen appear much at a loss to understand my communication to James G. King, Esq., President of the New York and Erie Railroad Company, which was published in your paper of January 13, 1836, respecting the power of locomotive engines upon Railroads, &c.

I agree with the gentlemen that steep grades are an objection to Roads for the use of locomotive power; and that they should be avoided when it can be done within a reasonable expense. If, in my communication to Mr. King, I stated that greater elevations are surmounted on the Baltimore and Ohio Road, by locomotive steam power, than was formerly thought practicable, it was with a view of showing that greater elevations than has heretofore been deemed possible, could be overcome without resorting to *stationary* power on the New York and Erie Railroad; a fact which must be admitted by all who are familiar with the route, and know the power and performance of *American Locomotives*. Even if S. D., or C. R. W. *have* constructed Railroads upon the plan of level, or slight ascents, and inclined planes, I trust they are willing to admit that a different plan is now deemed, by some of the oldest and ablest Engineers in the country, to be preferable, in certain cases, both as it regards economy in construction, and facility in transportation. If they have not, however, constructed Roads upon the above, or *any other* plan, and—independently of practice—have theory only sufficient to make calculations, they will do well to use much caution in the location of works, upon which they may be hereafter engaged.

C. R. W. desires proof that he is in error. I shall, however, at this time, only request him to examine some of those American Locomotives, on which the power is applied to *four*, instead of *two* wheels, and to go through with his calculations again; when he may, perhaps, entertain views different from those expressed in his late communication. If C. R. W. is disposed to communicate, in a friendly spirit, which is evidently not the case in the article above referred to, I will with pleasure give him my views in detail, and data for them, if necessary. As he appears fond of theory, he may, perhaps, answer the following query, viz. What rate of ascent per mile is preferable, for the use of locomotive steam power, to that of stationary, upon a straight line of Railroad, allowing the transportation to be equal both ways, the cost for construction equal in both cases, the distance the same, and the transportation equal to one half of what the Road is capable, with a good permanent double track, upon a level Road, supposing the Road to be not less than 100 miles in length?

P. S. Would it not be aswell for C. R. W., in his future communications, to transpose the initials of his name.?

Yours respectfully,

JAMES SEYMOUR.

Monticello, May 26th, 1837

PAMBOUR ON LOCOMOTION

Continued from page 314.

CHAPTER II.

ARTICLE II.

OF THE MERCURIAL STEAM-GAUGE

§ 3. *Experiments on the Pressure of Steam in the Locomotive Engines.*

As those experiments serve to illustrate the foregoing principles, as they give the amount of the effect produced by the miter and the additional parts of the valves, and as they, besides, are the foundation of some of the calculations we shall make on the engines, we shall here give an account of some of them.

1. ATLAS; valve $2\frac{1}{4}$ inches in diameter. miter $2\frac{3}{8}$ inches, cut with a slant in the middle of the breadth of the valve, as may be seen in fig. 22; levers 3 inches and 15 inches, or in the proportion of 1 to 5; second safety valve similar to the first, but fixed at too high a pressure to blow in any of the experiments.

The engine being brought to the mercurial gauge on the 15th July, 31st July, and

6th August, 1834, gave the corresponding degrees as follows:

	Degrees of the balance.	Corresponding pressure per square inch, by the mercurial gauge.
No. I.	0	4
	10	15.25
	11	15.50
	20	25.50
	20.25	25.75
	20.75	26.25
	22.50	27.50
No. II.	20.25	24.75
	20.50	25.25
	22	25.75
	23	26.25
	23.75	27
	25	28.25
	30	33.50
	30.25	34.50
	30.50	35
	33	37.50
	33.25	38
No. III.	51.25	54
	51.50	54.50
	51.75	55
	52	55
	52.50	55.50

In the first series of those experiments the degrees of the balance were taken with the valve resting on its seat, at least as much as possible, that is to say, the valve emitting scarcely any steam. To obtain this, the engine was brought to the gauge when its work was finished, at the moment when the fire diminishing rapidly, the pressure also decreased continually, so that the blowing at the valve became gradually less, and at last ceased almost completely. In proportion as the pressure indicated by the mercurial gauge was diminished, the screw of the balance was loosened, in order that it might continue to show the inferior pressures that were produced.

The degree corresponding to zero on the balance, could not be taken exactly; the balance having already fallen a little below zero when the index marked 4 lbs.

In the second series of experiments the engine was, on the contrary, taken at the moment when the screw of the spring-balance being loosened on purpose, the boiler contained steam at 20 lbs. pressure only. By forceing the fire and tightening by degrees the screw of the balance, the above-marked degrees were produced, and the corresponding numbers of the steam-gauge inscribed. We have seen, that in the first series all the degrees were taken with the valve resting on its seat. Here, on the contrary, the pressure, augmenting rapidly in the boiler, raised continually the valve, so that all the degrees were taken with a blowing-valve. However, as the screw of the balance was tightened in proportion as the pressure increased, the blowing was never very considerable, and scarcely ever showed above 1 or 2 lbs. on the spring-balance.

In the third series, the engine was in its usual working state; that is to say, the spring-balance marking 50 lbs. when the valve was shut by pressing upon the lever with the hand, and the valve rising beyond that point by the blowing of the steam, as far as the force of the steam was able to push it. As the screw was not tightened in proportion as the pressure augmented, the valve in this last case was raised much higher than in the preceding one.

By examining the first series, we see that, in those experiments, the pressure by the mercural gauge is equal to the pressure marked by the spring-balance, with an addition of 5 lbs.

In the second series, we have only 4 lbs. to add to the degrees of the balance.

And in the third series, only 3 lbs.

Those differences are easily explained by referring to the preceding principles.

The valve-lever of this engine, when weighed at the place of the valve, as explained above, gave $7\frac{1}{2}$ lbs.; the disk of the valve weighed $10\frac{1}{4}$ ounces; which makes for those two objects together 8.14 lbs. weight, directly applied on the valve.

Besides, the tolal weight of the balance was 4 lbs., and turned upside down it marked half a pound, which gives for the weight of the rod and spring

$$\frac{4+1.5}{2}=2.75 \text{ lbs.}$$

This weight of 2.75 lbs., acting at the end of the lever, must be multiplied by the length of the lever. So that the whole addition to be made to the tension marked by the spring, is

$2.75 \times 5 = 13.75$, effect of the rod and spring at the end of the lever.
8.14, weight of the lever and disk of the valve.
Sum 21.89

And as the diameter of the valve is 2 inches, which gives a surface of 4.91 square inches, those 21.89 lbs. divided per unit of surface or square inch, give

$$\frac{21.89}{4.91}=4.46 \text{ lbs.}$$

So that the real pressure surpasses by 4 or 5 lbs. that which results from the spring of the balance.

This result applies to the valve resting on its seat, that is to say, in taking its diameter at $2\frac{1}{2}$ inches, which gives us for its surface in square inches, and consequently for divisor, 4.91; but as, by the effect of the blowing, the effective area of the valve is augmented, we must not be surprised, if, by a moderate blowing, this addition of 5 lbs. be reduced to 4 lbs., and even to 3 lbs. for a valve that blows violently. If, for instance, the calculation is applied to a pressure of 52 lbs. marked at the balance, we shall have

$(52 \times 2.75) \times 5 = 273.75$ Effect of the weight suspended at the end of the lever, including the rod and spring
8.14 lever and valve.
281.89 total pressure.

Which, divided by 4.91 square inches, gives for each 57.41 lbs.

But in reality the corresponding point of the mercurial gauge is only 55 lbs., the blowing must therefore have augmented the real area of the valve to 5.13 square inches instead of 4.91, that is to say, must have brought its real diameter to 2.55 inches, instead of 2.50 inches.

So it is an addition of $\frac{5}{100}$ of an inch to the diameter of a valve of 2.50 inches, that has been sufficient to produce the difference of $2\frac{1}{2}$ lbs. we observe here. That is the effect of the blowing of the valve, which as we see is considerable; and it can only be known by the mercurial gauge, and not by any measures taken on the engine itself.

II. Vesta; valve $2\frac{1}{2}$ inches diameter; lever 3 inches and 36 inches, or in the proportion of 1 to 12. Second valve of the same diameter as the first, with a lever of $2\frac{1}{2}$ inches and 15 inches, or in the proportion of 1 to 6, marking 50 on the balance, and giving issue to the steam at the same time as the first, but so difficult to move, that 5 lbs. more by the mercurial gauge causes no motion in it. This engine brought to the mercurial steam-gauge on July 28, and August 5, 1834, in the same manner as the *Atlas*, gave the following results:—

	Degrees of the spring-balance. lbs.	Corresponding pressure per square inch, by the mercurial gauge. lbs.
No. I.	8.50	24
	9	24.50
	9.50	26
	10	27
	10.25	28
	10.50	29
	10.75	30
	12	31.50
	12.25	32
	12.50	33
	12.75	34
	13.25	35
	13.50	36
	13.75	37
	14	38
No. II.	20	starting point of the valve.
	21	50
	21.25	51
	21.50	52
	22	53.25
	22.25	54
	22.50	55

The experiments of the first series were made as much as possible with the valve resting on its seat; that is to say, that the screw of the spring-balance was tightened in proportion as the pressure augmented, so that there was scarcely any blowing,

For those of the second series, the engine was brought to the mercurial guage in its usual working state, with the spring-balance at 20, when the lever is pressed upon to shut the valve, and the degrees observed are those that result from the blowing of the steam beyond that point; that is to say, that these degrees are taken with a valve rising from degree 20.

The valve lever of this engine being divided in the proportion of 1 to 12, every weight inscribed on the spring-balance produces on the valve a pressure 12 times as great. The surface of the valve is 4.91 square inches. Multiplying therefore the degrees of the balance by 12, and dividing the produce by 4.91, the pressure resulting from the spring, considered by itself, will be obtained. That calculation is generally considered sufficient.

If the results thus obtained be compared with the corresponding degrees of the mercurial guage in the first series of experiments, it will be found that those results rea always below the real pressure by 3 lbs. or 4 lbs.; this must therefore be the effect of the weight of the additional parts that we are considering.

In fact, the lever of this engine, reduced onpurpose by the constructor, weighs 15 lbs. at the place of the valve. The disk of the valve weighs 10 ounces. The balance is not placed in its usual position; it is turned upside down, so that the lever, instead of supporting the rod of the balance, bears only its foot. The weight of this foot is 0.25lb.; for the whole balance weighs 2 lbs., and when suspended with the rod downwards it marks 15 lbs., which is the surplus of the weight of the rod over the weight of the foot; wherefrom results that the weight of the foot is, as has been said, 0.25 lb.

So that the addition owing to these different objects is

	lbs.
Weight of the lever and disk of the valve	15.60
Effect of the foot suspended to the lever 0.25 lb × 12	3.00
Sum . . .	18.60

This additional weight divided over each square inch of the surface of the valve makes 3.8 lbs., so that the calculation in the case of the valve resting on its seat is verified.

As for the cases of a blowing-valve, or those of the second series, the fact shows that the real pressures are less than they would be with a valve resting on its seat by 4 lbs. or 5 lbs., no other means existing of discovering that difference than by the mercurial gauge; so that if we had calculated the pressure in this case in the same way as in those of a valve resting on its seat, that is to say, by dividing the whole weight over a surface of 4.91 inches, or a valve of 2.50 inches diameter, we would have reckoned 4 lbs. too much in each case. It happens here that when the valve is considerably raised, the reduction, owing to the blowing, compensates at last for the addition required by the weight of the lever, disk, and balance-rod.

These examples prove how faulty would be any calculation of power or effect of engines, the real pressure of which had not been determined by manometrical processes; and it has been already observed, that of all the railways at present in activity, the Manchester and Liverpool Railway is the only one where a mercurial steam-gauge is to be found,

III. Firefly; valve 2.50 inches in diameter; miter 3 inches; levers 3 inches and 36 inches. This engine gave on the 2d of August, 1834:

Degrees of the balance			Corresponding pressure per square inch, by the mercurial gauge.
lbs.			lbs.
17	starting point of the valve,		
17	...	...	50
20	...	...	51

We see that, for this engine, the addition to be made to the pressure marked by the spring-balance is 8.5 lbs. per square inch for lever, disk, and balance; and that in the cases of a blowing-valve, the reduction produced by the miter may amount to 6 lbs., this miter being really considerable.

IV. Leeds; valve 3 inches; miter 3.125 inches; lever 3 inches and 36 inches; second valve screwed at too high a pressure to let any steam escape during the experiments. The engine gave, on the 28th of July, and 6th of August, 1834:

	Degrees of the balance.			Corresponding pressure per square inch, by the mercurial gauge.
	lbs.			lbs.
No. I.	28	starting point of the valve.		
	29.50	...	...	50
	29.75	...	...	51
	30	...	...	51.5
	30.50	...	...	52
	31	...	...	53
No. II.	31	starting point of the valve.		
	32	...	...	54
	33	...	...	55
	34	...	...	56
	36	...	...	57.5
No. III.	32	starting point of the valve.		
	34	...	...	60

V. Vulcan; with valves and levers exactly similar to those of the preceding engine; second valve different, but also fixed too high to give any sign during the experiments: gave on the 28th of July, 1834:

Degrees of the balance.			Corresponding pressure per square inch, by the mercurial gauge.
lbs.			lbs.
31	starting point of the valve.		
35	...	...	56.5

VI. Fury; with valves and levers exactly similar to those of the preceding engine; second valve different, but also fixed too high to give issue to the steam during the experiments: gave on the 6th of August, 24th and 25th of July, 1834:

	Degrees of the balance.			Coreesponding pressure per square inch, by the mercurial gauge.
	lbs.			lbs.
No. I.	31	starting point of the valve.		
	33.50	...	...	56.50
	33.75	...	...	57.50
	34	...	...	58
	36	...	...	62.50
No. II.	32	starting point of the valve.		
	36	...	...	67

In the first series of experiments with the Leeds, the blowing of the valve was from the degree 28 to the degree 31 of the spring-balance. In the second series of the same engine it was from 31 to 36, which is considerable. In the third series it was less, say 32 to 34. It is therefore in that third series that we find the smallest reducing effect of the miter.

The experiment of the Vulcan is the common working state of the engine.

In the experiments of the Fury, there are two different effects of miter as well as in those of the Leeds.

In consequence of the weight of the levers and balance-rods of these three engines, the addition to be made to the effect of the tension of the spring is 7 lbs. per square inch; but, on the one hand, the blowing, and on the other, the circumstance of the feet of the valve not fitting the valve entirely, produce the reductions we find here. That circumstance explains the anomalies those experiments apparently present.

—

ARTICLE III.

OF A NEW SPRING-BALANCE AND MANOMETER.

§ 1. *Of a proposed Modification to common Valves.*

All the foregoing calculations are as many proofs of the difficulty of acquiring a knowledge of the real pressure of the steam by the inspection of the spring-balances, so as they are at present constructed, and the mistakes that must necessarily occur, whenever we have no mercurial gauge at our disposal.

These difficulties might evidently be avoided by adopting a new disposition for the valve, of which, during our stay in Liverpool in the month of July 1834, we left a drawing with one of the directors of the railway company.

The fulcrum of the lever must be placed between the valve and the spring-balance, as in fig. 17, and the balance suspended by its rod as in common weighing; besides, the long branch of the lever must equilibrate round the fulcrum C, with the short branch more the disk of the valve, which can be easily effected by augmenting a little the breadth of the shortest lever, or by putting some additional mass of metal under the valve. Lastly, the proportion between the two branches of the lever must be the same as that of the area of the valve to the unit of surface, and the seat of the valve must be fitted to it exactly.

By means of this simple disposition, it is clear that the degree inscribed on the balance will show immediately, and without any calculation, the effective pressure which takes place in the boiler. In fact, 1. The spring-balance being placed in its usual situation, in which the weight of the foot P is taken into account, no addition will be required for the weight either of the foot or the rod. 2. The two parts of the lever equilibrating with each other, there will be no addition required for the weight of the lever or the valve. Lastly, the branches of the lever, bearing to each other the proportion of the area of the valve to the unit, any number inscribed on the balance will represent an equal pressure on the unit of surface of the valve.

Thus this valve will dispense with all calculation, and will show immediately written on the balance, the real pressure per square inch. It will exactly answer the conditions required of a valve, which is intended only to limit the pressure; that is to say, that if we fix it at 50 we may be certain, without any calculation or consideration whatever, that the steam will raise it precisely at 50 lbs. pressure per square inch. This is all that is commonly required for the business of a railway, where the proprietors only wish, through prudential motives, that the engine may be regulated according to a determined pressure.

In case of theoretical experiments on certain circumstances of the motion of the engines, a deduction must still be made for the effect of the miter in the blowing; inand

these cases, recourse must still be had to the mercurial gauge: but we are also going now to propose a portable instrument, capable of being used instead of it; and which, besides, does not require the use of the above-described valve.

§ 2. *Of a new portable Manometer, calculated to replace the Mercurial Gauge.*

We have observed, that at present when we wish to know at what pressure an engine was working in a given circumstance, it is necessary, after the experiment, to bring it to the mercurial gauge, in order to know the pressure that corresponded with the different degrees of the spring-balance, observed during the work.

This second experiment, which must succeed the first, is of itself an inconvenience. Besides it is necessary, in seeking the pressures, to replace all things precisely in the state in which they were during the trial of the engine. In fact, we have seen that a valve fixed at 32 lbs. as starting-point, and blowing at 36, may represent 67 lbs. pressure, whilst that same valve having its starting-point at 31 lbs., the same degree of 36 may only correspond with 62 lbs. The second valve must also have been observed during the work, and be replaced precisely at the same point; for if it be loosened, it will give issue to a certain quantity of steam, which else would necessarily have been forced to escape through the first, and thus have augmented the pressure. Lastly, the engine-men have an interest in concealing the true pressure of the engines, for fear of their being obliged to reduce it. They calculate that it would diminish the speed of their course, and thus keep them longer on the road. In consequence, they not only loosen, secretly, the second valve, and raise from time to time the lever, in order to augment the effect of the miter with which they are very well acquainted, but they also sometimes slip a metal plate, under the pin which presses on the valve, in hopes of deceiving in regard to the real degree of the balance.

The precautions necessary to be taken in seeking the pressure, make that research more fastidious than it would seem at first sight, when one has a mercurial gauge at one's disposal. To this must be added, that the steam necessarily cools in the long passage from the engine to the instrument. It is forced to follow a metallic tube 8 or 10 feet long by half an inch in diameter, and must consequently arrive on the mercury with a less degree of pressure than in the boiler.

These difficulties proceed evidently from the impossibility of fastening the mercurial guage to the engine; for if that could be done, one might read on it the pressure immediately during the work, and no second experiment would be necessary.

We are therefore of opinion, that that instrument might be advantageously replaced by the following one:—

The engine having its two safety-valves as usual, and constructed in any way, R (fig. 19) is a cock fixed on the boiler, and susceptible, when wanted, of giving issue to the steam it contains. The orifice of the cock bears on the outside the thread of a screw, in order that the instrument may be screwed to it. The upper part of the figure represents the instrument itself. It presents a tube which is to be joined to the ajutage of the cock R. These two pieces being brought next to each other, and bearing each of them the thread of a screw on the outside, a moveable screw E, unites them firmly to each other, as long as the experiment lasts, as may be seen on the figure. Then turning the cock R, the steam will have access into the tube of the instrument.

Besides, A is a valve, the arear of which is one square inch, or any other unit of surface, according to that which one wishes to employ for measuring the pressure. This valve, while tending to rise, acts against a lever AC, the opposite end of which is kept back by the pressure of a spiral spring, forming a common spring-ballance. The two branches of this lever are equal, and their reciprocal weight, including the disk of the valve for the corresponding side, equilibrate exactly round the fulcrum C. Lastly, the point S is fastened by a screw to some part of the boiler, in order to give solidity to the whole.

The instrument being thus fastened to the engine, and the cock opened, the steam will act against the valve, and the consequence of the dispositions we have explained will be, that the inspection of the balance will immediately give the real pressure per square inch. In fact, by the position of the balance, there is no addition to be made for the weight of the rod or foot; the equilibrium of the lever renders also unnecessary any correction for its weight; and lastly, the two common valves of the engine giving issue to the surplus of steam, the valve A will never blow. The screw may thus be lowered, until the balance equilibrates exactly the pressure of the steam, by which means no effect of miter will complicate or falsify the result.

The facility with which the real pressure may be found, without being obliged to make purpusely a second experiment; the accurateness of the observation, the steam not having a long passage to make before it arrives at the instrument; the advantage the instrument presents of being carried with the engine, and, when necessary, fastened to any other engine; lastly, its low price, whereas the mercurial steam-guage is very expensive: all those reasons combine to pursuade us that this thermometer may be of some use. With it, all the difficulties we met with in our experiments would immediately have disappeared. It may, besides, also serve to determine the pressure, as well in locomotive engines, as in other high or low-pressure steam-engines.

The accurateness of the instrument may easily be vrified once for all; 1, by measuring the valve when separated from the engine; 2, by examining whether the lever equilibrates of itself on the fulcrum; 3, by taking the balance off and suspending known weights to it, to see whether they coincide with the divisions.

§ 3. *Comparative Table of the different Modes of expressing the Pressure of Steam.*

To complete what has been said in this article, and to facilitate to the reader the converting of the different measures of pressure, which we shall be obliged to make use of in the course of this work, we subjoin here a table of the different modes of expressing the pressure of steam. We have calculated it by half atmosphers, but the intermediate degrees may be easily filled up.

COMPARATIVE TABLE OF THE DIFFERENT MODES OF EXPRESSING THE PRESSURE OF THE STEAM.

Total Pressure of the Steam.				Surplus of that force over the atmospheric pressure, or effective pressure.			
In atmospheres.	In inches of mercury.	In lbs. per square inch.	In lbs. per square foot.	In atmospheres.	In inches of mercury.	In lbs. per square inch.	In lbs. per square foot.
1	30	14.7	2,117	...	...	...	...
1.5	45	22	3,175	0.5	15	7.3	1,058
2	60	29.4	4,234	1	30	14.7	2,117
2.5	75	36.7	5,292	1.5	45	22	3,175
3	90	44.1	6,350	2	60	29.4	4,234
3.5	105	51.4	7,409	2.5	75	36.7	5,292
4	120	58.8	8,467	3	90	44.1	6,350
4.5	135	66.1	9,526	3.5	105	51.4	7,409
5	150	73.5	10,584	4	120	58.8	8,467
5.5	165	80.8	11,642	4.5	135	66.1	9,526
6	180	88.2	12,701	5	150	73.5	10,584

CHAPTER III.

OF THE RESISTANCE OF CARRIAGES MOVED ON RAILWAYS.

§ 1. *Necessity of making further researches on that subject.*

From the description we have given of the engine, we see that the steam, by acting on the pistons, communicates to the wheels a rotary motion, which must necessarily make the engine advance, provided the train that follows, does not oppose a greater resistance than the force of which the engine disposes.

The first point therefore which must be considered concerning the motion of locomotive engines is the resistance opposed by the trains they draw.

Those trains consist of a more or less considerable number of carriages called wagons, upon which the goods are loaded. Their resistance to the motion depends not only on their weight, but also on the state of the railway, and the more or less perfect construction of the carriages. The purpose of the establishment of a railway being to produce a perfectly hard and smooth road,

on which the carriages may roll with ease, if the railway is not kept in good order, or if it does not answer the intentions for which it was established, it is clear that the rasistance the train will oppose along those rails will be so much the greater. The same will also take place if the carriages, being ill-constructed or badly repaired, have a considerable friction.

From this observation, we see that the power required to draw a given weight, a ton for instance, cannot be the same upon all railways, nor with all sorts of carriages. On perfectly smooth rails, and with a well-greased and well-constructed wagon, the draft of a ton may require only a power of 8 lbs. We mean to say that a weight of 8 lbs. suspended at the end of a rope passing over a pulley, will, in that case, be sufficient to make a loaded carriage, weighing a ton, move forward. On another railway, on the contrary, and with carriages of another construction, the same load of a ton may require a power of 10 lbs., and perhaps more.

The old wagons, on which some experiments had been made, required a power of 10 lbs. to 12 lbs. for each ton weight of the load. Since that time, the carriages had been brought to greater perfection, and had never been submitted to any experiment made on a large scale, and in the usual working state. At the time of the introduction of the new wagons at Liverpool, one trial had been made with a single wagon, and just at the moment it was coming out of the hands of the maker. But as that wagon had been carefully oiled on purpose for the experiment, and as it had not yet encountered any shock by which the axles might have been bent, the wheels warped, or the hind wheels prevented from following exactly in the track of the fore ones; and as, moreover, the rails had been nicely swept, the result of such an experiment could scarcely be considered as a common practical result; and, in fact, the friction of the trains continued to be calculated on the Liverpool Railway at the rate of 10 lbs. per ton. These uncertain data could not be admitted in a new work on the subject.

It became therefore necessary for us to find another base for the calculations that were to be made on modern wagons. However, the occasion which gave rise to the experiments we are going to relate, occurred in the work of the locomotive engines. They pointed out themselves, in a way, the errors committed in the appreciation of the resistances they overcame. This point is worthy of notice, as it proves at the same time both the perfection of the engines, and the correctness of the calculations, to which it is possible to submit them. It inspires consequently more confidence in the other results which were obtained in the same way, and it is for that reason we mention it. Having made, during our stay at Liverpool, in 1834, a great number of experiments on the power of locomotive engines, we found than one of those experiments, made with the Atlas, and which we shall have occasion to relate hereafter, appeared to exceed the limits of the power of that engine. The Atlas had, on July 23, on an inclined plane at $\frac{1}{1306}$, drawn 40 wagons, weighing 190 tons, and the diameter of its cylinder was only 12 inches. According to the ideas admitted on the railway, on the resistance of the trains, this fact could only be explained, by supposing either that the proportions of the engine were not exactly what they were thought to be, or that the railway had a different inclination from what was computed, or the train a different weight from that inscribed on the weighing books. Other experiments, however, made by us with other engines, in other circumstances, and in other points of the railway, having given similar results, we were already convinced that the friction of the wagons could not exceed 8 lbs. per ton, and that the mistake lay there, unless we preferred supposing that mistakes had been made in the dimensions of all the engines, and in the levelling of all the parts of the road.

It became, therefore, necessary to ascertain the fact in a direct manner, by establishing a series of experiments for that purpose; but it was particularly satisfactory to have been led to the knowledge of the truth by the calculation, as the experiment became thus the verification of it.

§ 2. *Of the Friction determined by the Dynamometer.*

The most natural means of determining the friction or resistance of the wagons, seemed to be the dynamometer, which gives directly the force of traction required to execute the motion; but as the act of drawing, either by men or any other living moter, takes place by starts, the dynamometer oscillates between very distant limits, and can give no certain result. It appeared, however, to us, that if the draft were effected by an engine, the effort of which is always equal, and the motion regulated by the mass of the train itself the oscillation of the dynamometer would not be so great, particularly if the instrument were to be fastened to one of the last carriages, on which the pulsations of the engine have naturally much less effect.

Therefore, at the moment the Leeds engine was setting off with a train of 12 wagons, after the whole mass had been put in motion, and while the motion continued with an uniform velocity of three or four miles an hour, the chain of the three last carriages was unhooked, and replaced by a circular spring-balance, which had been prepared for the purpose. The rod of the balance was fixed to the frame of the ninth wagon, and the three following, which were the last of the train, were fastened to the spring. The experiment took place between the milestones one and a half and two of the Liverpool Railway, on a space of ground which is a dead level.

We expected to see the index of the balance remain nearly steady; but we were disappointed. Its average position was near the point marking 100 lbs.; but it underwent very great variations, that is to say, from 50 lbs. at least, to 170 lbs. at most; and even two or three times, at certain extraordinary starts of the engine, the needle ran to the end of the balance, marking 220 lbs. As, however, this case happened only accidentally, it could not be considered as an effect of the regular draft: and, indeed, after the shock which had caused this extraordinary excursion, the needle immediately returned to its usual point of 100 lbs., and began again its oscillation between 50 lbs. and 170 lbs. After having, to no purpose, waited to see whether the motion would become more regular, we concluded that the experiment was not suspectible of a greater degree of precision.

The variations of the needle between 50 lbs. and 170 lbs., gives an average of 110 lbs.

The three wagons weighed together 14.27 tons. So the experiment gave $\frac{110}{14.27}$ or 7.70 lbs. resistance per ton.

It is important to remark, for what will be said hereafter, that this experiment was free from the direct resistance of the air; for these three waggons, being the last of the train, underwent from the air only a very inconsiderable lateral resistance, particularly as the speed was only three or four miles an hour. All the direct resistance of the atmosphere took place on the first carriage of the train, with which our experiment had nothing to do.

This approximation, as it was, might be be useful, but it was thought necessary to obtain more positive results.

In consequence a convenient place having been chosen on the Liverpool Railway, at the foot of Sutton inclined plane, and at a distance of $11\frac{1}{2}$ miles from Liverpool, the level was taken in the most accurate manner, to a tenth of an inch, and the experiments commenced on the following principle:—

§ 3. *Of the Friction determined by the Angle of Friction.*

Let us suppose a heavy body left to itself on an inclined plane AB (*fig.* 23.) and sliding without friction to the foot of the plane; let us suppose at that point another plane, being the continuation of the first, and on which the same body continues its motion.

The body will descend along the plane, by virtue of its gravity; but that force will act only partially: it will be decomposed into two others, one perpendicular to the plane, which will be destroyed by the resistance of that plane, and the other in the sense of the plane, which will have its full effect, and will be the accelerating force of the motion. If therefore g express the intensity of gravity, and θ' the angle of the plane, with a vertical line, the accelerating force of the motion will be

$$\varphi = g \cos \theta';$$

but the general expression of any accelerating force is $\varphi = \frac{v}{t}$, v being the velocity and t the time; consequently

$$g \cos \theta' = \frac{v}{t}.$$

Besides, when we consider only an infinitely small interval of time, any motion may be regarded as uniform, which, by ex-

pressing by x the space passed over, gives

$$v = \frac{x}{t},$$

or

$$t = \frac{x}{v}.$$

Thus the equation above becomes

$$vv = g \cos \theta' x.$$

Making the integral, and observing that the velocity is zero at the starting point, or that $x = 0$ gives $v = 0$, we have

$$\frac{v^2}{2} = g \cos \theta' x.$$

This equation gives the velocity of the moving body in any point whatever of the first plane.

Consequently, if we express by x' the distance of the point B, from the starting point, measured along the plane, the velocity of the falling body, when arrived at that point, is

$$V^2 = 2g \cos \theta' x'.$$

This is the velocity the body has acquired, at the moment it is going to pass from the first to the second plane. This velocity being applied to it in the direction of the first plane, would produce, in the direction of the second, only a certain velocity, resulting from the relative inclination of the two planes, if the passage from the one to the other took place abruptly. But if the passage is effected by a continued curve, we know that there will be no loss of velocity, and the body will begin its motion on the second plane with the same velocity it had in leaving the first. This will, therefore, be its velocity in beginning its descent on the second plane.

The body will, besides, continue to be impelled by gravity. θ'' being the angle of inclination of the second plane with a vertical line, the gravity will produce an accelerating force

$$\varphi = g \cos \theta'' ;$$

and by a calculation similar to the former, we will also have on that plane,

$$v^2 = 2g \cos \theta'' x + C.$$

In this equation, C is determined by the condition that $x = 0$ must give for v the incipient velocity of the second motion; and as we have seen that this incipient velocity is

$$V^2 = 2g \cos \theta' x',$$

it follows that

$$C = 2g \cos \theta' x'.$$

Substituting that value of C, the velocity in any given point of the second plane is expressed by

$$v^2 = 2g \cos \theta'' x + 2g \cos \theta' x'.$$

Further z' and z'' being the vertical heights gone through on each plane by the moving body, we have

$$x' \cos \theta' = z', \text{ and } x \cos \theta'' = z''.$$

Consequently the equation may be written in the following form:

$$v^2 = 2g (z' + z'') ;$$

or

$$v^2 = 2gz,$$

by letting z express the vertical height of the point where the moving body is below the starting point.

This is therefore the equation of the motion, in the case of a body moving without any friction or resistance whatever. In that equation we see that we can only have $v = 0$, when $z = 0$; that is to say, that the body once put in motion, will not stop until it has re-ascended the second plane to the height of its starting point, that second plane being then supposed to be inclined in an opposite sense to the first.

But if the body moves with the friction, experience having proved that friction does not increase with the velocity, it will act as an uniformly retarding force, contrary to the gravity along the plane. By the introduction of that new force, the accelerating forces of the motion on each of the planes will no longer be

$$g \cos \theta', \text{ and } g \cos \theta'' ;$$

but

$$g \cos \theta' - f, \text{ and } g \cos \theta'' - f,$$

f being the expression of the retarding force owing to the friction.

In that case the velocity in any given point m of the second plane, the distance of which to the point B is expressed by x, will consequently be

$$v^2 = 2(g \cos \theta'' - f)\, x + 2(g \cos \theta' - f)\, x'.$$

Effecting the indicated operations, and substituting z'' for $x \cos \theta''$, z' for $x' \cos \theta'$ and z for $z' + z''$, we have

$$v^2 = 2\, [gz - f(x' + x)] ;$$

which equation gives the velocity in any point of the motion of the planes, taking the friction in consideration. In that case we see by the equation that we cannot have $v = 0$, unless $z = 0$, $x' = 0$, $x = 0$, that is to say at the beginning at the motion; or unless we have the equation

$$gz - f(x' + x) = 0.$$

If, therefore, a body once put in motion stops at any point, m for example, that point must fulfil the above condition, or we must have

$$gz = f(x' - x).$$

If we multiply the two members of that equation by M, mass of the moving body, we shall have

$$gMz = fM(x + x').$$

The quantity g being the action of the gravity on one of the elements of the body, gM is its action on the whole of that body, or its weight which we shall express by P. Also f is the retarding action of the friction, as relates to a single element of the moving body. But the friction being proportional to the weight, fM is the friction when we consider the whole mass of the body. Expressing, then, that friction by F, and making those two substitutions, the equation may be written in the following form:

$$Pz = F(x + x').$$

Let us suppose, then, that, having left in the beginning the moving body free on the inclined planes, it has descended to the point m, for instance, and has not gone farther; that point must necessarily fulfil the above condition, else the moving body would not have stopped there. If, therefore we measure on the spot the quantities z, x and x', and know the weight P, the equation will contain no other unknown quantity but F; so that equation will give us its value, viz.

$$F = P \frac{z}{x + x'}.$$

Consequently, when a body of a given weight P, placed in the above stated circumstances, stops in descending at a certain point m, *the value of the friction that stopped it, will be found by dividing the total height from which the body descended by the total distance which it travelled over.*

This determination once made, it is clear that if we were to construct an inclined plane, the height of which were z, and the length $x + x'$, and if we were to place the body on it, it would remain in equilibrium. In fact, the gravity that tends to impel the body onwards would be exactly equal to the friction that retains it.

The ratio $\frac{z}{x \times x'}$ gives us, consequently, what is called the angle of friction; and it is for that reason that we have also called by that name the principle we have explained, and which we shall make use of in the following experiments.

§ 4. *Experiments on the Friction of Wagons.*

A series of experiments was according ly undertaken on that principle, upon one of the inclined planes of the Liverpool and Manchester Railway.

From a point taken on Sutton inclined plane, at 50 chains from the foot of that plane, 34 distances of 10 chains or 330 feet each were measured. At each of these points a numbered pole was fixed in the ground, and the level exactly taken. The following table shows the result of the levelling operation expressed in feet and decimals of feet.

Number of the posts.	Distance from the first post in feet.	Vertical decent below the first post in feet, and decimals of feet.	
0	0	0	Starting point.
1	330	3.47	
2	660	7.07	
3	990	10.62	
4	1,320	14.36	
5	1,650	18.17	
6	1,980	21.77	
7	2,310	25.53	
8	2,640	28.98	
9	2,970	32.07	
10	3,300	34.61	Foot of the inclined plane, or rather middle ponit of the continued curve.
11	3,630	35.06	
12	3,960	35.19	
13	4,290	35.23	
14	4,620	35.37	

Number of the posts.	Distance from the first post in feet.	Vertical descent below the first post in feet, and decimals of feet.	
15	4,950	35.71	.34
16	5,280	36.17	.46
17	5,610	36.44	.27
18	5,940	36.66	.22
19	6,270	36.80	.14
20	6,600	36.92	.12
21	6,930	37.06	.14
22	7,260	37.14	.08
23	7,590	37.22	.08
24	7,920	37.37	.15
25	8,250	37.34	+.03
26	8,580	37.63	.29
27	8,910	37.92	.29
28	92,40	38.14	.22
29	9,570	38.35	.21
30	9,900	38.54	.19
31	10,230	38.67	.13
33	10,560	38.77	.10
33	10,890	38.92	.15
34	11,220	39.08	.16

On the ground where the experiments took place, a little beyond the foot of the inclined plane, the wagons had to cross three junction roads, each of them necessitating the passing over three switches, as may be seen in fig. 24. This made in all nine switches, either on one side of the rails or the other. On passing each of these obstacles, the wagon received a jolt from the unevenness of the road, and their velocity was checked. The ground was consequently unfavourable for experiments, and made the friction appear rather more considerable than it really was.

The wagons used for the experiments are of the following construction. They consist of a simple platform, supported on four springs. Their wheels are three feet in diameter, and fastened to the axletree which turns with them. The body of the carriage rests upon the axletrees, but outside the wheels; that is to say, that the axles are prolonged through the nave, in order to support the carriage. At the bearing they are turned down to 1⅞ inches in diameter. The chair is made of brass at the bearing-point. In its upper part it contains grease, continually feeding upon the axle through a hole in the chair, and the waste of which is prevented by a cover on the underside of the chair. The grease-box, which is filled every morning, is sufficient for the whole day. In the experiments, no alteration whatever was made to the usual disposition; every thing was left as it is in the daily work, as well in regard to the wagons as to the rails. Among the wagons there are some, the extremity of the axle of which, instead of being from one end to the other of an uniform diameter of 1¾ inches, is thickened near the frame of the carriage by three eighths of an inch, and is on the contrary diminished as much at the other end. Consequently, that part of the axle is composed of three cylindrical parts equal in length, and the diameters of which are, 2⅛, 1¾, and 1⅜ inches.

This disposition is adopted, in order to leave the mean diameter as it was at first, but to give, however, a greater strength to the point which appears to suffer the most. There are, nevertheless, but few axletrees constructed on that principle, they having been only meant as a trial, the advantage of which has not yet been confirmed by experience.

I. On July 29, 1834, five wagons taken at random, and loaded with bricks, were brought to the spot fixed for the experiments by the SUN engine. The train was followed by a sixth empty wagon. The weight of five wagons together, accurately taken with their load, amounted to 30.65t, and including the weight of ten persons, not weighed with them, to 31.31t., or to 6.26t. per carriage.

The middle of the train having been carefully placed facing the starting point on the plane, and the engine being taken away, the brakes were taken off all at once, at a given signal, and the five wagons were left to their gravity on the plane. They continued their motion till 33 ft., beyond post No. 30, having thus run a total distance of 9933 feet, with a difference of level, between the points of departure and arrival, of 38.55 feet.

By recurring to the principle laid down above, we had, in this experiment, $x+x=$ 9933 feet, $x=38.55$ feet and the friction was the $\frac{38.55}{99.33}$ or $\frac{1}{258}$ of the weight. Consequently, the friction of a ton was $\frac{1t.}{258}=\frac{2240 \text{ lbs.}}{258}=8.69$ lbs. This friction, however, included the resistance of the air, and was augmented by the above-mentioned circumstance, of the passage of nine switches at the foot of the plane.

II. After this first experiment, 300 bricks were taken out of each of the wagons. The weight of 100 of those bricks having been carefully taken, and found to be 855 lbs.; this was, consequently, an alleviation of 2,565 lbs. or 1.145t. for each carriage. The weight of the five loaded wagons, including the same 10 persons, amounted thus to 25.58t. or 5.12t. for the average weight of each of them.

In this state the wagons were brought back to the same starting point as at first, and left again to their gravity on the plane. They continued their motion until 84 feet beyond the post No. 28, having gone through a total distance of 9824 ft. on a difference of level of 38.19ft. In this second experiment the friction was $\frac{1}{244}$ of the weight, or 9.17 lbs. per ton: so the resistance per ton was less in the first case than in the second.

The wagons were then, for the third time brought back to the starting point, and each of them was successively and separately left to itself on the plane, as also the empty wagon, when they gave the following results:—

	Number of the wagon.	Weight loaded.	Distance gone through.	Difference of level.	Friction.	Friction per ton.
		tons.	feet.	feet.		lbs.
III.	No. 294	4.65	7,326	37.16	$\frac{1}{197}$	11.36
IV.	100	5.15	6,663	36.95	$\frac{1}{180}$	12.42
V.	196	5.20	7,455	37.19	$\frac{1}{200}$	11.17
	111	5.00	stopped by mistake		"	"
	150	4.85	stopped by mistake		"	"
VI. empty wagon,	202	1.85	6,201	36.78	$\frac{1}{169}$	13.25

The wagon, No. 100, at the moment it arrived, had one of its axle-boxes very hot, which explains why it did not continue its motion as far as the others, though equally loaded. The empty wagon was very low, being formed only of a platform surrounded by an open railing.

According to these experiments, each of the loaded wagons, taken separately, had an average friction of 11.3 lbs. per ton; and those same five wagons, united together in a train, had only a friction of 9.17 lbs. per ton. The difference in favor of a greater number of carriages was evidently owing to the resistence of the air, the effect of which only takes place on the first carriage. If the train is composed of only one wagon, that one must bear alone the whole resistance; but if it is composed of several, the resistance of the air remaining the same, is divided between all the wagons, and becomes consequently less peecestible on each of them. The same effect may be observed in the first experiment compared with the second. The number of carriages was the same in both, but the first train being more heavy, the resistance of air was distributed between a greater number of tons.

It appeared therefore necessary, in order complete our investigation, to make other experiments, with trains of different weights and in different circumstances. In the following experiments the wagons were no longer loaded with bricks, but with goods of different sorts, such as were furnished by the trade in the common business of the railway.

VII. The following day, July 30, a train of 19 loaded wagons was brought to the same place by the MARS engine. The 19 wagons weighed together exactly 92 tons, giving 4.84 tons for the average weight of each of them. The train was again stopped on the plane, so as to make the middle or centre of gravity of the mass exactly facing the post No. 0; and the whole was left to its gravity as in the foregoing experiment. The mass being put in motion, stopped at 168 ft. beyond the post No. 32. So the space gone through was 10,728 ft., and the difference in level between the starting and stopping points was 38.85 ft., which made the friction equal to $\frac{1}{276}$ of the weight, or 8.11 lbs. per ton.

VIII. The same day the same experiment was made with the tender of the JUPITER engine, which stopped at 27 feet beyond the post No. 18, and its friction was, consequently, including the resistance of the air, $\frac{1}{163}$, or 13.76 lbs. per ton. This tender is nothing but a wagon of a particular form, giving, comparatively, a considerable hold to the air, particularly when it is not much loaded. The tender of the JUPITER was then nearly empty, having only sufficient provisions to bring back to Liverpool the persons that were present at the experiment.

This as well as the preceding day's experiments were made jointly with Mr. H. Earle, one of the directors of the railway; Mr. J. Locke, engineer of the Grand Junction Railway; Mr. King, of the Liverpool Gas-works, and other persons more or less directly connected with the administration of the Company.

IX. On the 31st of July the tender of the ATLAS engine, then weighing $5\frac{1}{2}$ t., was left to itself from a point situated at 84 ft. below the post No. 1. It stopped at 90 ft. beyond the post No. 23, having run over a space of 7,266 ft. by 32.88 ft. descent, which gives for the friction $\frac{1}{221}$, or 10.13 lbs. per ton.

X. The same day the train led by the same ATLAS engine, composed of 14 wagons, weighing together 61.35 t., was left to its gravity on the plane from a point situated at 24 ft. above the post No. 1. Not having at our disposal a sufficient number of men, the train could not be stopped before. It ran to 15 ft. before the post No. 5; that is to say, over a space of 9579 ft., in a descent of 35.32 feet, which gives for the friction $\frac{1}{271}$, 8.26 lbs. per ton.

XI. On the 1st of August a train of 10 wagons was brought to the place of the experiments by the VESTA engine. The 10 wagons weighed together 43.72 t. The tender of the engine, weighing 5 tons, was left attached to them, making thus together 48.72 t. for 11 carriages, or 4.43 t. per carriage. The whole was left to its gravity on the plane, and ran till 108 ft. beyond the post No. 30, being a space of 10,008 ft. on a slope of 38.58 ft. which gives for the friction $\frac{1}{259}$, or 8.64 lbs. per ton.

XII. The same day 24 wagons were brought to the same place by the ATLAS engine, these 24 wagons weighing together 104.50 t., and making with the tender of the engine, which weighed 5.50 t., 110 t. for 25 carriages, or 4.40 t. per carriage. They were left to their gravity on the plane, and did not stop until they reached 108 feet beyond the post No. 32. They ran, consequently, over a space of 10,668 ft., with a descent of 38.82 ft., which puts the friction at $\frac{1}{275}$, or 8.15 lbs. per ton.

Lastly, complete trains, that is to say, the engine, tender, and wagons together, were brought to the trial of gravity on the plane, and gave the following results :—

XIII. On the 2nd of August the FURY engine, followed by its tender and by 17 wagons, weighing as follows: wagons 81.26 t., engine 8.20 t., tender 5.5 t., together 94.96 t., was left to its gravity on the plane. The engine and its tender being, on account of their weight, reckoned for three wagons in the position of the centre of gravity of the mass, the whole was considered as equal to 20 wagons. The train was consequently stopped so as to place facing the starting-post, the interval between the seventh and eighth wagon. The mass, being put in motion, stopped at 42 ft. beyond the post No. 34. It had run over 11,262 feet, with a descent of 39.10 ft.; which put the friction at $\frac{1}{283}$ of the weight, or 7.78 lbs. per ton, including the engine, tender, and wagons.

The whole weight of the train, engine included, was 94.16 t. The resistance of the whole, taken at the rate of 7.78 t. as it had been found, was then 733 lbs. But the engine, submitted alone and a moment before to the experiment, had been found to have 113 lbs. friction, as we shall see below. Of these 733 lbs. there were, consequently, only 620 applicable to the wagons and tender. Their aggregate weight was 85.96 t.; consequently, the resistance belonging to them was 7.21 lbs. per ton.

XIV. On the 2nd of August the VULCAN engine, weighing 8.54 t., followed by a train of twenty wagons, weighing 96.30 t., and by a tender weighing 5.5 t., forming together a mass of 110.14 t., was brought to the place of the experiments. Not having been able to stop the train in time, it could only depart from a point situated at 18 ft. below the common starting-post, the engine and its tender being reckoned together for three wagons, in fixing the situation of the centre of gravity. The mass stopped at 39 ft. beyond the post No: 33. The distance ran over in 12′ 10″ was 10,911 ft., on a descent of 38.75 ft. The friction calculated over the whole was consequently $\frac{1}{282}$ of the weight, or 7.96 lbs. per ton.

The total resistance for the 108.50 t. weight of the whole train, engine included, was 863 lbs.; if from that we deduct 127 lbs. for the resistance of the engine itself, according to an experiment made immediately afterwards, and of which we shall speak below, here remains for the 100.16 t. of the train and tender 736 lbs., which make 7.35 lbs. per ton.

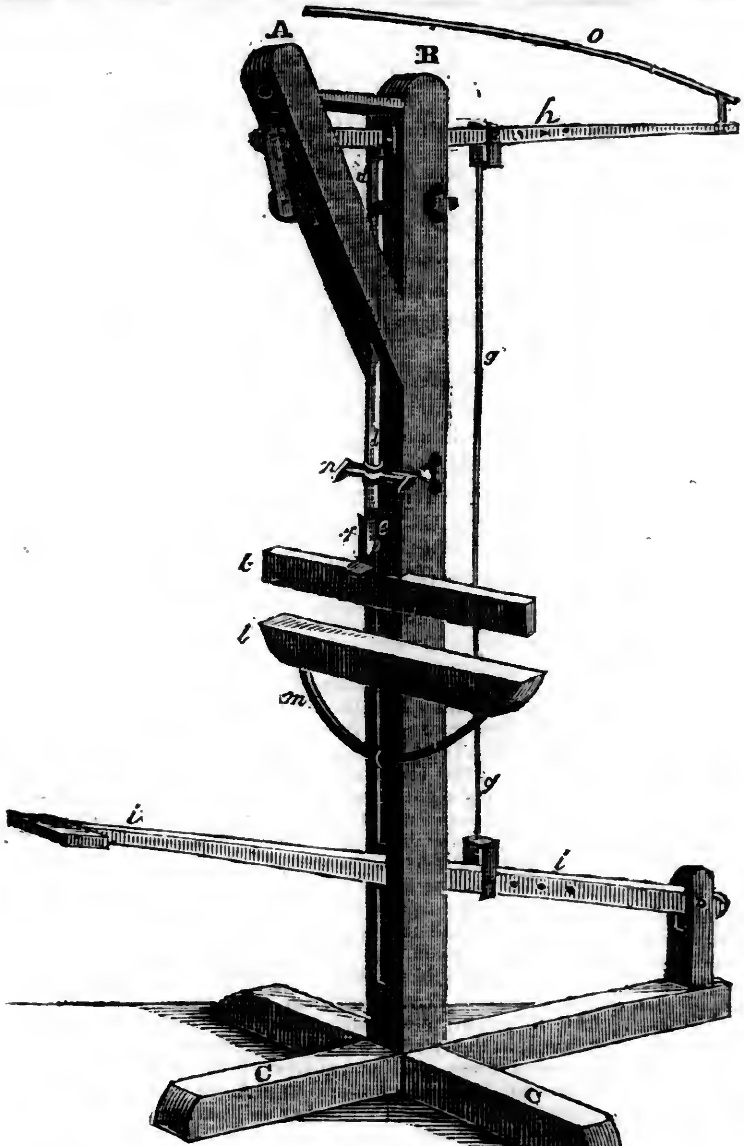
XV. To conclude, on August 15, the LEEDS engine, weighing 7.07 t., followed by its tender and a train of seven wagons, the aggregate weight of which, besides the engine, was 33.52 t., was also submitted to the same experiment. Starting exactly from the post No. 0, it ran till 255 ft. beyond the post No. 24. Distance 8,175 feet; descent 37.35 ft.; friction of the whole $\frac{1}{219}$, or 10.23 lbs. per ton.

The whole train weighing 40.59 t., had therefore a total resistance of 415 lbs.; and as the engine submitted alone to the experiment had been found to have 112 lbs. friction, on those 415 lbs. there were only 303 lbs. applicable to the wagons and tender, and consequently the resistance belonging to the train was $\frac{1}{248}$, or 9.04 lbs. per ton.

(To be Continued.)

MORTICINO MACHINE.—The following cut represents a Morticing Machine, exhibited at the Fair of the AMERICAN INSTITUTE, in October last, by Mr. George Page, of Keene, New-Hampshire, to which was awarded a *silver medal*. This simple and unpretending machine was viewed, and its operations witnessed, by a large number of practical mechanics, who were highly gratified by the rapidity and precision of its movements, and the wonderful accuracy of its work. Any person could, at once, perceive that, with ordinary care, and a few hours' experience, any man can perform as much labor in *one day*, with this machine, as in a *whole week* in the ordinary mode. Such, indeed, is the simplicity of its operation, and economy of its use, that over three hundred machines have been sold since the Fair in October last; and it is probably not too much to say, that the owners of them have, on an *average*, saved *twice the cost of them*, in addition to the great advantage and convenience in forwarding work during the present scarcity and high prices of labor. A small proportion, however, of those mechanics who have morticing to do, have yet obtained them. A small number only of those journeymen who "work by the piece," have yet consulted their own interest by adopting them. A few, however, who view things properly, have got them, and are, consequently, enabled to do much more work, and, of course, to earn more money, than was possible before. If a man, who worked on bedsteads, for instance, which have much morticing, could formerly earn $15 a week, he can now do the same morticing in one-sixth or one-eighth of the time, and, of course, do more work, and certainly do it better. Indeed, any man who has much morticing to do, will save the cost of a machine in a month, and even less.

This machine may also be used, with a little alteration, for morticing *hubs*, for car-



riages, waggons, &c.; and an experienced hand can prepare and mortice a sett of common-sized carriage hubs in ¾ths *of an hour*, with ease, and do them far more *accurately* than in the ordinary way.

The HUB MACHINE can be attached to the morticing machine, and the whole will not occupy, when in use, a space of over four feet by six in the shop, for the workman and his materials.

We are *un*-authorised, yet take the liberty of referring to the following gentlemen, who have machines in use, and who will probably give an opinion in relation to them:—

Talbot & Perry,	Prince st.,	used for mahogany doors	
James De Witt,	James st.,	do	do
Charles Baker,	Grand st.,	do	do
Mr. Lasher, 16 Downing st.,		do	do
J. Green,	Orange st.,	do	do chairs
James Berry,	Le Roy st.,	do	do
Hadden & Gedney,	Prince st.,	do	carpenters' work.
George Smith,	Prince st.,	do	do
George Webb,	Greene st.,	do	do
J. L. Black,	Amos st.,	do	do

Andrew Woodruff, Jefferson, corner of Henry st.
Clarkson Dey, 488 Broome st.,

An hundred others who have used them might also be named if it were necessary, but it is not, as all the descriptions and opinions in the world will not be as satisfactory to many as one half hour's observation of its operation; we therefore refer those who may desire to examine it, to the office of the manufacturer, No. 136 Nassau, corner Beekman street, or to the shops of the gentlemen whose names are given above for further evidence, if they desire it.

DESCRIPTION.

C, C, B, A, the *frame*, consisting of two cross pieces or sills, with an upright post from their centre, and a piece projecting upward in front, at an angle.

d, d, The slide, with a socket in the lower end, into which the chisel is inserted. This slide is of iron, connected with the lever *h*, and sustained in its place by two boxes, passing through the upright, which are regulated by thumb-screws on the side of the post.

e, The CHISSEL, a small but very important part of the machine. It is made of cast steel, about six inches in length, and from *one-eighth* to an inch in diameter.—The cut is perpendicular on *one* side, and beveling on the other, with *side cutters*, projecting backward about one-fourth of an inch, which serve not only to make the sides of the mortice as smooth as the ends, but also to clear the chips, as the chissel is withdrawn from the mortice.

This chissel is either *single*, or *double*, cutting one or two mortices of equal width and depth at the same time. It has also a tool for making *dowells*, and another for cutting holes in Venitian blinds, for the cord to pass through. The two latter are of much use, especially that for making dowells, or pins, of any size, from one-fourth to an inch in diameter, and 4 to 6 or 9 inches in length; and the other performs, at one pressure of the foot, an operation which in any other way requires five times the labor.

f, The stop, which is made fast to the upright by a bolt and thumb-screw, to prevent the timber from rising when the chissel is drawn up by the spring.

g, g, The connecting rod between the lever *h* and the treadle. This rod is movable to accommodate the depth of the mortice.

h, The *lever*, passing through the upright post and front brace, to which it is connected, in front, by two straps of iron. The lever, is about three feet in length, and at its extreme end connected with a spring-poll to raise the chisel from the mortice.

i, i, The treadle, or foot-board, by which the machine is put in motion. This foot-board is also, like the lever, about three feet in length; passing through a long mortice in the lower part of the upright post, and made fast *at the back end*, to a short upright standard, rising about 14 inches from one of the cross sills. It is then connected by an iron rod in the rear of the upright post, with the lever at the top, which rests upon the slide *d, d,* into which the chissel is inserted. The lever *h* acts upon a pivot in *front*, resting, at about nine inches from the pivot, upon the top of the slide *d, d,* which is moveable—and is connected by a rod with the treadle *i, i,* which acts upon a pivot at its extreme *back* end. By placing one foot upon the foot board, and pressing it down, the back end of the lever *h* also descends, and causes the chissel to perform its office upon the timber, which is laid upon the rest *l*. It will be readily perceived that a powerful leverage is obtained by this arrangement, and that a rapid motion is easily produced with the foot, by which the chissel is driven into the timber, and drawn out again by the aid of the spring pole.

The timber to be mortice is held in its place on the rest *l*, until it receives a thrust from the chissel, when it is moved forward one eighth of an inch, by hand, or otherwise, as the chissel rises, and falls again by

the aid of the foot. When the mortice is headed down at one end, to its proper depth, the chissel is turned the half of a revolution, by the aid of a spring and movable box *n*, and again confined, by a spring, in a proper position, and the timber is caused to retrace its course, and the mortice is completed to a uniform depth, and headed down at the other end; and, on turning it over, the chips will either drop out, or may be easily picked out, as the chissel is so constructed, with side cutters, as to cut at *both sides*, as well as at the end; and therefore the mortice is not only perfectly true, or uniform in its sides, but also smooth, or free from splinters, arising from cross grain, as is frequently the case in the ordinary mode of morticing.

k, A back board or fence, which serves to keep the timber parallel.

l, The *rest* or *bench*, on which the timber to be morticed is laid. It may be *raised* or *lowered*, or placed at any desired angle to suit the nature and size of the work.

m, The half-circle, by which the position of the rest is regulated.

n, The box and thumb-spring, by which the position of the chissel is regulated.

o, The spring-pole, (shown in part,) which acts upon the lever *h*, and of course the slide and chissel which are connected with it.

It will be readily perceived that, by pressing the foot-board down to C, the chissel *e* will be brought down in a perpendicular line near to the top of the rest *l*; and it may be repeated an hundred times a minute, and thereby cut a mortice three inches or more in depth, and six to twelve inches in length, according to the wood, in a minute.—[Ed. M. M.]

It is said that the Prussian Government has renounced its opposition to Railroad Companies. The subscriptions on the Exchange at Stettin amounted, in one day, to 800,000 rix dollars (3,300,000fr.,) and was immediately closed; but as the whole expense of the road to Stettin is estimated at 2,000,000 rix dollars, in order to complete this sum, a subscription is to be opened at Berlin.

Dr. Bowring, M. P., with M. G. Thomas, and Capt. Pringle, R. E., have come to Paris, as a deputation, for the purpose of obtaining the co-operation of the French Government in a plan for uniting by a grand railroad the three capitals of France, England, and Belgium. It is understood that the Governments of all these countries look upon the project with the most kindly eyes, and are desirous of lending it their cordial support. When accomplished, the journey to London will be performed in 13½ hours from Paris; in 11½ hours from Brussels; and from Paris to Brussels in about seven hours.

AN ACT

TO INCORPORATE THE HARLÆM RIVER CANAL COMPANY.

Passed April 16, 1827.

Be it enacted by the People of the State of New-York, represented in Senate and Assembly:

1. That Peter Embury, Richard Riker, and such other persons as now are, or hereafter may be associated with them, be, and they hereby are constituted and created a body corporate and politic, in fact and in name, by the name of "the Harlæm River Canal Company," and by that name, they and their successors and assigns shall and may have continual succession, and may sue and be sued, defend and be defended, in all manner of suits and actions, in all courts and places whatsoever, and that they and their successors may have a common seal, and may change and alter the same at pleasure; and also, that they and their successors, by the same name and style, shall be in law capable of purchasing, holding and conveying any estate, real or personal, for the use of the said corporation: *Provided*, That the real estate so to be holden, shall be such as the said company shall purchase and obtain by voluntary transfer, to be used in and about the construction of the said canal, and the works connected therewith.

2. *And be it further enacted*, That the stock, property and affairs of the said corporation shall be managed by thirteen directors, to be elected from the stockholders, (one of whom to be president) who shall hold their offices for one year, and until others shall be elected in their stead; and that the directors of the said company, after the term of the first board thereof shall have expired, shall be elected on the fourth Monday of April in each and every year, at such time of the day, and at such place, as the directors for the time being may appoint; and public notice shall be given by the said directors, not less than fourteen days previous to the time of holding the said election, in at least two of the public newspapers printed in the city of New-York; and the said election shall be held under the inspection of three stockholders, not being directors, to be appointed by the board of directors; and such election shall be by ballot, and by a plurality of votes of the stockholders present, or their proxies, allowing one vote for every share of stock; and if it shall happen at any election that two or more persons have an equal number of votes, so that no choice shall have been made as to such person or persons, then the said stockholders, herein before authorised to vote at such election, shall proceed by ballot a second time, and by a plurality of votes determine which of the said persons so having an equal number of votes, shall be the director or directors, so as to complete the whole number of twelve; and the said directors, as soon as may be after the election, shall proceed to elect by ballot one of their number, to be their President; and if any vacancy shall be occasioned in the board, by resignation, death, or otherwise, the same shall be filled for the remainder of the year in which it may happen, by such person or persons as the remainder of the directors for the time being, or the major part of them, shall appoint; that Richard Riker, Benjamin Bailey, Elisha W. King, Charles H. Hall, John Watts, William R. Smith, Alexander Hamilton, William P. Hawes, Henry D. Sewall, William S. Smith, Stephen Richards, Aaron Sergeant, and William W. Todd, shall be the first directors, and shall hold their offices until the fourth Monday of April, in the year of our Lord one thousand eight hundred and twenty-eight, and until others shall be chosen; and that the major part of said directors shall form a board for the transaction of business.

3. *And be it further enacted*, That if at any time it should happen, that an election of directors should not be made on the day when, pursuant to this act, it ought to have been made, the said corporation shall not for that cause, or for any non-user, be deemed to be dissolved, but that it shall and may be lawful, on any other day, to hold an election of directors.

4. *And be it further enacted*, That the said corporation shall have full right, power and authority to cut, construct and make a canal, in the twelfth ward of the city of New-York, from Spitendeuvel creek to Harlæm river, from and to such points and places as the said directors shall deem most expedient and advantageous; and such number of basins, connected therewith, as may be necessary; and to improve the navigation of Harlæm river, so as to afford to vessels, boats and other freighting craft, which shall traverse the land, canal and river, a secure and easy navigation from the said Spitendeuvel creek to and along the Harlæm river into the East river; and it shall also be lawful for the said corporation to invest such sums as they may deem expedient, in the building, purchase and employment of steam or other freighting boats, to be used in navigating the said canal and Harlæm river, and the waters adjacent, and therewith connected; and also to purchase, build or hire houses, factories, ware-houses, wharves and other necessary buildings for the use of said corporation, and to sell or lease the whole or any part of the above mentioned property as they may think conducive to the interests of the said incorporation: *Provided*, That the said company shall not take any land against the consent of the owner or owners, and shall not break ground in the excavation of the said canal or canals, or basins, without the approbation of the Corporation of the city of New-York, first had and obtained under their corporate seal.

5. *And be it further enacted*, That the capital stock of the said company shall be five hundred thousand dollars, to be divided into shares of fifty dollars each; and that it shall be lawful for the directors to call and demand from the stockholders respectively, all such sums of money by them subscribed, at such time and in such proportion, as they shall see fit: and that Richard Riker, Elisha W. King and Charles H. Hall shall be commissioners, for opening books and receiving subscriptions to said stock; and shall give thirty days notice of the time and place of holding such subscription; and that in case of the death or refusal to act, of any or either of the said commissioners, that the directors for the time being, shall and may appoint any one or more persons, as commissioners to supply the vacancy or vacancies occasioned by such death or refusal to act as aforesaid: and that if any stockholder or stockholders, so subscribing, shall neglect to make such payment as the said directors, on public notice of thirty days, may call for and demand, for ten days after the

same ought to have been paid, the shares of the said stockholders, so neglecting, and all previous payments by them made, may be forfeited to the use and benefit of the said corporation hereby created.

6. *And be it further enacted*, That the directors for the time being, shall have power to make such by-laws, rules and regulations as shall appear needful and proper, touching the management and disposition of the stock, property, estate and effects of the said corporation, the rate and manner of collecting tolls and fares, with power to appoint such and so many officers, clerks and servants for carrying on the business of the said corporation, and such allowances and salaries as to them shall seem meet and proper.

7. *And be it further enacted*, That if any person or persons shall wilfully do or cause to be done any act whatsoever, whereby the said canal, basins and works, or any matter or thing appertaining to the same, shall be impaired or injured, the person or persons so offending shall forfeit and pay to the said company treble the amount of damages sustained by means of such offence or injury, to be recovered by said company, with costs of suit, and by action of debt, in the supreme court of judicature of this State, which action shall, in every instance, be considered transitory in its nature, and may be triable in any county of this State.

8. *And be it further enacted*, That it shall not be lawful for the said corporation to employ any part of its capital in banking, nor shall it issue any bond, bill, note of credit, check, draft, or other obligation for the purpose of loaning the same; nor shall it use any power not expressly granted by this act, or any power not necessary to affect the object of the incorporation; and that any violation of this section shall be deemed a forfeiture of the privileges and rights of such corporation.

9. *And be it further enacted*, That the stock of said corporation shall be deemed and considered personal estate, and shall be assignable and transferable, and that no transfer of such stock shall be valid until the same shall have been duly assigned and transferred in and upon a book to be kept for that purpose, by the president of said corporation, which book shall be closed ten days previous to every election, and no transfer of stock shall entitle the person to election, unless the same shall have been transferred at least ten days previous to any such election.

10. *And be it further enacted*, That this act shall be deemed a public act; and shall be benignly and favorably construed for all the purposes therein declared and expressed, in all courts and places whatsoever.

11. *And be it further enacted*, That the term of two years from the passing of this act be, and it is hereby allowed for constructing said canal, and no more; and should said canal not be made within said period, then this act shall be deemed to have expired, and to be void to all intents and purposes.

12. *And be it further enacted*, That the stockholders shall jointly and severally be liable for the debts and demands against the said company, to the amount of the stock held by each stockholder: *Provided*, That no suit shall be brought against any stockholder or stockholders until thirty days after such debt or demand shall have been demanded from the said corporation.

13. *And be it further enacted*, That the Legislature may, at any time, alter or amend this act.

AN ACT TO AMEND AND EXTEND THE ACT ENTITLED "AN ACT TO INCORPORATE THE HARLÆM RIVER CANAL COMPANY." PASSED APRIL 16, 1827,

Passed May 13, 1836.

The People of the State of New-York represented in Senate and Assembly, do enact as follows:

§ 1. The act entitled "An act to incorporate the Harlæm River Canal Company," passed 16th April 1827, is hereby revived and continued and the time limited by said act for constructing said canal shall be extended to the term of five years from the passing of this act.

§ 2. Charles Henry Hall, Francis Fickett, Richard Riker, William Beach Lawrence, Lewis Morris, James R. Whiting, J. Green Pearson, Isaac Adriance, Jonathan B. Hall, Joseph G. Swift, Benson McGowan, Benjamin F. Carman, and Joseph E. Bloomfield, shall be the first directors, and shall hold their offices until the fourth Monday in April one thousand eight hundred and thirty-seven, and until others shall be chosen.

§ 3. The company are hereby authorised to extend their capital to the sum of seven hundred and fifty thousand dollars.

§ 4. Section twelfth of the former act is hereby repealed; but the said corporation shall not purchase, hold, or possess docks, wharves, ware-houses, or any other real estate exceeding in amount the sum of two hundred thousand dollars.

§ 5. Every thing in the act hereby revived, inconsistent with the provisions of this act, is hereby repealed.

§ 6. But persons residing upon, or owning lands bounded upon Harlæm River, or Spitendeuvel Creek, shall at all times have the liberty of passing through the locks or works of said company, with their ordinary farm boats, to and from New-York market, or pleasure boats, free from toll or other charges.

§ 7. This corporation shall continue for fifty years, and the Legislature may at any time alter and amend this act.

STATE OF NEW-YORK, }
Secretary's Office. }

I have compared the preceding with an original act of the Legislature on file in this office, and do certify that the same is a correct transcript therefrom, and of the whole of said original.

ARCH'D. CAMPBELL,
Albany, May 13, 1836. Dep. Secretary.

DR. URE'S PATENT CORRUGATED SUGAR-PAN OR TEACHE.

The pan is made of cast-iron, and is double. Between the outer case, which is evenly, and the inner one which is corrugated into a double surface, there is a space for containing a liquid medium, which is unalterable by the fire in any length of time, and serves as a bath to transmit a sufficient heat to boil the syrup very quickly, but intercepts the scorching temperature which turns it into molasses. The sugar, therefore, cannot be burned in the inner pan, and the fire need never be extinguished, as at present, when a skip is struck. Thus, much time, labor, and fuel, are saved. The pan may be set up by any bricklayer, at the end of the ordinary range of coppers in a colonial sugar-house, where the finishing teache now stands; or it may be worked by a separate fire at the pleasure of the planter, and may have the spare heat of its flue applied to the clarifier-coppers.

Fig. 1 is a section of the double pan Being as tight as a bottle, and without seams or joints it is not liable to leak, like pans made of copper, which must be rivetted or brazed. G is the vacant space between the two pans for the play of the bath-liquor during the time of skipping, when no evaporation is going on in the inner pan. H shows the level of the bath-liquor about two-thirds up the side corrugations. A is a bent pipe, three inches wide, for connecting the space between the pans, with an iron drum D, called the condenser. Any watery vapor which may occasionally exhale from the bath, when overforced by fire, rises freely up the pipe A, and is condensed into water in D. The water thus condensed is quite pure, and is allowed to trickle slowly down through the stopcock F into the funnel beneath it, from which it runs back into the bottom of the medium through the pipe B, and thus preserves the boiling pitch of the medium always at the requisite temperature. The best heat of the medium for boilng sugar quickly without discoloration has been found to be from 300 to 310 degrees of Fahrenheit's thermometer, but it may vary a few degrees up or down without inconvenience. The temperature of the bath may be made higher or lower, at the pleasure of the boiler. By merely preventing some of the water that exhales into the condenser D from returning into the bottom of the bath, the temperature is raised; and by pouring slowly a little more water into the bath through the pipe B, the temperature is lowered. A few quarts of water added make a difference of several degrees in the heat of the bath. E is a light basin of cast iron inverted over the open top of the safety-pipe of the drum D. The edges of the basin rest on 3 iron props, and dip an inch deep, or thereby, into some water poured round them, in the upper space of the drum. This arrangement forms a water-valve, which allows air or steam to pass freely to and from the bath-space between the pans, but at the same time cuts off the open communication between the external atmosphere and the bath liquor. This liquor consists of a strong solution of caustic potash, and may be preserved any number of years in a perfect state for sugar-boiling, by this plan of seclusion from the open air. Should the body of medium after a long time absorb so much carbonic acid or fixed air, as to impair its action as a bath, it may be easily made caustic again, and thus restored to its original state, by boiling it for half an hour in a copper with half a hundred weight of fresh slaked quick lime, and six times its bulk of water. This lime-mixture being allowed to settle a night in the large copper in which it was boiled, must be ladled off into smaller copper in successive portions, and boiled down till its boiling pitch rises to 290 degrees, or thereby. The copper should be partially covered with boards during this boiling up, and whenever the liquor is concentrated enough, the copper should be closely covered with boards or mats, till th

Fig. 1.

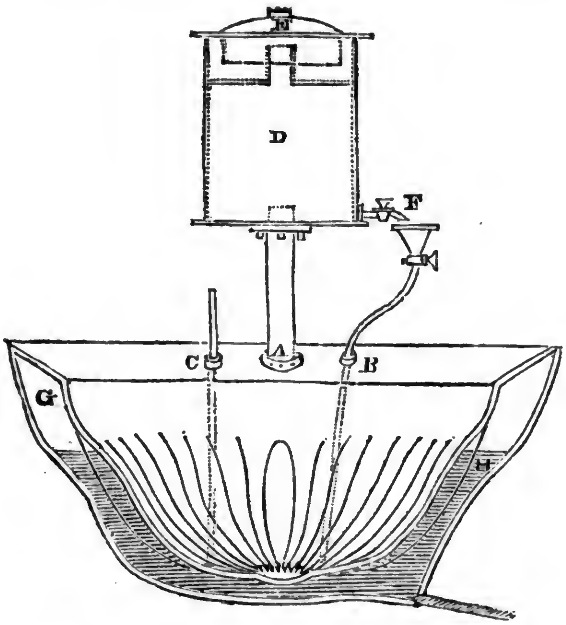


Fig. 2.

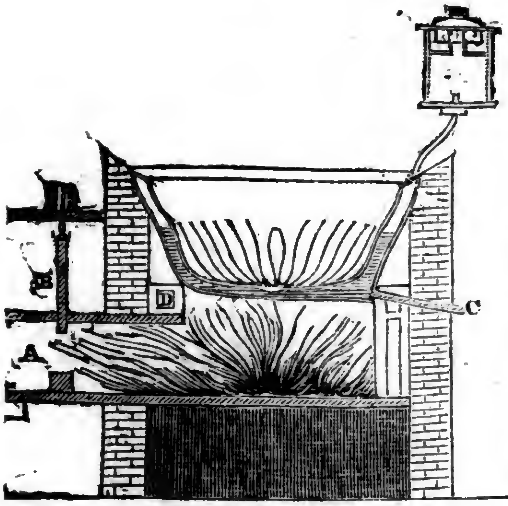
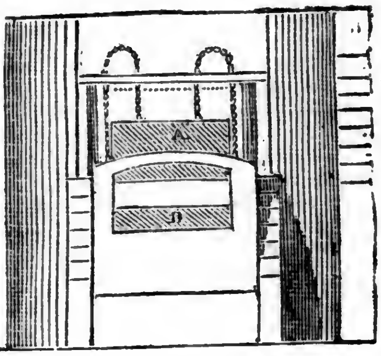


Fig. 3.



liquor has become cool enough to be poured into the bath space through the aperture at C or B (unscrewed for this purpose,) by means of a funnel, or a stone pitcher with a spout.

The flange A, of the bent pipe, is made water-tight to the brim of a pan by a lead-washer, and is fixed down firmly with screw bolts, having square heads. The funnel-pipe B, with the lengthening piece for introducing water into the bottom of the medium for regulating the temperature of the bath, is fixed in its place by a union-joint screw turned by a screw-key or wrench. The thermometer tube-case has a flange, with lead-washer at C, by which it may be screwed tight into its aperture. Into this tube which is shut bottom, an inch or two of quick silver is to be poured, or sufficient for covering the bulb of the thermometer. This quick silver lying always in the tube, takes the temperature of the medium, and immediately imparts it to the thermometer, on dipping its open end down into the bottom of the quicksilver. The thermometer, after some experience in boiling with the pan, need only be used occasionally, as in the morning and afternoon. It shows at once, whether the bath is too hot or too cool, so that a little water may be poured into it through B in the former case, or a little of the condensed water in D, allowed to run to waste, by the stop cock in F, in the second case.

The condensing-drum D, must be propped in its proper position, while its being fixed on to the brim of the pan by the screw-bolts of the flange A. When the pan is briskly at work, both stop-cocks for regulating the medium may be shut, and slightly opened only when the pan is charged afresh with syrup; or the stop cocks after a little practice, may both be left always slightly opened, whereby the pan will become self-acting, by the circulation of a little vapor into the condenser, and a return of it in the state of water to the bottom of the bath. Water poured on the *surface* of the dense medium does not incorporate with it, and therefore has little or no effect upon its temperature.

Fig. 2 is a section of the patent pan when set as the first of the range. A is the flue leading to the other pans. B B, the shuttle-valve, or dampers of fire-brick, by means of which the orifice of the flue may be lowered when required; thereby allowing the flame to have less contact with the bottom of the patent pan. C is the medium discharge-pipe, to be made use of only on finishing crop, when the medium ought to be run off into an iron drum, where it would remain free from the influence of the atmosphere till the following season. D D represents the circle of fire-bricks upon which the patent pan is seated.

Fig. 3 represents more clearly the action of the dampers, as previously shown. These are placed betwixt the patent pan and the second of the range. A and B are the two dampers, equal in weight, and consequently of easy adjustment. When the dampers are furthest apart, the patent pan is receiving the full influence of the fire, but as they approach each other the flame is sucked more rapidly through the diminished orifice, and is in consequence allowed less contact with the bottom of the patent pan.

By these means the fierceness of the fire, as applicable to the patent pan, may be completely controlled, without the least waste of fuel; for while little of the heat is acting upon the patent pan, more is made available to the other pans of the range.

The medium is carefully prepared under the superintendence of the patentee, in a laboratory fitted up on purpose, and is sent out in a state ready for use, in an iron drum-tank, packed in a cask. The orifice of the tank is closed with a screwed iron plug, having a lead-washer under its flange. On taking out this plug with a common screw-wrench, the medium must be poured by portions into a stone or metal pitcher, and thence into the bath-space between the pans; the discharge-hole at the bottom of the pan having been previously closed tightly with its screwed pipe, and flange with lead-washer. At the other end of this short pipe there is a stop-cock, which is never to be opened but when the bath-liquor is to be drawn off at any vacant period, for the purpose of making it caustic again after some years' use. This stop-cock should in general be incased in brick-work or mortar, to screen it from idle fingers. The bath-liquor is corrosive to skin and wood and should not be put into wooden vessels or much handled; if a little happens to touch the fingers, it may be washed away with a little water. Should some of the medium be found to be congealed, the bottom of the open tank may be plunged in boiling water for a little, or surrounded with blazing cane-trash, and half a gallon of hot water may be poured in to wash out the remainder.

Should the junction of the outer and inner pans, at their brims above, become in the least open at any time, they may be made secure again, by packing them with iron cement, made of ground iron borings sal-ammoniacs, well mixed, in the proportion of six pounds of the former to one ounce of the latter, and very slightly damped with water.

When fire is first applied to the pan, after the proper charge of medium has been introduced into it, the progressive heating of the bath must be carefully observed by means of the thermometer, standing in the quicksilver tube C. If the temperature rises to 290 degrees, or thereby, the pan is ready without discoloration. A charge of such syrup may be boiled off into good sugar, by the patent teache, in half an hour, and into fine syrup for shipment home, in half that time. At the instant of running off the granulating skip into the cooler, the firing should be suspended, and resumed as soon as the fresh charge of syrup is introduced. The pans have a shelving brim, to which the usual sloping saddle of lead or mortar

cement may be most conveniently adapted, for allowing the juice to froth up without boiling over. The bath is a constant magazine of heat, by which the hot syrup is made to boil briskly immediately after its introduction, so that not an instant is lost in the operation of a sugar house. This pan is also more easily managed than the simple teache, as it cannot by possibility burn the juice, the fierceness of the fire merely agitating the bath for a little, without affecting the quality of the sugar. When there is no syrup in the corrugated pan, the medium should not be forced with a strong fire, as having no evaporable liquor to transfer its heat to, it might possibly boil up a little into the condenser. Even in this case no evil could result, since the moment that the fire becomes moderate, or that fresh syrup is put into the inner pan, the drop of medium which may have been forced up into the condenser D, can be run back into its proper place, through the stop-cock F, and subjacent funnel-pipe.

For some time after beginning to use the pan, it is proper to look every two or three days into the state of the bath, and to measure the depth at which it stands. This is conveniently done, at any interval of the boiling, by unscrewing the quicksilver pipe C, lifting it perpendicularly up, and noting how high the wet mark of the medium is. If it corresponds with about the middle height of the side corrugations, all is right; if it shows the medium to stand lower, a few gallons may be poured in from the spare tank. Too much medium is not advisable, as it merely heats the sides of the pan above the level of the granulated skip, and as it leaves too little space for the free play of the medium exposed to a fierce and fluctuating fire.

From the London Mechanics' Magazine.

ON THE STATE OF THE ARTS OF DESIGN IN ENGLAND, WITH A POSTSCRIPT ON TAXIDERMY AND TRAVERTINO.

Sir,—Upon reading your judicious testimony before the Committee of the House of Commons on Arts and Manufactures, I was struck with a passage (p. 189, 642d No.) wherein you most appositely remark on the "wretched prints," and "still more wretched stucco images," with which this country is inundated by the itinerant *Italian* hawkers. A great portion of the plaister of Paris casts are good, and in good taste; but the prints are all, without exception, the most wretched that it is possible to conceive it possible to execute. Many of the plaister casts, too, are as bad as the prints; and your remarks on this head brought to my recollection a circumstance which tallies most opportunely with them.

Some ten years ago, walking in the country in company with a gentleman of extensive knowledge, and the most correct taste, we met an Italian lad bearing his board of images, most of which were of that horrible sort of rubbish most prized in country places—all daubed with paint, red, yellow, blue, and black. My friend asked the Italian how he could possibly think of selling such *ugly* things, and how he could look on them without being sick? The Italian's reply exactly tallied with that which you, Mr. Editor, gave to the Committee:—"No doubt they consulted the taste of their customers." He said, "*Ugly*, do you say? Yes, they are ugly; but some people's do like them for to be ugly!" and added, in Italian, "*In Londra, possiamo vendere le cose regolare; ma in campagna, ci vuole il colorato e barbaresco.*"—"In London we can sell the *regular* things; but here (in the country,) we must have the colored and barbarous." By-the-bye, I will remark, that the Italian did not mean to attach the epithet of "barbarous" to the colored, merely as colored; though I do not mean to say that he was actually aware of the fact of the ancients, both Greeks and Romans, painting the statues of their gods and goddesses to the natural hues, and clothing them in garments according to the most approved fashion of the day.

I should think that there can be little doubt but that the contemplation of, and the drawing from, good statues or casts, is far more efficacious in infusing a right knowledge of design ino the student, as well as good taste and judgment in the public, than engravings, drawings, or paintings, can possibly be. I mean, that *cæteris paribus*, the diffusion of good statues or casts will have a far greater effect in a community than an equal diffusion of engravings and paintings. The *facilities*, however, which occur in the dissemination of the latter, through the innumerable publications which are now accompanied by wood cuts or superior engravings, must give it the lead in the power of general instruction to a community.

Speaking of castings in plaster of Paris, I will mention a circumstance which. I dare say most of your readers will feel aware of, which is, the very imperfect representations of fishes exhibited in museums and collections of natural history, when the stuffed skins of the animals are given as something like unto the originals. When we look upon the stuffed and varnished skin of fishes we have never seen alive or dead, the faults in the representation do not strike us; but let any one look at the preserved specimens of cod, soles, salmon, pike, trout, &c., with the very *phisiognomy* of which he is quite familiar, and he will surely require the aid of the name affixed to the specimen in order to recognise his old acquaintance! Not one of the stuffed fishes of the collections bear any greater resemblance to the real animals, than a stocking stuffed with hay or wool would have any anatomical resemblance to the leg of a human being! The transformations of the stuffer are truly ludicrous. But it is not his fault; it is the *process*, which is entirely inadequate to the purpose. Birds, and some animals with long hair, such as bears, &c., may be tolerably well represented through the art of stuffing, &c. But has any one seen a stuffed horse? I have, at Paris and elsewhere; and, unfortunately, our eyes are so familiar to the "noble presence," and to every beautiful swell and turn of the limbs and muscles of that noble animal, that the specimens I allude to, although executed by the first artists of the line in the world, might almost be mistaken for apes, or even cows, but for want of the ears and horns! But I am too prolix in the introduction of the trifle I have to present to such of your readers as are fond of fish and fishing, which has been my only diversion for many years. I have been in the habit of catching pike of 10, 12, and 20 lbs. weight; trout of 7, 10, and 11 lbs.; and in Italy, fish of much larger size. I was for some time in the habit of preserving a drawing of the best fish, by laying them on paper and taking the outline, an exact fac-simile as far as that went. I then attempted to stuff some of them, but succeeded no better than the gentlemen of the museums. I then thought of taking a cast in plaster of Paris of the fish, which I executed in more ways than one, all equally satisfactory. First, I took a cast of the fish, and then saturated it with linseed oil, and painted it from nature, so as to be, to all intents and purposes, a fac-simile. Secondly, I skinned the fish, took a cast, and then drew the skin over the cast. Thirdly, I made the cast from the unskinned fish, then skinned it, and drew the skin over the cast. The only difficulty I had was with the skin of the head, but that is of no consequence, and it might be overcome after three days' application. But by painting the cast the most perfect fac-simile is produced, both in form and color; and the latter will not be liable to the changes and blackening which occurs to the varnished skins of fishes.

I fear that you will accuse me of occupying your valuable columns with much trivial matter; but as far as the preservation, or rather *representation*, of fishes and reptiles is worthy of consideration, I think that the "preservers" will be benefitted by this communication.

Another word or two on a subject connected with the preservation of stone and roofs, &c. The stone of which the Church of St. Peter's, at Rome, is constructed, is a calcareous, stalictitious stone, called Travertino, formed by an agglomeration of bushes, leaves, roots, and some shells, by means of a calcareous fluid by which the whole is fossilised. The very process of this formation may be observed in all its various stages of progression and completion, on the road to Tivoli, about twelve miles from Rome. This is an interesting topic, but I must only allude to it in order to introduce the Travertino, which I have to represent as rather liable to honeycombs. These honeycombs when they occurred in the surface of any of the steps, copings, terraces, &c., on the vast surface of the top of St. Peter's Church, were usually filled with melted pitch or some kind of cement; but the great heat of the sun, combined with the action of the air and water, soon melted, decomposed, and dissipated these fillings in. In 1804, I recommended the application of melted sulphur into al, honeycombs, cracks, crevices, and junctions in the stone or clinkers, which constitute the top and pavements of St. Peter's Church which, in extent and appearance, is very much like a small town or fortress. The sulphur was universally applied; and up to 1815, I had frequent ocular proofs that it was no more affected by the sun or atmosphere, than would have been so much pure gold. To this, I will only add, that from subsequent experiments I have found, that by the addition to the sulphur of a small quantity of iron filings, a very hard sulphuret of iron, or artificial pyrites is produced. Copper, or brass filings would probably produce an analogous result.

I have read, with very great satisfaction, in your last number, Mr. Thomas S. Mackintosh's Electrical Theory of the Universe, to which I take the liberty of soliciting the particular attention of your philosophical readers. I shall venture to offer some remarks upon it next week. Meantime, I have the honor to be, Sir, your obedient servant, F. Maceroni.

From the following article, we are much pleased to find that the Champlain and St. Lawrence Railroad promises to answer all expectations. Mr. Casey deserves great credit, for having erected a work as yet uninjured—having stood the test of one of the severest winters that may ever be expected.

No one, unless acquainted with the nature of the ground, can form any conception of the severe stress upon the pins and other work at the termination of the road.

The inexperience of the Canadian people in such matters, is an impediment of no small consequence, unknown, of course, in the United States.

We wish Mr. Casey equal success in all his works, though we cannot but feel jealous that our Canadian neighbors should secure to themselves so promising a member of the profession.

From the Report, in this day's paper, of the Committee of Management of the Champlain and St. Lawrence Railroad Company, it will be seen that every thing connected with that undertaking is in a highly forward and promising state, and that there is every prospect of the Railway being in operation in July. We think, with our contemporary the *Gazette*, that "the opening of the Railway will be one of the proudest days in the annals of Lower Canadian improvement."—[Morning Courier.]

At a meeting of the Stockholders of the Champlain and St. Lawrence Railroad Company, held on Monday last, the following Report of the proceedings since the last half yearly meeting, was submitted, approved, and ordered to be printed :—

The Committee of Management of the Champlain and St. Lawrence Railroad, beg to submit to the Stockholders of the Company a Report of the progress of the undertaking, since they had the honor of addressing them on the 14th of December last.

Shortly after the period just mentioned, contracts were entered into by the Commissioners of the Company, for preparing all the materials required for the superstructure of the Road, and also for the distribution of the same, when completed, together with the iron along the line of road, and we are happy to state that notwithstanding the unfavorable weather for such work during the past winter, the Commissioner reports that these several contracts have all been regularly fulfilled, and the various materials for completing the road now lie along the line, ready prepared to be put down thereon.

Contracts were entered into with the Messrs. Wards, early in the winter, for the completing of twelve, and the castings of eight freight cars, together with a variety of castings of iron works for *turn-outs*, splicing plates, &c. &c., all of which are rapidly progressing, (the splicing plates being completed, and in a great measure distributed along the line.)

A locomotive ordered in September last, and made by Stephenson of Liverpool, who ranks among the first in this department of engineering, was to be shipped, say our correspondents, about the end of March, and may be expected among the first vessels; the Company have been most fortunate in the seasonable execution of this order, sa well as in that for the iron, which the present high price of that material will clearly testify.

The superior style in which passenger cars are got up in the city of Troy, in the United States, together with the inexperience of the mechanics in this city in the construction of such carriages, induced the Committee to send the Engineer of the Company, Mr. Casey, to Troy in January last, who entered into contracts with Messrs. Eaton & Robertson for two, twenty-four passenger cars, and with Messrs. Eaton & Gilbert for two, sixteen ditto, *complete for the road*, and which by late accounts from that place are being finished in a style of elegance worthy of the establishments from which they will emanate, and no doubt with the view of extending their high reputation to this country.

It is most gratifying to state, that the wharf at Laprairie, after undergoing an ordeal of no ordinary nature, remains uninjured in the slightest degree, thus justifying the high terms of commendation made use of in the Report which we had the honor to submit at the last half-yearly meeting.

The work upon the station house at Laprairie, was recommended on the 13th April, and completed, as far as practicable for the present, on the 3d instant. The work also upon the station house at St. John's, is now rapidly progressing.

The state of the graduation of the road is matter of much congratulation to the stockholders, for our Engineer reports, and we use his own words. "That the admirable state of the banks will not only facilitate all our operations this year, but is a guarantee that the superstructure will hereafter suffer little, if any, derangement from the frost. All streams and discharges have been uncommonly high this year, and two or three small culverts will be added to aid the passage of the water across the road,—this is all the extra work required." The Engineer also states, that about 1200 feet of the timber superstructure has been laid down ready to receive the iron, and that the workmen employed in this branch improve daily in expertness.

We have much pleasure in stating, that the steamboat building by Mr. Lindsay, to run in connexion with the Railroad, will be ready to launch in a day or two, and as the contract with the Messrs. Wards for the engine was entered into as early as the 1st December last, there is every reason to suppose the boat will be ready to take her station upon the ferry about the 10th July.

It now only remains for us to state, that the reports of the Engineer and Commissioner are such as confidently lead us to expect, that with favorable weather the road may be opened from station house to station house about the 15th July next, and that there is still every reason to suppose the estimate set forth in the Engineer's report of December last, will vary but little from the sum necessary to accomplish this desirable result.

PETER M'GILL, *Chairman*.

THE NEW SAFETY CAB.

We extract the following clear and sensible exposition of the advantages of this new vehicle (the invention of Mr. Hansom the architect of the Birmingham Townhall, confessedly one of the finest architectural productions of modern times,) from the prospectus of a company which has been formed for promoting its introduction into the metropolis :—

"The very peculiar construction of this carriage secures advantages that men of science and of practical experience have long wished for, but which have never before been obtained. Instead of an axle going through from side to side of the carriage, Mr. Hansom uses a frame work so contrived, that, while fully able to sustain any shock te which it may be exposed, and admitting the use of wheels of any diameter, it allows the body to be placed at any distance, however small, from the ground.—By this contrivance, three most important objects are attained : namely—

"1st. *Absolute safety:* for the body is placed so low, and the frame work so arranged, as to render it impossible that the carriage should be upset in any direction whatever ; nor can a kicking, a rearing, of a stumbling horse plaee the passengers in danger.

2. *Great relief to the horse in peculiar situations :* for the centre of gravity of the load being placed below the centre of the wheels, the injurious pressure on the horse, in ascending and descending hills with a 2-wheel carriage of the common construction, is avoided ; for in descending, the pressure on his back is entirely removed ; while in ascending, a small and advantageous addition is made to it.

3. "*Considerable reduction of draught in all circumstances :* for wheels of larger diameter than usual may be employed, not only without prejudice to the other advantages of the invention, but in promotion of them, and it is on all hands agreed, that very great saving of draught might be effect a by the use of large wheels, but for the hitherto supposed impossibility of reconciling them with the other necessary properties and conveniences of a carriage.

* * * * *

"The inconvenience and danger of the present cabs have been long, loudly and justly complained of. The new cab is perfectly and obviously safe, and effectually protects passengers from injury by a vicious or stumbling horse ; it affords ingress and egress as safe and easy as those of a sedan-chair, and is smoother of motion than many of the best carriages of other kinds ; it also combines the shelter and comfort of a close carriage, with the lightness of an open one, and the speed of the best of the present cabs, at the cost of perhaps one-third less labor to the horse, and with the entire avoidance of the injurious effect of common 2-wheel carriages on hilly roads.

* * * * * *

"In ascents and descents, any moderate degree of safety to the passenger, or of pressure on the horse, has been, hitherto, attainable only by the use of four wheels. Where four are used, they cannot be large : much power is thus lost—to say nothing of the additional friction—and two horses are needed. Absolute safety, and greater comfort to the passengers, and much greater ease to the animal, are now secured by two wheels, and those large ones. The additional horse is thus dispensed with, and posting may be done by one horse, on terms and with a convenience and rapidity yet unaccomplished. The conveyance of mails and despatches may be done by 2-horse carriages, with the like, or even greater, benefit.

"A carriage has recently been built, and is ready for public inspection and trial, which exemplifies the plan, and fully justifies the preceding observations. It has been subjected to severe trials, both intentionally and by accident; and by coming out of them without the slightest failure, has proved that its framework may be safely relied on in any emergency."

☞ Business on the Chemung Canal has opened this spring with vigor. Several boats have already departed laden with produce and lumber for the great emporium. There is more than twice as much lumber now on its banks as there was last year.—No damage has been done to the canal by the spring freshot.—[Elmira Republican.]

SOMERVILLE, (N. J.,) RAILROAD.—The most difficult part of the grading of this road between the town and the Point, has been completed. The contractors experienced a little difficulty a short time since from a strike among their hands; this difficulty was only for a day, the laborers returned to their work without any augmentation of their wages. There are but few difficulties to be encountered in grading the road between the town and the Point. The part about midway between the two Points is low and marshy, and as there are no abrupt inequalities to be encountered, the filling up can be accomplished without much cost. From the town to Somerville, the road has not yet been located, although several routes have been run. In addition to these favorable circumstances, it is said that 220 miles of the New-York and Erie Railroad will be put under contract this summer. The Point begins to present an appearance which will warrant us in the conclusion that its improvement is not the fanciful dream of a few speculators. Those grounds at the Point, which swell so nobly from the Sound, present to the eye of a close observer one of the finest locations which can be imagined for the erection of a commercial and manufacturing city. Laborers are now at work driving the posts for the building of a dock for the accommodation of the company.—[Elizabethtown Journal.]

COST OF THE RAILROAD TO THE WEST.—Our attention has been turned to this subject by an article in the Wheeling Gazette, received to-day, which we copy below. The opinion expressed by the experienced engineer of the Baltimore and Ohio Railroad, as to the probable cost of that portion of the road which will extend from Cumberland to Wheeling—a distance of 132 miles—may be safely relied on as a tolerably correct criterion for an approximate estimate of the cost of the road from Harper's Ferry, by way of Hagerstown, to Cumberland, which is about half the distance. The estimate would then be as follows—

From Wheeling to Cumberland,	4,202,000
From Cumberland to H.'s Ferry,	2,101,000
Branch to Pittsburgh, 50 miles,	935,000
	$7,238,000

And the whole cost would be seven millions, two hundred and thirty-eight thousand dollars.

To meet the above estimate, the city of Baltimore has made provision to furnish three millions—the cities of Pittsburgh and Wheeling will each furnish one million, and if the legislature of Maryland shall subscribe three millions, it will amount in the whole to eight millions; which will furnish a surplus above the estimate, of $762,000, for moving power and contingencies.—[N. Y. Gazette.]

COMPARISON OF SPEED.—A French scientific journal states, that the ordinary rate is per second :—

Of a man walking - - -	4 feet.
Of a good horse in harness -	12
Of a reindeer in a sledge on the ice	26
Of an English race horse -	43
Of a hare - - - - -	88
Of a good sailing ship - -	19
Of the wind - - - -	12
Of sound - - - -	1038
Of a 24 pounder, cannon ball	1800
Of the air, which, so divided, returns into space - -	1300

The number of passengers on the Birmingham and Gloucester Railway calculated upon, amounts to uparwds of 400,000, and the quantity of goods to about 70,000 tons annually. The amount of income expected to arrive from the conveyance of goods and passengers, is £145,855 5*s.* 1*d.* The estimated charge of the annual expenses of the railroad when completed is £52,000; and the cost of making the road, which is expected to be completed in four years, is £889,703. The engineering difficulties are considerable, in consequence of the country through which it has to pass. There are two inclined planes of upwards of a mile and a quarter each, to be passed by passengers, and another one at the termination of the line at Gloucester of 500 yards, to be used for goods only. The carriages are to be drawn up these inclined planes by means of stationary engines. There will also be one tunnel 440 yards in length.—[Ledger.]

The carriages running on that part of the Greenwich Railroad which is finished have been filled every day during the last week. The Company's receipts have been about 50*l.* a day. The form of the road appears advantageous for the carriages; and it is found that the two coats of cement and concrete which are laid over the whole of the brick-work of the arches is quite effectual in preventing any moisture from penetrating.—[Herald.]

On the 2d inst., a disastrous occurrence took place at the British Iron Company's Works at Aberyschen. The fly-wheel, propelling the machinery at the forge, is upwards of 20 feet diameter, and revolves upwards of 70 times a minute. During this velocity and with but a momentary notice, it is supposed that one of the cogs of the wheel gave way, the whole of the attached wheels, etc., were hurled in an alarming momentum through the roof into the air, upwards of 300 feet, and one piece, weighing nearly two tons, descended within ten feet of the forge, and was buried a considerable depth in the ground; fortunately, although some persons were within two or three yards of the place where this huge mass of iron fell, and nearly 100 altogether in and about the works, not a single person was injured. The damage done to the works is estimated at 5,000l.—[Chronicle.]

A journeyman engraver has just made a discovery of much importance, for the economy caused by it in the manufacturing ef fire arms. The stocks of guns, that usually require much labour, are made quite miraculously by the aid of a machine which he has invented. Government, it is said, has bought the invention at the price of 300,000fr., and the inventor is immediately to set up machines of this kind in eoch of the arsenals.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. C. E. Jr.

20—ta18

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95 tons of 1 inch by ⅜ inch.
200 do 1¼ do ⅜ do
40 do 1¼ do ½ do
800 do 2 do ½ do
800 do 2¼ do ½ do
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

SMITH & VALENTINE,

STEREOTYPE FOUNDERS,

Are prepared to execute orders in their line, at 213 Grand street, New-York.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted. MOSES LONG.

General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harbor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS

OF VOLUME II. OF THE

CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wildnerness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at \$4 per annum, if paid at the time of subscribing; \$5 if paid at the expiration of six months, or \$6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a \$5 bill will receive the paper fifteen months.

*** All sums to the amount of \$10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, Editor.] SATURDAY, JUNE 4, 1836. [VOLUME V.—No. 22

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 4, 1836.

NOTICE TO RAILROAD CONTRACTORS.

THE First Division of the BANGOR and OLD TOWN RAILROAD, extending from Bangor to Stillwater, will be ready for contract by the 15th inst., and sealed proposals will be received for the grading, masonry and bridging the same until the 25th inst., at the office of the subscriber in Bangor.

JOSHUA BARNEY, Engineer.

Bangor, June 2, 1836. 22—2t

TO CONTRACTORS.

PROPOSALS will be received at the Office of the Eastern Railroad Company, Boston, between the 28th and 30th inst., for the grading and masonry of said Road from East Boston to Newburyport, a distance of 33¾ miles.

The line of this road is along a favorable country, passing through Lynn, Salem, Beverly, and Ipswich, which places will afford contractors every facility for obtaining provisions, &c. Plans and Profiles will be ready, and may be seen at the Office, after the 22d instant.

Satisfactory recommendations must accompany the proposals of those who are unknown to the Engineer.

22—t30j JOHN M. FESSENDEN, Engineer.

Maryland Internal Improvement Bill.—No legislative act, connected with Internal Improvement, out of our State, has given us so much pleasure as the passage of this bill. Our neighbors of the Monumental City have celebrated the event by various festivities. They have good reason to rejoice, inasmuch as the rapid completion of several of their most valuable public works is now ensured to them.

We cannot but think, however, that to the passage of the Erie Railroad Bill, the Marylanders are indebted for their own success. They boasted of their great advantages over New-York, and her public works—we, not to lose what we have so long enjoyed, grant increased facilities to our companies, and now, they determined to try our metal, have lent a helping hand to their favorite works. We hope this profitable rivalry may long be continued in as good feeling as it has commenced.

We perceive that the "Broome County Courier," published at Binghampton, is for sale. The editor, J. R. Orton, Esq. "in consequence of impaired health, which it seems probable nothing short of a temporary change of climate will restore, offers for sale the Establishment of the Broome County Courier, and his Bookstore. His press, materials and business are decidedly good—and to those acquainted with the location and prospects of Binghampton, and with the fact, that the Courier is the only democratic journal in the county of Broome, in which there is but one other newspaper of any description, nothing farther will be needed to illustrate the value of the location. He will also include in the sale, his new building, fitted up expressly for a general Printing and Book publishing Office, Bookstore, and Book-Bindery; or he will rent the building for a term of years.

If a sale is not effected within a short period, the subscriber would form a partnership in business."

We consider Binghampton an important point on the line of the New-York and Erie Railroad. It lies at the junction of two branches of the Susquehannah River; and it is also the termination of the Chenango Canal. Binghampton is certainly destined to become a place of considerable importance.

Scarcity of Instruments.—It is now pretty generally understood by Engineers, that there is a very great scarcity of *Instruments* for their use in market at this time. There is scarcely a first rate Leveling instrument to be had in New-York; it is therefore a matter of some importance to those who intend to procure them to give their orders in time to have them manufactured, or imported.

Should it be desired, we will answer inquiries in relation to, or give orders for instruments either of American, or European manufacture.

We have received from our Paris correspondent a description, with views and plans, of the St. Germain Railroad.

As this is a work intended to excel in appearance (passing, as it does, the vicinity of many splendid structures), and also in solidity of construction, we shall endeavor to give our readers a translation of such of them as may be interesting or useful.

We have received Williams' Annual Register for 1836. This work, always valuable for the statistics collected by its enterprising publisher, appears this year much increased in size, and equally so in usefulness. When it is recollected that the same amount of information is not to be procured in any other form, due credit will be given to the perseverance of the proprietor, who has given it to us in such a convenient and portable form.

We notice numerous articles of interest and value in addition to the usual contents.

PAMBOUR ON LOCOMOTION.

Continued from page 328.

CHAPTER III.

OF THE RESISTANCE OF CARRIAGES MOVED ON RAILWAYS.

§ 5. *Table of the Results obtained in those Experiments on the Friction of Wagons.*

Bringing together the different experiments described hereabove, we make out the following table:—

EXPERIMENTS ON THE FRICTION OF WAGONS.

Number of the experiment.	Date of the experiment.	Description of the trains.	Weight of the train.	Weight per wagon.	Distance run over.	Duration of the race.	Difference of level.	Friction.	Friction per ton.	Observations.
	1834.		tons.	tons.	feet.		feet.		lbs.	
VI	July 29	1 empty wagon	-	1.85	6204	-	36.78	$\frac{1}{169}$	13.28	This wagon has only a platform surrounded by an open railing.
VIII	July 30	1 tender	-	4.50	5967	-	26.66	$\frac{1}{163}$	13.76	This form gives a great hold to the air.
III	July 29	1 loaded wagon	-	4.65	7326	-	37.16	$\frac{1}{197}$	11.36	
IV	July 29	1 loaded wagon	-	5.15	6663	-	36.95	$\frac{1}{180}$	12.42	An axle-box very hot on arriving.
V	July 29	1 loaded wagon	-	5.20	7455	-	37.19	$\frac{1}{200}$	11.17	
IX	July 31	1 tender	-	5.50	7266	-	32.88	$\frac{1}{221}$	10.13	
II	July 29	5 loaded wagons	25.58	5.12	9324	10'.20"	38.19	$\frac{1}{244}$	9.17	
I	July 29	5 loaded wagons	31.31	6.26	9933	10.00	38.55	$\frac{1}{258}$	8.69	
XI	Aug. 1	10 loaded wagons and 1 tender (11 carriages)	48.72	4.43	10008	11.45	38.58	$\frac{1}{259}$	8.64	
X	July 31	14 loaded wagons	61.65	4.40	9579	-	35.32	$\frac{1}{271}$	8.26	
VII	July 30	19 loaded wagons	92.00	4.84	10728	11.00	38.85	$\frac{1}{276}$	8.11	
XII	Aug. 1	24 loaded wagons and 1 tender (25 carriages)	110.00	4.40	10668	-	38.82	$\frac{1}{275}$	8.15	
XV	Aug. 15	7 wagons 1 tender and 1 engine in front	40.59	4.00	8175	8.30	37.35	$\frac{1}{219}$	10.23	Including the friction of the engine.
XIII	Aug. 2	17 wagons 1 tender and 1 engine	94.96	4.78	11262	-	39.10	$\frac{1}{288}$	7.78	
XIV	Aug. 2	20 wagons 1 tender and 1 engine	110.14	4.83	10911	12.10	38.75	$\frac{1}{282}$	7.96	

During all those experiments the weather was fair and calm. As we have said before, no particular precautions had been taken, nor had anything been altered in the usual state of the wagons or rails. The circumstance of the trains passing over nine switches at the foot of the inclined plane, must make the results appear a little greater than they would generally be on any other part of the road taken at random.

§ 6. *Friction of the intermediate Wagons of the Trains.*

We have already marked in the first six experiments the influence of the resistance of the air in the results. When five wagons move together, their resistance to the motion is 9.17 lbs. per ton; and if each of those five waggons move separately, their average resistance per ton is 11.65 lbs. The other experiments present similar results. By comparing large trains with those which are composed only of a small number of carriages, we constantly see the resistance diminish, when the mass which is drawn, although continuing to cut the air on the same surface, comprises, however, a more considerable weight.

The direct resistance of the air takes place only on the first carriage of the train. Now, the first six experiments made with a single wagon give us the resistance of a carriage when it advances the first. Deducting it therefore, in the other experiments, we shall discover the resistance of the intermediate wagons of the trains; that is to say, the friction, independently of the direct resistance of the air.

The experiments III., IV., V., VIII., and IX., put together, give us the average friction of a loaded wagon at the head of the train equal to 11.77 lbs. per ton. Taking, therefore, experiment VII., for instance, the weight of the train was 25.58 t. Each ton had a resistance of 9.17 lbs.; thus the total resistance was 234.5 lbs. Deducting the resistance of the first wagon at the rate of 5.12 t. × 11.77 lbs. = 60.25 lbs., there remain for the four following wagons 174.25 lbs., which, divided by the weight of those four wagons, make 8.50 lbs. friction per ton.

§ 7. ***Table of the Results of the foregoing Experiments on the Friction of the intermediate Wagons of the Trains.***

If we make the same calculations for each of the other experiments, and if we add to them the similar results, already presented for the three experiments where the engines had remained attached to the trains, the following table will be made out:—

RESISTANCE OF THE INTERMEDIATE WAGONS OF THE TRAINS, THAT IS TO SAY, AFTER DEDUCTION OF THE DIRECT RESISTANCE OF THE AIR ON THE FIRST CARRIAGE.

Number of the experiment.	Description of the trains.	Weight of the trains.	Average weight per carriage.	Resistance per ton of the first carriage of the train.	Resistance per ton of the intermediate wagons of the train.
		tons.	tons.	lbs.	lbs.
II	5 wagons	25.58	5.12	11.77	8.50
I	5 wagons	31.31	6.26	11.77	7.92
XI	11 carriages	48.72	4.43	11.77	8.33
X	14 wagons	61.65	4.40	11.77	7.99
VII	19 wagons	92.00	4.84	11.77	7.91
XII	25 carriages	110.00	4.40	11.77	7.99
XV	8 carriages	33.52	4.00	15.84	9.04
XIII	18 carriages	86.76	4.78	13.78	7.21
XIV	21 carriages	101.80	4.83	15.22	7.35
	126 carriages	591.00	4.78	"	8.03

The average resistance is therefore no more than 8 lbs. per ton, if we take into account only the intermediate wagons of a train. Now, in all the cases we have to calculate, in respect to railways, the train is always preceded by the engine. It is, therefore, upon that alone that the direct resistance of the air exerts its influence, and that resistance being already taken into account in what is called the friction or resistance of the engine, it is clear that all the wagons must be considered as intermediate

Fig. 8.

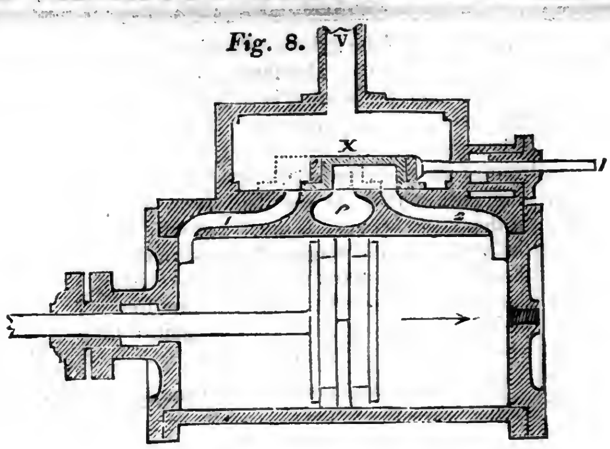


Fig. 9.

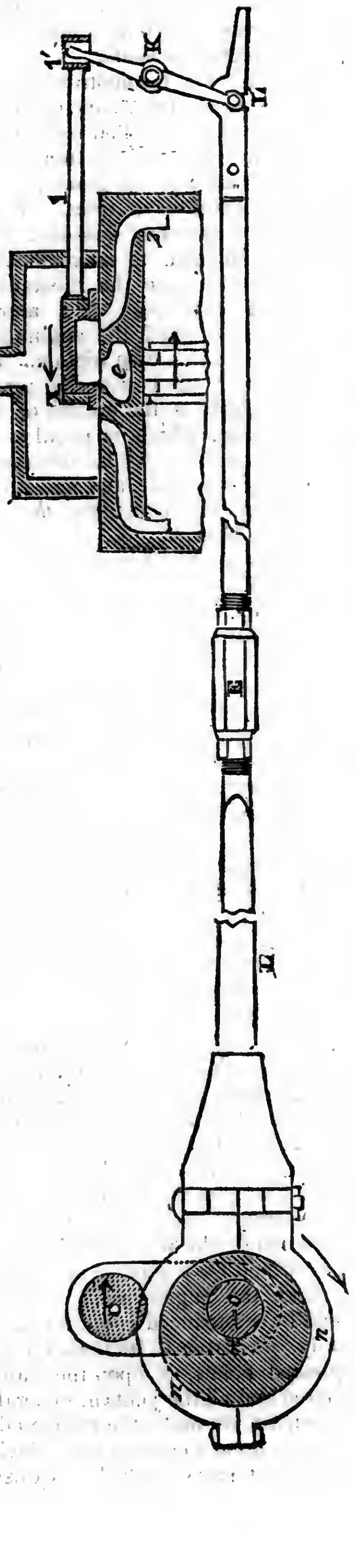
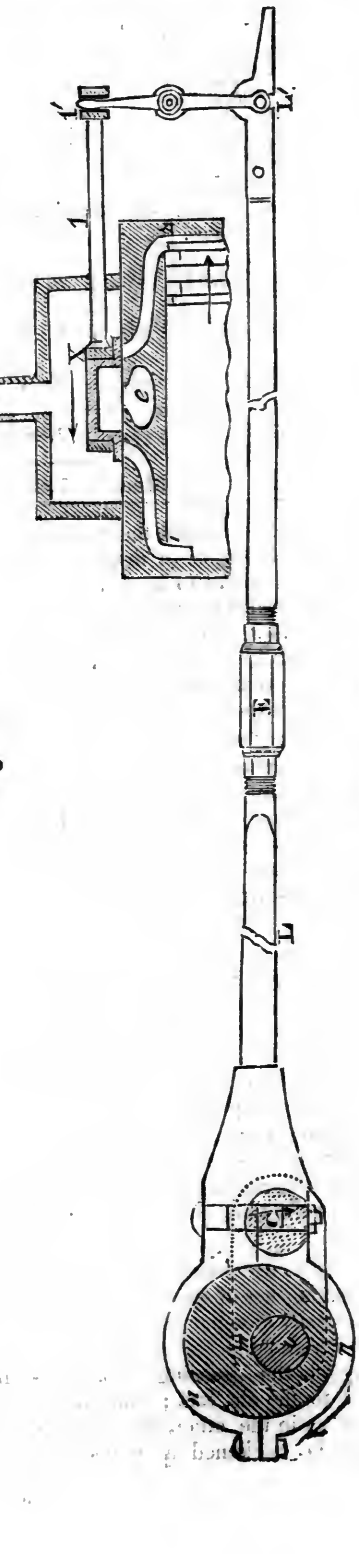
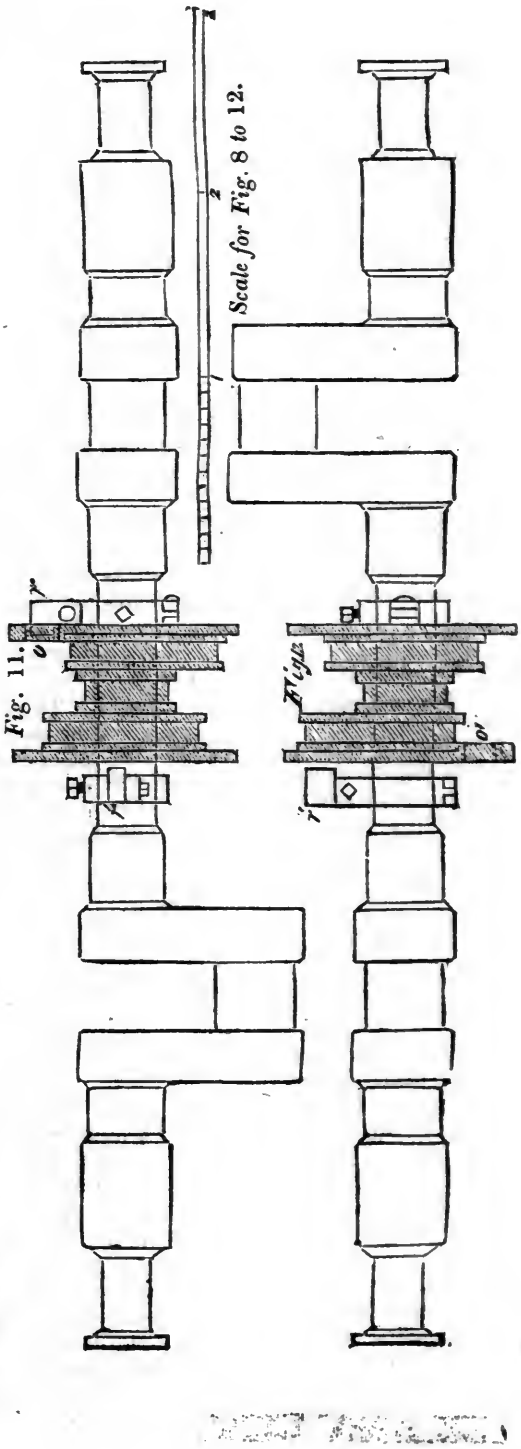


Fig. 10.





carriages. Consequently, their proper resistance must only be reckoned at the rate of 8 lbs. per ton. It is upon this proportion that we shall establish the resistance of the trains in all our experiments.

In the foregoing tables, the average weight of a wagon was 4.78 t. That wagon, placed at the head of the train, had a resistance of 11.77 lbs. per ton, or 56 lbs. for the whole; while, placed in an intermediate situation, its resistance was 8.03 lbs. per ton, or 38 lbs. in all. The difference between the results was owing to the obstacle of the air. The air created, therefore, a resistance of 17 lbs. to 18 lbs. on a wagon of a moderate height, as those were, and at the average speed of the experiments. That speed was of about 12 miles an hour, or 16 feet per second, a space of 10,000 feet having been, on an average, run over in 10 minutes.

This determination agrees with direct experiments made on the force of the wind. We know that when the wind has a velocity of 20 feet per second, it causes on a surface of a square foot a pressure of 0.915 lbs. or a little less than 1 lb. In other words, a surface of one square foot cutting the air with a velocity of 20 feet per second meets with a resistance of 0.915 lbs. Thus a loaded wagon presenting a surface of about 22.5 square feet must meet, from the atmosphere, with a resistance of about 20 lbs.

The direct resistance of the air against the first carriage of the train once deducted, the resistance per ton does no longer depend upon the number of wagons. The remaining differences seem to be the effect of accidental circumstances, such as the state of the rails, or the wind, or the greasing of the wheels, &c., which prevent those experiments from presenting a mathematical preciseness.

§ 8. *Experiments on the Friction of Wagons without Springs.*

The foregoing experiments having been made with wagons mounted on springs and constructed on an improved principle, one might perhaps suppose that common wagons, having no springs, would offer a greater resistance to the motion.

In order to clear up this point, some experiments were, at our request, undertaken on the Darlington Railway. They were conducted exactly on the same principle as the foregoing, by Mr. Robert B. Dockray.

The wagons employed were the common wagons in use on that line. Their wheels are 3 feet in diameter, like those of Liverpool. Their weight when empty, is 1.30 t., and 4 t. including the load. They are not mounted on springs, and the axle is 3 inches in diameter at the bearing.

We have seen t at in the Liverpool wagons the axle in the same part is only $1\frac{3}{4}$ inches in diameter. This difference arises from the circumstance that in the Liverpool wagons, the support is *outside* the wheel, on a prolongation of the axle; and that part, the only service required of which, is to support the wagon, may be reduced to so small a diameter without depriving the middle part of the axletree itself of its usual strength. In the Darlington wagons, on the contrary, the bearing is *within* the wheel, like in common carriages. The support takes place, therefore, not on a prolongation of the axle, but on the axle itself; and this part cannot be less than three inches in diameter, because it must not only bear the weight of the wagon, but also maintain the wheels in a fixed situation, by resisting the lateral pressure and the twisting forces which are continually exerted against the wheels during the motion.

With those wagons the experiments on friction gave the following results:—

EXPERIMETS ON THE FRICTION OF WAGONS WITHOUT SPRINGS.

Number of the exp'riment	Number of wagons in the trains	Distance run over by the wagons before they stopped.	Difference of level between the starting and arriving points.	Friction.	Friction per ton in lbs.
-		ft.	ft.		lbs.
I -	12	9,552	35.64	$\frac{1}{276}$	8.11
II -	4	9,600	34.60	$\frac{1}{277}$	8.07
III	16	10,500	35.04	$\frac{1}{300}$	7.48
IV	8	9,894	34.82	$\frac{1}{284}$	7.88
				Mean	7.88

During those experiments, the wind blew with a moderate strength in favour of the motion, which is a point to be considered; for we know that trains of wagons are sometimes propelled to a considerable distance on railways, by the force of the wind alone. All the wagons were in good order, and particularly those of experiments III. and IV., which were, besides, the best on the line.

These experiments having, contrary to the naturnl expectation, given more advantageous results than those which had been obtained with wagons mounted on springs, it became necessary to determine exactly the influence of springs on the resistance to motion.

In consequence, the platform of a wagon mounted on springs, having been wedged so as to raise it *off* the springs, the wagon was loaded with pigs of lead, weighing 2 tons, and in that state it was left to its gravity on the inclined plane. The resulting friction was 8.58 lbs. per ton.

Then the wedges were struck out, so as to let the platform descend on the springs again, and the experiments having been repeated, gave a friction, per ton, of 8.35 lbs.

There exists, consequently, a small advantage in making use of springs; but that advantage is easily compensated by some adventitious circumstances, as better polished bearings, better greasing, a load giving less hold to the air, &c.; and, in one case as well as in the other, the *average* friction must be reckoned at 8 lbs. per ton.

CHAPTER IV.

ON THE FRICTION OR RESISTANCE OF THE ENGINES.

ARTICLE I.

ON THE FRICTION OF ENGINES WITHOUT LOAD.

§ 1. *Of the different modes of Determination.*

After having determined the resistance opposed by the loads that are to be moved, it was also necessary to ascertain the resistance belonging to the moters themselves, for it is only the surplus of their force, beyond the power they require to move themselves, which those moters can apply to the traction of loads.

The friction of a locomotive engine is the resistance which that engine opposes to motion. It is the force that must be applied to it, to overcome all the frictions that oppose its progress, at the moment it executes the traction of a train. At that moment it must evidently possess: 1st, a certain power sufficient to make the train advance or to overcome the resistance of all the loaded carriages; 2nd, another power sufficient to repel the engine itself along and overcome its own friction. It is this second power, the power that propels the engine, which is the friction of that engine, or, rather, which is equal to the *friction of that engine*; whilst the first is *the resistance of the load*; and whilst both the powers together constitute *the total power applied by the moter.*

The power required to move a locomotive engine differs according to three different circumstances.

1st. If the steam remains shut up in the boiler without having any access to, or exercising any pressure on, the mechanism, so that the progress of the engine be produced by an external agent, the engine, moreover, drawing no load.

2nd. If the steam is the agent that produces the motion; but if, as in the first case, there is no train attached to the engine.

3d. If the engine cannot move without drawing after it a load, the resistance of which, creating an increase of pressure on all the parts of the mechanism, must necessarily augment the friction on every one of its joints, and consequently, the total resistance of the engine.

The difference between the first and second case cannot be very great; for, in both circumstances, the load of the engine remains the same, being nothing more than its own weight. Besides, by whatever means it is made to move, it advances; so that at every turn of the wheel, there is a complete revolution, and, consequently, a complete friction of the whole mechanism. The steam would have applied a certain force to make the engine move. That force would have produced pressures, and, consequently, proportional frictions on all the compressed points, as upon the crank of the axletree and all the joints in general. Now, as soon as we make the engine advance, we apply a force equal to that which the steam would have applied. Conse

quently, we produce on the crank and on all the joints the same friction that would have been produced by the force owing to the steam. Of all these joints, those only upon which the steam acts in a direct and particular manner, cease to be compressed equally in the two cases. These parts being strongly pressed against one another, when the steam is admitted into the cylinders, cease to experience that pressure, and have, in consequence, evidently less friction when the steam takes no part in the creation of the motion. But the only parts on which the steam exercises a direct pressure are the two slides.

The surface of the slide, on which the pressure of the steam takes place, is, in general, $7\frac{1}{2}$ inches long to 6 inches broad, or 45 square inches, which makes 90 square inches for the two slides together. When we talk of the engine moving alone, and without drawing any load after it, we cannot suppose that the pressure of the steam in the boiler need to surpass 10 lbs. We shall find, by experiment, that it may happen not to be above 4 or 5 lbs. The pressure exercised by the steam on the slides, amounts, therefore, at most, to 900 lbs. So that, taking the friction of iron on iron, ground and polished, at $\frac{1}{10}$ of the pressure,* we shall have a friction of 90 lbs. But we know that the real resistances on different points of an engine are in the ratio of the velocity with which those parts move. The slide only moves three inches for each stroke of the piston, or half a foot for each turn of the wheels; that is to say, that it only runs over a space of half a foot, while the engine having a wheel of five feet, advances 15.71 ft. The friction of the slide, considered as opposing itself to the motion of the engine, creates, therefore, a final resistance only $\frac{90}{2 \times 15.71}$ lbs. or about 3 lbs. From which we see, that, in practice, the friction occasioned either in the first case or in the second, may be considered as being the true friction of the engine, when it draws no load.

As for the difference between these two first cases and the third, we know that the friction is always in a direct ratio to the pressure. Now, it is evident that the pressures which take place on the rubbing parts of the engine, vary in proportion to the load it draws. That principle is true, provided the weight of the engine itself is taken as a part of the load. The only parts which are excepted from that rule are: the piston, which remains in all cases pressed in the same manner, the steam having no access into its interior; the slide, the friction of which varies with the pressure in the boiler, which depends only indirectly upon the load; and, lastly, the excentrics, the friction of which follows the friction of the slides. All the other parts of the engine are subject to the rule laid down above. The principal pressure takes place on the crank of the axle, and that pressure is exactly in proportion to the load.

There must consequently be a considerable difference in the friction of an engine when loaded or when without a load. We shall have recourse to experiments to determine that difference.

First, we shall endeavour to make ourselves acquainted with the friction of the engine without a load, and then we shall come back to the second part of the problem which consists in determining the influence of the load upon that friction. By that means we shall be able to calculate the resistance of locomotive engines in all circumstances.

* According to the experiments of Coulomb on the resistance of surfaces.

§ 2. *Friction of the Engines determined by the least Pressure.*

The considerations above stated, which tend to prove that the power necessary to move an engine is very nearly the same, whether the force of the steam itself, or any other external agent, is employed, furnished us with two means of ascertaining the friction of engines without a load. The first consisted in seeking what was the least pressure of steam required by a locomotive engine to put itself in motion on the rails, when it had no other resistance than its own to overcome; the second was the method already employed in regard to the wagons. Both were successively tried.

The principle upon which the first of these two methods is founded is the following:—

If we find that the steam, by causing a known effective pressure per square inch, can make the engine advance, the area of the two pistons in square inches being known, it is easy to calculate the total force applied by the steam on those two pistons. That force being sufficient to make the engine advance,—that is to say, to conquer its resistance,—it gives of course the value of that resistance. It must only be observed according to the principle known in mechanics by the name of *the principle of virtual velocities*, that the pressure exercised on a part of an engine, being transmitted to another part of the same engine retains the same intensity only in case the two parts have the same velocity. If not, the force or pressure is reduced in an inverse ratio to the velocity of the points of application. This principle appears in an evident manner and *a priori*, in simple machines like the lever, the roll, the pully, &c. Inspection alone is sufficient to demonstrate, that if a force can, by the aid of the machine, raise a weight four times as great as itself, it is only by travelling, in the same space of time, four times as far as the weight it raises. In the case before us, the velocity of the piston is to that of the engine as twice the stroke is to the circumference of the wheel, the piston giving two strokes while the wheel turns once round. A force applied on the piston produces, therefore, in regard to the progress of the engine an effect reduced in the same proportion, that is to say, as twice the stroke is to the circumference of the wheel.

Let d be the diameter of the piston, and π the ratio of the circumference to the diameter, $\frac{1}{4} \pi d^2$ will be the area of one of the two pistons; and p being the *effective* pressure of the steam per square inch,

$$\frac{1}{2} \pi d^2 p$$

will be the *effective* pressure upon the two pistons. If, moreover, l express the length of the stroke, and D the diameter of the wheel, the effective force of transfer resulting for the engine, in consequence of that pressure, will be

$$\frac{1}{2} \pi d^2 p \times \frac{2l}{\pi D}, \text{ or } \frac{pld^2}{D},$$

which, according to what we have said, gives the measure of the resistance of the engine.

Here it must be noticed that we suppose the pressure of the steam in the cylinder to be equal to that in the boiler. The reason is, that in the experiments we shall have occasion to make, the motion of the engines being always extremely slow and the regulator completely open, the two pressures have time to put themselves in equilibrium, and are consequently equal. It must also be observed that the *effective* pressure p of the steam, or the surplus of the total pressure over that of the atmosphere, is not the true moving power residing in the steam. That moving power is the *total* pressure of the steam, which we shall express by P. But, on the other hand, the true resistance on the piston is neither that only which results from the traction of the engine. It comprises also the atmospheric pressure, which takes place either directly or intermediately on the other face of the piston, as well as upon every other body in communication with the atmosphere. So, we omit on both sides an equal quantity, viz. the atmospheric pressure. Nothing prevents us here from simplifying in that manner; because having to compare the power and the resistance only in a case of equality, that equality is not destroyed by substracting an equal number on each side.

To succeed in ascertaining the least pressure by which the engine could be moved, it was necessary to take the engine at the instant when it furnished the steam at a very low degree of elasticity. In the evening, after the work was finished and the fire taken out of the fire-box, the water of the boiler began to lose its heat, and the steam that it generated also gradually lost its force. This was the proper moment to ascertain the least pressure by means of which the engines were able to advance on the rails. The spring-balance that shut the safety-valve enabled us to ascertain the pressure of the steam in the boiler, by loosening the spring until it stood in exact equilibrium with the pressure. It was then easy to calculate the pressure from the degree marked on the balance. However, to make all calculation unnecessary, the engine was brought to the mercurial gauge, which gave immediately the pressure per square inch in the boiler, at the moment of the experiment. It is in that manner that the following experiments were made:—

I. On the 5th of July, the ATLAS engine, cylinders 12 inches diameter, stroke 16 inches, weight 11.40 t., wheels five feet, four wheels coupled, was submitted to the experiment separated from its tender.

The spring of the balance having been successively loosened, to show the pres-

sure of the steam in the boiler in proportion as it went down, the following trials were made :—

At 2 lbs. pressure, marked by the balance, the engine moved backwards and forwards, passing from a state of rest to one of motion, or conquering, besides the friction, what is called the *vis inertiæ* of the mass of the engine ; that is to say, not only maintaining an acquired velocity, but acquiring one which proves a surplus of force in the moving power.

At 1 lb. pressure, marked in the same way, the engine started, passing from a state of rest to one of motion.

The pressure diminishing a little more, the engine *continued* moving. At that moment we brought it under the mercurial gauge. It marked 4 lbs. effective pressure per square inch in the boiler, the valve then bearing no more than the weight of the lever, or a little less, which could not be ascertained, the balance not going below zero.

The cylinder being 12 inches in diameter, the area of the two pistons was 226 square inches. Thus a pressure of 4 lbs. per inch produced on the pistons a force of $226 \times 4 = 904$ lbs. that is to say, was able to move the resistance of 904 lbs. at the velocity of the piston. But at the velocity of the engine, which is greater in the proportion of the circumference of the wheel to twice the stroke, or $\frac{15.71}{2 \times 1.33} = 5.887$, that same force was only able to overcome a resistance of $\frac{904}{5.887} = 154$ lbs.

Thus, as we have seen that the engine continued moving at the moment it was brought under the steam gauge, though the pressure was then reduced to 4 lbs., we see that the resistance of the engine did not exceed 154 lbs.

This first experiment was made with the engine separate from its tender, with a view not to counteract one resistance by the other ; but, in wishing to apply it to lighter engines, of which the wheels were not coupled, a difficulty occurred. The pressure required for the engine to move without tender was so very low that the spring-balance could not mark it, that pressure being less than the weight of the lever itself. Another inconvenience of that low pressure was, that it could only be obtained at the moment the boiler generated no more steam at all; the consequence of which was that at that moment the pressure diminished so rapidly that no confidence could be put in the accurracy of the experiment.

But as the resistance of the tender could be easily calculated by the experiments made on the friction of the carriages, and already inserted above, it was also easy to take it into account. Thus, by having the tender attached to the engine, the experiment presented the same degree of accurateness, with more facility in observing the pressure of the steam. It is for that reason that, in the following experiments, the tender was no longer separated from the engine :—

II. On July 21, the Sun engine, cylinders 11 inches, stroke 16 inches, weight 7.91 tons, wheels 5 feet ; only one pair of wheels worked by the piston, was submitted to the same experiment.

At 6 lbs. pressure by the balance, the engine started, followed by its tender full of coke and water.

At 4 lbs. the same.

At 2 lbs. the same.

At 1 lb. pressure the engine started also.

With the weight of the lever alone, the balance marking no pressure at all, the engine started again.

The pressure still a little further diminished, the engine did not start, but, once put in motion, continued going.

At that instant we brought it under the mercurial gauge; it marked $5\frac{1}{2}$ lbs. pressure per square inch, so that at that pressure the engine can move, followed by its tender.

The area of the two pistons (11 inches in diameter) being 190 square inches, a pressure of 5.5 lbs. per inch, produced on the piston a force of 190×5.5 lbs. $= 1,045$ lbs. at the velocity of the piston, and thus a draft of $\frac{1,045}{5.887} = 177.5$ lbs. at the velocity of the engine. That was then the force required to move the engine and its tender. Now, the tender filled with water and coke, weighed 6.50 tons, and according to the experiments made on the friction of the carriages, each ton required to put it in motion a power of 8 lbs. The tender consumed, therefore, for its share, a force of 6.50 lbs. $+ 8 = 52$ lbs. Thus the resistance proper to the engine was 177 lbs.—52 lbs. = 125 lbs.

III. On July 23, the same engine, the Sun, was tried again at the least pressure, and gave the following results :—

At 4 lbs. marked on the balance, the engine started, followed by its tender filled with water and coke.

At 1 lb. marked on the balance, it started rapidly.

At 0 of the balance, it still started with facility.

At 2 lbs. under zero, it still moved at the rate of two or 3 miles an hour.

At that instant it was put under the mercurial gauge, which marked $4\frac{3}{4}$ lbs. We may consider that, in this experiment, we had arrived at the lowest pressure by which the engine could move. According to the calculation established above, that pressure of $4\frac{3}{4}$ lbs gave a force of 902.5 lbs., which, referred to the motion of the engine, produced a traction of 153 lbs. Deducting 52 lbs for the resistance of the tender, there remained 101 lbs. for the resistance of the engine.

IV. The same day, the Firefly engine, cylinders 11 inches, stroke 18 inches, weight 8.74 tons, wheels 5 feet, one pair of wheels worked only by the piston, was submitted to the same trial.

At 3 lbs. marked on the balance, it started, followed by its tender filled with water and coke.

At 2 lbs. also.

At 0 it started also, came back, and went off again in a contrary direction.

At 1 lb. under 0, it still started forwards and backwards. The pressure diminishing a little more, the engine has just power enough to move.

At that moment it was brought to the mercurial gauge ; the pressure was found to be $4\frac{1}{2}$ lbs. According to the proportions of the engine mentioned above, a pressure of $4\frac{1}{2}$ lbs. per square inch on the piston, produced a traction on the engine of 163 lbs. ; deducting 52 lbs. for the tender, there remained for the proper resistance of the engine 111 lbs.

§ 3. *Friction of the Engines determined by the Dynamometer.*

While the resistance of the engines was being determined in that manner, other trials were also made, to obtain a valuation of that same resistance by means of the dynamometer.

V. On July 22, in the morning, the Vulcan engine, cylinders 11 in., stroke 16 in., wheels 5 ft., weight 8.34 t., one pair of wheels only worked by the piston, being ready to set off for Manchester, its boiler full of water, and its fire-box of coke, was separated from its tender. A circular spring-balance was fixed to the engine, and a lever was passed through the ring of the balance, so that two men might draw the engine by means of the lever.

The engine was first put in motion by five or six men. The first impulse being given, the two men that pushed on the lever maintained it without difficulty in motion, at the rate of two or three miles an hour. The index of the balance oscillated very much. It varied generally from 130 to 170 lbs., giving an average traction of of 150 lbs.

The balance was afterwards taken off from the front of the machine, and fixed behind on the Liverpool side, when the same experiment repeated, gave an average traction of 140 lbs. The index still oscillated about 20 lbs. above and below that point.

Average of the two experiments, 145 lbs.

The engine was ready to go off, and it had already made some turns on the rails, in order to light its fire and fill its boiler, so that the grease that anointed the rubbing parts was melted, and the oil perfectly liquid. But the experiment taking place in the interior of the Liverpool station, in a great thoroughfare, the rails were covered with cinders and dirt; a circumstance which considerably augmented the resistance to the motion.

VI. On July 23, in the evening, the Sun engine, of which the proportions have already been givnn above, and the weight of which is 7.90 t., was tried in the same manner. It gave 100 lbs. traction towards Manchester, and 130 lbs. backwards, towards Liverpool. Average 115 lbs. The boiler of the engine was full of water; the fire-box empty.

VII. On the same day, the Firefly, already described, the weight of which is 8.74 t., drawn by the dynamometer, required 125 lbs. in one direction, and 130 lbs. in the other. Average traction $127\frac{1}{2}$ lbs. The boiler of the engine was full of water ; the fire-box was empty.

VIII. On the same day, the FURY engine, cylinders 11 in., stroke 16 in., wheels 5 ft., of which only one pair are worked by the piston, weight 8.20 t., required in advancing towards Manchester 100 lbs. traction, and 110 lbs. going back towards Liverpool. Average 105 lbs.

These experiments took place on the engines separated from their tenders. They were made on a part which is considered as being exactly level. We may, however, suppose, that on the precise spot where the engine was, the soil was not perfectly horizontal, and that that was the cause of the slight difference in the resistance, observed between one direction and the other.

§ 4. *Friction of the Engines calculated by the Angle of Friction.*

These results did not differ considerably from the preceding ones; but as in all the experiments, the index of the balance varied extremely, in consequence either of the slight inequalities of the road, or of the jerks given by the men that drew the engine, the average traction was very difficult to ascertain exactly. Besides, the dirtiness of the rails augmented considerably the resistance. It was, consequently, desirable to get those results verified by a different method, admitting of greater accuracy.

For that reason the same engines were submitted to experiments similar to those which had served to calculate the friction of the wagons.

IX. On July 30, the JUPITER engine, cylinders 11 in., stroke 16 in., wheels 5 ft., only one pair of wheels worked by the piston, weight 7.90 t., was brought on the inclined plane of Sutton, to the same place where the experiments on the friction of the wagons had been made. It was separated from its tender, and left to its gravity on the plane.

Gone off from the post No. 0, it continued its motion until 249 ft. beyond the post No. 18, and ran during 7′ 12″. This experiment gives: Distance travelled, 6189 ft.; difference in level between the points of departure and arrival, 36.78 ft.; consequently, friction $\frac{1}{168}$ of the weight, or $\frac{7.90\text{ t.}}{168.} = \frac{17,696\text{ lbs.}}{168} = 105\text{ lbs.}$ This result includes the direct resistance of the air at a velocity of 9 to 10 miles an hour.

X. On July 31, the ATLAS engine, cylinders 12 in., stroke 16 in., wheels 5 ft., four wheels coupled, weight 11.40 t., was brought to the same place. Not having been in time, the train could not be stopped precisely at the suitable point, and the engine was already 99 ft. beyond the post No. 1. It was not possible to push back the considerable train it was drawing; so that the starting-point having been carefully determined, the engine was left to itself at that point, and ran to 273 ft. beyond the post No. 17.

The distance travelled by the engine was 5454 ft., and the difference in level between the points of departure and arrival, 32.07 ft. Thus the friction was $\frac{1}{170}$ of the weight, or 150 lbs. This calculation includes the direct resistance of the air, at an average velocity of 8 to 9 miles an hour.

XI. On August 1, the same engine, the ATLAS, brought to Sutton inclined plane, and the centre of the engine being carefully placed facing the usual starting-post, was left to its gravity on the plane. It ran until 45 ft. beyond the post No. 14.

Distance travelled in 5′ 40″, 4665 ft., total descent 35.40 ft.; friction $\frac{1}{132}$ of the weight, or 194 lbs.

The engine had been repaired the night before. The connecting-rods being too weak had been changed, and the new ones were not yet exactly adjusted to their proper length. The resistance they produced, acting upon the wheel at the end of a lever of one foot, which is the radius of the crank-arm by which they turn the wheel, produced the effect of a powerful brake to check the velocity of the engine. This friction of the ATLAS is, consequently, not applicable to the experiments made with that engine before August 1.

XII. On August 1, the VESTA engine, cylinders $11\frac{1}{8}$ in., (this engine had originally cylinders 11 in. diameter, but in repairing it, the cylinders were newly bored, which augmented their diameter by one-eighth of an inch,) stroke 16 in., wheels 5 ft., two wheels only worked by the pistons, weight 8.71 t., was submitted to the same trial. Setting off from post No. 0, it continued in motion to 33 ft. beyond post No. 11. It ran thus in 6′, over a space of 3663 ft., with a difference in level between the departure and the arrival of 33.07 ft.; which establishes the friction at $\frac{1}{104}$ of the weight, or 187 lbs.

This engine had been repaired, since which it had only made two or three trips at the time of the experiment. The different pieces were not yet well fitted, nor the joints very easy. Thence arose the increase of resistance observed in it, comparatively with the other engines.

XIII. On August 2, the FURY engine, cylinders 11 in., stroke 16 in., wheels 5 ft., not coupled, weight 8.20 t., left the usual starting-point, and stopped at 48 ft. beyond the post No. 18, running in 7′ over a space of 5,988 ft., with a difference of level between the points of departure and arrival of 36.68 ft.; which puts the friction at $\frac{1}{163}$ of the weight, or 113 lbs.

XIV. On August 2, the VULCAN engine, cylinders 11 in., stroke 16 in., wheels 5 ft., not coupled, weight 8.34 t., left to its gravity from a point situated at 27 ft. above the usual starting-point, ran in 6′ 30″ over a space of 5,391 ft. with a difference of level of 36.52 ft., which puts the friction at $\frac{1}{148}$ of the weight, or 127 lbs.

XV. On August 4, the LEEDS engine, having the same proportions as the FURY and the VULCAN, weight 7.07 t., ran in 6′ 30″ over a space of 5,472 ft., on a slope of 36.32 ft. Thus the friction of the engine was $\frac{1}{150}$ of its weight, or 105 lbs. (one of the pistons of the engine creaked for want of greasing.)

XVI. On August 15, the same engine, the LEEDS, went off from the same point, and ran over 5,061 ft. in 6′, on a slope of 35.86 ft., which puts the friction of this engine at $\frac{1}{141}$, or 112 lbs. (one of the pistons creaked, as in the foregoing experiment.)

All these results include the direct resistance of the air against the engine, at an average velocity of 10 to 12 miles an hour.

§ 5. *Table of the results of the foregoing Experiments on the Friction of Engines.*

Placing all those experiments next to each other, we form the following table:—

EXPERIMENTS ON THE FRICTON OF LOCOMOTIVE ENGINES.

Number of the experiment.	Date of the experiment.	Name of the engine.	Diameter of the cylinder.	Stroke of the piston.	Diameter of the wheel.	Weight of the engine.	Mode of determination.	Friction resulting from the experiment	Friction of the engine.	OBSERVATIONS.
	1834.		inches.	inches.	feet.	tons		lbs.	lbs.	
I .	July 5	ATLAS .	12	16	5	11.40	by the least pressure	154	152	The engine has 6 wheels, 4 of which are worked by the piston.
X .	July 31	—	12	16	5	11.40	by the angle of friction	150		
XI .	Aug. 1	—	12	16	5	11.40	by the angle of friction	194	194	The connecting rods working hot.
II .	July 21	SUN . .	11	16	5	7.91	by the least pressure	125	114	
III .	July 23	—	11	16	5	7.91	by the least pressure	101		
VI .	July 23	—	11	16	5	7.91	by the dynamometer	115		
IV .	July 23	FIREFLY	11	18	5	8.74	by the least pressure	111	119	
VII .	July 23	—	11	18	5	8.74	by the dynamometer	127		
V .	July 22	VULCAN	11	16	5	8.34	by the dynamometer	145	136	
XIV .	Aug. 2	—	11	16	5	8.34	by the angle of friction	127		
VIII .	July 23	FURY . .	11	16	5	8.20	by the dynamometer	105	109	
XIII .	Aug. 2	—	11	16	5	8.20	by the angle of friction	113		
XV .	Aug. 4	LEEDS .	11	16	5	7.07	by the angle of friction	105	108	
XVI .	Aug. 15	—	11	16	5	7.07	by the angle of friction	112		
IX .	July 30	JUPITER	11	16	5	7.90	by the angle of friction	105	105	
XII .	Aug. 1	VESTA .	11⅛	16	5	8.71	by the angle of friction	187	187	The engine rather stiff, having just come from repairing.

Considering these results, we see that, setting aside the VESTA, which was particularly circumstanced, the locomotive engines, with uncoupled wheels, had an average resistance of only 115 lbs.; and the ATLAS, with coupled wheels, and of a considerable weight, only 152 lbs., when not thwarted by his connecting-rods.

However, to provide a datum for all cases, it may be concluded from the total weight of the engines, compared with their friction, that locomotive engines, well constructed and in good order, have a resistance of 15 lbs. per ton of their weight. This is the result which may be reckoned upon, when an engine is not yet constructed, and when, consequently, one can estimate only by guess what will be its future friction

We have already observed, that the experiments with the dynamometer and by the least pressure, were made on a spot where the rails offered more resistance than along the line. On the other hand, the experiments on the angle of friction took place at a point of the railway where there were nine crossings to get over. These obstacles acted more particularly on the engines, because they occurred in a place where the velocity of the motion was already considerably dimmished. We may, therefore, when we have engines well constructed, kept in good repair, and on the Liverpool model, calculate on the result we have obtained, without fear of putting the resistance too low.

In each of the experiments with the engines, which we shall have occasion to relate, we shall take not the average result, but the individual friction of each of them, as it has been determined.

ARTICLE II.

OF THE ADDITIONAL FRICTION OF LOCOMOTIVE ENGINES, IN PROPORTION TO THE LOAD THEY DRAW.

§ 1. *Of the Mode of Calculation.*

We have now determined the friction or resistance of locomotive engines, when they draw no load. We have, however, already shown, that the friction must increase in proportion to the load the engine draws. The aim of our researches must, therefore, now be, to discover the amount of friction for different loads, in order to deduce from it the surplus of resistance created in the engine by each ton of the load.

When an engine executes the traction of a train, we know the pressure in the boiler by inspecting the spring-balance; but we do not know the pressure of the steam in the cylinder, because, in passing from the boiler to the cylinder, the elastic force of the steam changes, as will be seen hereafter. If we could know, *a priori*, the pressure in the cylinder; if, for instance, it were possible to apply a mercurial guage to it, we might immediately deduce the friction of the engine corresponding to that load.

In fact, if by hypothesis we know the pressure in the cylinder, or on the piston, by calculating the total effect of that pressure on the area of the piston, we find the exact valuation of the power applied by the engine,

On the other hand, we also know the resistance opposed to the motion; it being composed of the resistance of the train and of the engine.

Besides, if the engine, in drawing that load, increased constantly in velocity, it is clear that there would be an excess of power over the resistance. If, on the contrary, the velocity were to diminish gradually, the power would be inferior to the resistance; but if we take the engine at the moment it has acquired a certain uniform velocity, and if that velocity be maintained without alteration, the power the engine thus applies must necessarily be exactly equal to the resistance it undergoes, or else there would be either acceleration or retardation in the motion.

Thus we know the power applied by the engine; we know the resistance to the motion, which is the sum of the resistance of the train and that of the engine; and, besides, this sum is equal to the power applied: consequently, the resistance of the engine is equal to the power applied, less the resistance of the train.

This mode would give thus immediately the friction of the engine, if we knew the pressure in the cylinder.

But there are cases in which the pressure in the cylinder is known *a priori*, and is equal to the pressure in the boiler. These cases are those in which the engine attains the limit of its power with the pressure at which it is working; that is to say, when it

draws the greatest load it can draw with that pressure.

In fact, as by the hypothesis the engine has arrived at the limit of its power, the pressure in the cylinder cannot be less than in the boiler; for, if it were, by diminishing the velocity, which is the only obstacle to the establishment of an equilibrium of pressure between the two vessels, one might give to the steam time to rise in the cylinder until it would equal the pressure in the boiler, and then the effect would be augmented. That is to say, that the engine might draw a greater load, provided its velocity were diminished. On the contrary, as soon as the pressure in the cylinder becomes equal to that in the boiler, there is no further diminution of velocity that will permit to increase the load; for an increase of load requires an increase of moving power, which is no longer possible.

Thus, in case one has attained the *maximum* load of the engine, the power applied is known *a priori*; and one may, as we have actually done above, deduce from it the corresponding friction of the engine.

Let us then suppose, that in an experiment we have attained the limit of the power of the engine. Let d be the diameter of the piston, and π the ratio of the circumference to the diameter, $\frac{1}{4}\pi d^2$ will be the area of the piston, and $\frac{1}{2}\pi d^2$ the area of the two pistons together. Let also p be the effective pressure per unit of surface of the steam in the boiler, such as it has been observed during the experiment; it is clear from what we have said above, that $\frac{1}{2}\pi d^2 p$ is the force then applied to the piston.

Calling D the diameter of the wheel, and l the length of the stroke, the force applied to the piston is, when transferred to the engine, reduced in proportion to their respective velocities, or in the proportion of $\frac{2l}{\pi D}$. Thus, after its transfer to the engine, it is expressed by

$$\tfrac{1}{2}\pi d^2 p \times \frac{2l}{\pi D} = \frac{pd^2 l}{D},$$

which is the expression of the power of traction as applied to the progress of the engine.

On the other hand, M being the weight of the load, expressed in tons, and n representing the resistance for each ton of the load, such as we have determined it in the preceding chapter, nM is the resistance of the train. Finally, if we represent by X the proper resistance or frictien of the engine,

$$n\mathrm{M} + \mathrm{X}$$

will be the total resistance offered to the motion of the engine.

Having seen that, when the motion is uniform, the power applied by the engine is equal to the resistance, we have

$$\frac{pd^2 l}{D} = n\mathrm{M} + \mathrm{X};$$

and finally,

$$\mathrm{X} = \frac{pd^2 l}{D} - n\mathrm{M},$$

which equation gives us the value we sought of the friction of the engine.

In this equation p is the effective pressure in lbs. per square inch in the boiler; d the diameter of the piston expressed in inches; l the length of the stroke; and D the diameter of the wheel, both expressed either in inches or in feet, which is indifferent, the equation containing only their ratio. The number n, which is the resistance per ton, is 8 lbs.; and thus the value of X, when found, will also be expressed in lbs.

Here, as well as in the experiments made above with engines without load, we do not, in calculating the resistance, take into account the atmospheric pressure; because, also, in calculating the power, instead of reckoning the *total* pressure of the steam, we only reckon its surplus above the pressure of the atmosphere. In doing this, we only suppress on each side two equal forces which equilibrate. Having here, as before, only to compare the power and the resistance in a case of equality, the substraction of an equal quantity can take place on both sides without altering the result.

The formulæ we have obtained is very simple, and the principle it represents will easily give us the resistance of the engine, in all the cases in which it has attained the limit of its power. All that remains to be done, is therefore to arrive at tha point.

In consequence, experiments were made in that view, sometimes taking the greatest loads the engine was able to draw, and at others only middling loads, but lowering the pressure, by means of the spring-balance, as much as possible, without stopping the train.

Those experiments were made on three inclined planes of the Liverpool and Manchester Railway; viz. Sutton plane inclined at $\frac{1}{89}$; Whiston plane inclined at $\frac{1}{96}$; and the rise of Chatmoss at $\frac{1}{1300}$.* In estimating the resistance on these planes it is clear that the gravity of the mass, decomposed along the plane, forms an additional resistance to the friction of the carriages; so that the resistance of the train, not including the friction of the engine, is then composed of the friction of the wagons, at the rate of 8 lbs. per ton, and moreover of the gravity of the total mass in motion on the plane. Thus a train of 40 t., drawn by an engine weighing 10 t., offers on Sutton inclined plane the following resistance:—

	lbs.
40×8 lbs. $= 320$ lbs. friction of the carriages at 8 lbs. per ton, . . .	320
$\frac{40 \times 2240 \text{ lbs.}}{89} = 1{,}006$ lbs. gravity of the 40 t. (reduced in lbs.) on a plane inclined in the ratio of $\frac{1}{89}$,	1,006
$\frac{10 \times 2240 \text{ lbs.}}{89} = 251.6$ lbs. gravity of the engine on the same plane, . .	252
Total resistance, not including the friction of the engine, ...	1,578

And as we know that on a dead level a ton only requires 8 lbs. traction, we see that the train going up the plane is equal in that circumstance to a load, on a dead level, of $\frac{1578}{8} \times 197\frac{1}{4}$ t.

This is the manner in which the calculation will be made in the following experiments.

We give a considerable number of experiments because having to apply to the wagons their average resistance per ton, the greater the number of carriages, the more accurate will be the calculation.

§ 2. *Experiments on the additional Friction of Engines:*

I. On July 22, 1834, the VULCAN engine, cylinders 11 in., stroke 16 in., wheels 5 ft., weight 8.34 t., ascended *Sutton* inclined plane with a first-class train of nine carriages, amongst which the mail and two empty trucks; weight of the train, tender included, 39.07 t.

The velocity of 26.6 miles, before arriving at the plane, settled at the rate of 20 miles an hour for the first half of the ascent, took then an average of 11.42 miles, and went down to 7.5 miles in the last quarter of a mile of the ascent, which is a little steeper than the rest.

The spring-balance of the engine, fixed at 31, as a point of departure, marked 36, which by the mercurial gauge corresponds to 57.5 lbs. effective pressure per square inch.

In consequence of the proportions of that engine, we have:

190 area of the two cylinders in square inches, multiplied by
57.5 lbs. pressure of the steam per square inch in the boiler or on the piston, makes
10,925 lbs. force applied on the piston; which being transferred as a power of traction to the engine, the velocity of which is 5.887 times greater, gives

$\frac{10{,}925}{5.887}$ lbs. $= 1856$ lbs. power applied to make the engine advance.

On the other hand, the resistance was

39.07×8 lbs. $=$......313 lbs. resistance, owing to the friction of the carriages.

$\frac{47.41 \times 2240 \text{ lbs.}}{89} = 1193$ resistance owing to the gravity of the total mass, train and engine.

1506 total resistance.

Thus:

1,856 lbs. power applied.
—1,506 resistance, equal to $188\frac{1}{4}$ t. on a level.

350 corresponding friction of the engine.

As we have said, the average velocity of the ascent was 11.42 miles per hour, and the velocity at the top of the plane 7.5 miles per hour.

In all the experiments we give those two velocities separately, because the engine having a great impulse on arriving at the plane, we wish as much as possible to disengage that acquired velocity from the velocity proper to the motion. If we were to

* See the Section of the Liverpool Railway, Chap. V., Art. VII., § 1.

take 11.42 miles as the velocity of the motion, it would be a little too much, being complicated with the first impulse. On the other hand, by taking 7.5 miles we should commit a contrary error, because the last quarter of a mile of the ascent is steeper than the rest, and surpasses the inclination of $\frac{1}{80}$, on which our calculation is founded.

They call the first-class trains those which carry travellers, and go from Liverpool to Manchester without stopping. The carriages of those trains are never weighed. In all the experiments we have calculated them at an average weight of 4.73 t. loaded, and the mail coach at 3.44 t. The tender is reckoned at the rate of 5 t., or 5.50 t. according to the quantity of water and coke it contains at the moment of the experiment. The weight of the wagons, whether empty or loaded, is taken *exactly* in tons, cwts., quarters, and pounds. To simplify we shall express it here in tons and decimal fractions of tons.

II. On July 22, 1834, the same engine, the Vulcan, ascended *Whiston* inclined plane with a first-class train of 9 carriages, amongst which were the mail and two loaded trucks; weight of the train, tender included, 41.32 t. The velocity remained uniform during the ascent at 18.75 miles an hour, diminishing only to 12 miles an hour on the last quarter of a mile. The balance fixed at 31 marked 36, or effective pressure by the mercurial gauge 57.5 lbs. per square inch in the boiler.

This experiment gives:

lbs.
1,856 power.
1,489 resistance, equal to 186 t. on a level.

---

367 corresponding friction of the engine.

III. On July 23, 1834, the Atlas, cylinders 12 in., stroke 16 in., wheels 5 ft., weight 11.40 t., balance fixed at 50 lbs. as a point of departure, started from Liverpool with a train of 40 wagons weighing exactly 190 t., and, including the tender, 195.50 t.

The help of two other engines was necessary for the moment of starting. On *Whiston* inclined plane the train was helped by four engines; viz. two in front of the train, the Ajax and the Experiment, and two behind, the Sun and the Goliath. Drawn thus by five locomotive engines, the train went up the plane without a moment's delay; and once at the top, the Atlas resumed alone the haulage.

Arrived at the rise of *Chatmoss*, the engine with its whole train, ascended it without help for a space of 5½ miles. Its velocity was however considerably reduced. The first six quarters of a mile were travelled with an uniform velocity of 15 miles an hour, pressure 51 by balance, or 54 lbs. by the mercurial-gauge. During the four following quarters the velocity was 10 miles an hour, same pressure. Here began a steeper ascent for half a mile. At this point the velocity decreased rapidly. During the first quarter of a mile it fell from 10 miles to 6 miles an hour; during the second it fell to 3½ miles, and continued diminishing to the end of the pass. In proportion as the velocity diminished the pressure rose; first to 51½, then to 52 by the balance, where it stopped, pressure corresponding with 55 lbs. by the mercurial-gauge. After the passage of the obstacle the velocity increased again to 4½ miles, then to 7½ miles an hour; after which it settled again for the rest of the ascent at its regular rate of 15 miles an hour. At the same time the pressure went down again to 51 by the balance, or 54 lbs. by the mercurial-gauge.

At passing a second similar irregularity of short duration, near the bridge on the Bridgewater Canal, the same effects were produced. The velocity was again reduced to 3½ miles, and the pressure rose again to 52 by the balance.

The irregularity which exists on Chatmoss is an inclined plane rising at the rate of 8 feet per mile, or $\frac{1}{660}$, and the other parts of the moss have a much smaller inclination, so that the average inclination is no more than $\frac{1}{1350}$; but the difficult pass is only half a mile long. When a mass of 200 t. arrives with a velocity of 15 miles an hour, and has consequently a considerable momentum, an obstable, the inclination of which is moderate, and lasts only for half a mile, cannot completely destroy the first impulse. The engine not having been able, during its passage over the obstacle, to acquire an uniform velocity, but continuing on the contrary, to the last moment, to lose some of its speed, showed that that obstacle was too much for it; but the fact, ascertained on a length of 5½ miles, proved that the average inclination of the ascent, or $\frac{1}{1300}$, was within the limits of its power, with a pressure of 55 lbs. per square inch.

This experiment having given rise to some doubts on the real proportions of the Atlas, we measured them ourselves a few days afterwards, on August 8, 1834, when the engine was under repair, and they were found perfectly exact. The diameter of the cylinder is 12 in.; the stroke, measured on the crank of the axletree then separated from the engine, 16 in.; wheels 5 ft., at the part that rests on the rail, with three-eighths of an inch more near the flange, and the three-eights less at the basiled part.

This experiment, taken on the irregularity of Chatmoss, gives:

lbs.
2,111 power of the engine.
2,226 resistance opposed by the load on the accidental slope at $\frac{1}{660}$.

—155 power minus.

The resistance exceeded the power. It was consequently really impossible for the engine to settle at an uniform velocity, during its passage over the obstacle. It was necessarily compelled to lose constantly of its speed, and would have stopped if the obstacle had lasted any longer.

But, taken on the average rise at $\frac{1}{1300}$, we have:

lbs.
2,111 power.
1,921 resistance of the train, equal to 240 t. on a level.

---

190 corresponding friction of the engine.

The average velocity during the experiment was 8 miles an hour; the least velocity 3½ miles an hour.

IV. The same engine, on the same day, travelling with the same train over *Rainhill* flat, which is a dead level, attained an uniform velocity of 9.23 miles an hour; the balance fixed at 50 marked 50.5, or effective pressure 53.5 lbs. by the mercurial-gauge.

lbs.
2,054 power.
1,564 resistance of the train, equal to 195½ t. on a level.

---

490 corresponding friction of the engine.

V. On July 23, 1834, the same engine, the Atlas, ascended *Sutton* with a part of its train, consisting of 8 wagons, weighing 33.90 t. besides tender, and 39.40 t., tender included; balance fixed at 50 and marking 52, or effective pressure 55 lbs.; velocity 6 miles an hour.

lbs.
2,111 power.
1,594 resistance, equal to 199¼ t. on a level.

---

517 corresponding friction of the engine.

VI. On July 24, 1834, the Fury, cylinders 11 in., stroke 16 in., wheels 5 ft, weight 8.20 t., ascended *Whiston* with a train of 10 wagons, weighing together 51.16 t., and 56.16 t. with the tender; balance fixed at 32 and marking 35, or effective pressure by the mercurial-gauge 65½ lbs. per square inch in the boiler; average velocity 6.31 miles an hour, reduced to 3.33 miles at the top of the plane.

lbs.
2,114 power.
1,951 resistance, equal to 244 t. on a level.

---

163 corresponding friction of the engine.

VII. On July 24, 1834, the same engine, the Fury, ascended *Sutton* with a train of 10 wagons weighing 43.80 t., and 48.80 t. including the tender; balance fixed at 32 and marking 36, or effective pressure 67 lbs.; velocity 15 miles an hour. The engine drew its train with evident ease.

lbs.
2,162 pewer.
1,825 resistance, equal to 228 t. on a level.

---

337 corresponding friction of the engine.

VIII. On July 31, 1834, the Atlas, of which the proportions have already been given, cannot ascend *Whitson* with a load of 14 wagons weighing 61.65 t., and 67.15 t. tender included, though the balance had been carried to 57, as point of departure, and marked 60, or effective pressure 63 lbs. per square inch in the boiler.

lbs.
2,419 power.
2,370 resistance, equal to $296\frac{1}{4}$ t. on a level.

---

39 surplus of the power over the resistance, not sufficient to overcome the friction of the engine.

IX. On July 31, the same engine, the Atlas, cannot ascend *Sutton* with a train of 8 wagons loaded and 4 empty, weighing 35.15 t., and 40.15 t. tender included. The balance had been purposely lowered to 40, as point of departure, and marked $42\frac{1}{2}$, or effective pressure by the mercurial-gauge 46 lbs. per square inch. The velocity from 20 miles an hour, as it was before arriving at the plane, fell immediately to $7\frac{1}{2}$ miles in the first quarter of a mile; in the second quarter it fell to $4\frac{1}{4}$ miles; in the third to $2\frac{1}{4}$ miles, and at last the engine stopped.

lbs.
1,766 power.
1,619 resistance, equal to $202\frac{1}{3}$ t. on a level.

---

147 surplus of power over the resistance, not sufficient, as we see, to overcome the friction of the engine. We have seen that the friction of this engine, even without a load, is 152 lbs.

X. At the conclusion of the latter experiment, and just at the moment when the engine stopped, the balance was raised to 45, and marked $47\frac{1}{2}$, or effective pressure by the mercurial-gauge 51 lbs. With that pressure the engine regained velocity by degrees, and attained an uniform velocity of $7\frac{1}{2}$ miles an hour, with which it reached the top.

lbs.
1,958 power.
1,619 resistance, equal to $202\frac{1}{3}$ t. on a level.

---

339 corresponding friction of the engine.

XI. On August 1, 1834, the Vesta, cylinders $11\frac{1}{8}$ in. (this engine had originally cylinders of 11 in., but, in repairing them, they were bored again and acquired a diameter of $11\frac{1}{8}$ in.,) stroke 16 in., wheels 5 ft., weight 8.71 t., with a train of 10 wagons weighing 43.72 t, and 49.22 t. tender included, ascended *Whiston* until within 60 yards of the top. There the engine was on the point of stopping, and several men were obliged to push very hard at the wheels in order to enable it to attain the summit. Balance fixed at $20\frac{1}{2}$, and marking $23\frac{1}{2}$, or effective pressure by the mercurial-gauge 58 lbs. per square inch. The velocity of 20 miles per hour for the first four quarters of a mile of the inclined plane, was reduced to 10 miles for the fifth quarter, and to 6 miles for the following one; afterwards the speed fell completely, on arriving at the steep part that exists towards the top of the inclined plane. This steep part must however be ascended, before it can be said that the engine has gone up the plane; for the average inclination calculated at $\frac{1}{96}$, comprises equally that part, and if we were to separate it from the remainder of the plane, that remainder would have a less inclination than $\frac{1}{96}$: consequently, the load was too much for the engine with that pressure.

lbs.
1,915 power.
1,746 resistance, equal to $218\frac{1}{2}$ t. on a level.

---

166 surplus of the power over the resistance, insufficient to overcome the friction of the engine. We have seen that the friction of this engine, even without any load, amounts to 187 lbs.

XII. On August 4, 1834, the Atlas, of which the proportions have already been given, with a train of 9 loaded wagons and 7 empty ones, weighing together 38.76 t., and with the tender 44.26 t., could not ascend *Sutton*; the balance being fixed at 55, and marking $57\frac{1}{2}$, or effective pressure $60\frac{1}{2}$ lbs. per square inch in the boiler. That pressure is not sufficient; the engine is ready to stop.

lbs.
2,323 power.
1,755 resistance, equal to $219\frac{1}{2}$ t. on a level.

---

568 surplus of the power over the resistance, insufficient to overcome the friction of the engine.

This experiment and the following one confine the friction of the engine within very narrow limits; that is to say, between 568 lbs. and 616 lbs., and seem to raise that friction very high; but in referring to experiment No. XI, on the friction of the engines without load, we see that at the time those two experiments were made, the engine had been newly repaired, and was not yet working satisfactorily. On August 1, its resistance, without load, had been found to be 194 lbs., instead of 152 lbs., that it was before, a circumstance which we attributed then to the connecting-rods not being properly adjusted; but the defect seems however to have been more vital, and to have rather continued to increase, as, on August 7, the axle of the engine broke.

XIII. At the conclusion of the foregoing experiment, just at the moment the engine was going to stop, the pressure was raised, by means of the spring, to $58\frac{3}{4}$ by the balance, or $61\frac{3}{4}$ lbs. effective pressure per square inch in the boiler by the mercurial gauge. With that pressure the ascent was concluded, with a speed of 3.75 miles an hour for the upper part of the plane.

lbs.
2,371 power.
1,755 resistance, equal to $219\frac{1}{3}$ tons on a level.

---

616 corresponding friction of the engine.

XIV. On August 4, 1834, the Fury, cylinders 11 in., stroke 16 in., wheels 5 ft., weight 8.20 t., ascended *Sutton* with a first-class train of 8 carriages, amongst which was an empty truck; weight of the train 32.97 t., and with the tender 37.97 t.; pressure purposely reduced to 33 lbs. by the balance, or 55 lbs. by the mercurial-gauge. Average velocity 13.33 miles, *minimum* velocity 10 miles an hour at the top of the plane.

lbs.
1,775 power.
1,466 resistance, equal to $183\frac{1}{4}$ tons on a level.

---

309 corresponding friction of the engine.

XV. On August 15, the Leeds, cylinders 11 in., stroke 16 in., wheels 5 ft., weight 7.07 t., ascended *Sutton* with 7 wagons, weighing 29.65 t., and tender included 35.15 t. The pressure purposely reduced, stood at 29 by the balance, or 48.5 lbs. by the mercurial-gauge. The velocity of 15 miles an hour for the first mile of the ascent fell to 10 miles for the following quarter, and to 6.6 miles for the last quarter of a mile near the top; average velocity 10 miles.

lbs.
1,565 power.
1,344 resistance, equal to 168 t. on a level.

---

221 corresponding friction of the engine.

XVI. On August 16, 1834, in the morning, the Vesta, the proportions of which have already been given, ascended *Sutton* with a train of 7 loaded wagons, weighing together 34.43 t., and 39.93 t., tender included; the valve fixed at 20 as a point of departure, on the balance, and blowing at $23\frac{1}{4}$, or effective pressure per square inch by the mercurial-gauge 57.25 lbs. Velocity at the top of the plane, 2.50 miles: (The engine had set off on the plane without impulse or acquired velocity.)

lbs.
1,891 power.
1,543 resistance, equal to 193 t. on a level.

---

348 corresponding friction of the engine.

XVII. On August 16, 1834, in the morning, the same engine ascended *Sutton* with 8 wagons, weighing 31.95 t., and 37.45 t., tender included; balance fixed at 20, as point of departure, and marking $23\frac{1}{2}$, or effective pressure 58 lbs. per square inch in the boiler by the mercurial-gauge. *Minimum* velocity at the moment of attaining the summit of the plane, 3.25 miles.

lbs.
1,915 power.
1,462 resistance, equal to $182\frac{3}{4}$ tons on a level.

---

453 corresponding friction of the engine.

XVIII. On August 16, in the evening, the same engine, the Vesta, ascended *Sutton* with 8 loaded wagons, weighing 27.05 t., and 4 empty ones, weighing together 7 t, more, the tender making altogether 39.05 t.

Balance fixed at 20 lbs. and marking 23 lbs., or effective pressure per inch 56.5 lbs. by the mercurial-guage. Velocity at the most difficult point of the ascent, 17 complete strokes of the piston per minute, or 3 miles an hour.

lbs.
1,866 power.
1,514 resistance, equal to 189 tons on a level.

352 corresponding friction of the engine.

§ 3. *Table of the Results obtained on the additional Friction of Engines.*

If, amongst the foregoing experiments, we bring together those that have produced results, we get the following table. We have placed in it only those experiments, the velocity of which was not considerable. It is, indeed, clear that the more the velocity was reduced, the nearer the engine was to attain the proposed end, that is to say, to arrive at the *maximum* load it could possibly draw with its pressure :—

EXPERIMENTS ON THE FRICTION OF LOADED LOCOMOTIVE ENGINES.

Number of the experiment.	DATE.	Name of the engine.	Diameter of the cylinder.	Stroke of the piston.	Diameter of the wheel.	Weight of the engine.	Friction without any load.	Effective pressure in the experiment.	Velocity of the experiment.	Load on a level.	Corresponding friction of the engine.	OBSERVATIONS.
			inches.	inches.	feet.	tons.	lbs.	lbs. per square inch.	miles an hour.	tons.	lbs.	
I	1834. July 22	VULCAN	11	16	5	8.34	136	57.5	7.50	188	350	
II	July 22	—	11	16	5	8.34	136	57.5	12.00	186	367	
VI	July 24	FURY	11	16	5	8.20	109	65.5	3.33	244	163	
XIV	Aug. 4	—	11	16	5	8.20	109	55.0	10.00	183	309	
XV	Aug. 15	LEEDS	11	16	5	7.07	108	48.5	6.60	168	221	
XVI	Aug. 16	VESTA	11⅛	16	5	8.71	187	57.25	2.50	193	348	
XVII	Aug. 16	—	11⅛	16	5	8.71	187	58.0	3.25	183	453	
XVIII	Aug. 16	—	11⅛	16	5	8.71	187	56.5	3.00	189	352	
III	July 23	ATLAS	12	16	5	11.40	152	55.0	3.50	240	190	
IV	July 23	—	12	16	5	11.40	152	53.5	9.23	196	490	
V	July 23	—	12	16	5	11.40	152	55.0	6.00	199	517	
X	July 31	—	12	16	5	11.40	152	51.0	7.50	202	339	
XIII	Aug. 4	—	12	16	5	11.40	194	61.75	3.75	219	616	The connecting-rods keyed too tight.
			Mean	...	...	...	151			200	362	

Considering the average friction deduced from these experiments, we see that a load of 200 t. causes in the engine, above its proper resistance, an *additional* friction of 362 lbs. 151 lbs. = 211 lbs.; which makes 1.05 lbs., or about 1 lb. per ton.

§ 4. *New Illustration of the Mode of Calculation employed.*

The friction of the engines must be increased by the load; for it is a principle in statics, easy to be ascertained in a simple machine like the lever, the pulley, the winch, &c., that for two forces to equilibrate on that machine, the fixed axis, plane or fulcrum, must support the resulting effort of the two forces. Thus the pressure on the fulcrum is in ratio to that resulting force. If the machine be in motion, we have seen that, as soon as that motion becomes uniform, the power equilibrates exactly the resistance, or the machine falls into the preceding case. Thus again, the pressure on the fixed points is in proportion to the forces that equilibrate on the machine. Consequently, the friction follows the same rule, being itself in proportion to the pressure.

This is applicable to the friction on all the joints of an engine, and consequently to what we call its resistance, which is nothing else than the aggregate of all those frictions.

An increase of resistance, in proportion to the load, is therefore founded on principle, and the mode of calculation we have employed must give us its exact measure. It is sufficient for it that the engine have really attained the limit of its power with a given pressure; that is to say, the *maximum* load it is able to draw with that pressure. In those cases in which the engine reduced its velocity to the rate of two or three miles an hour, it was evident that that point was attained, as the engine was literally going to stop. But besides, we shall see that in all the cases where the velocity did not exceed 12 miles an hour, we were authorised also to consider the pressure on the piston as equal to that in the boiler.

In fact, the steam being at a certain degree of pressure in the boiler, passes into a narrow steam-pipe, and from thence into the cylinder, where it immediatety dilates, and would quickly attain the same degree of pressure as in the boiler if the piston was immoveable. However, the piston opposing on the contrary only a limited resistance, determined by the load drawn by the engine, 40 lbs. per square inch for instance, will obey as soon as the elastic force of the steam in the cylinder will have attained that point. A piston which only bears a resistance of 40 lbs. per square inch, is nothing but a valve loaded with 40 lbs. per square inch. If the communication between the boiler and the cylinder were completely free, and without pipe or narrow passage, the piston would become a real valve for the boiler; and that valve giving way before the safety valve, which is loaded, for instance, with 50 lbs. per square inch, the steam in the boiler could not rise above 40 lbs. The passage, however, being narrowed, the piston is not a valve for the boiler, but it remains one for the cylinder.

From this result three points. 1st. That the pressure in the cylinder is exactly equal to the resistance on the piston. 2nd. That it is because the piston yields and gives way to the steam that the steam cannot augment its pressure beyond that point, nor

rise to the pressure in the boiler; but that if by any means the piston could be rendered immoveable, or only if it were not to give way quicker than the steam is generated, the equilibrium of pressure would immediately be established between the cylinder and the boiler; and, 3d., that if, in the steam-pipe, the velocity of the current is greater than the one corresponding to the generation of the steam in the boiler, it is because the pressure is less in the cylinder than in the boiler, and that in consequence the fluid endeavours to put itself in equilibrium in the two vessels; without which there could only be the current, owing to the generation of the steam.

From these observations, we see that the effective pressure on the piston may be calculated after that which exists in the boiler, as soon as the velocity of the piston is reduced to an equality with that of the generation of the steam. As we shall soon know by experience what is the total mass of steam, at the pressure of the boiler, generated by the engine in a given instant, it will be easy to calculate how many cylinders full of steam, at that pressure, the engine is able to furnish in a minute, and thus what is the velocity that corresponds to what we call full pressure in the cylinders. We shall then find, that for the engines we are examining, that velocity is at least twelve miles an hour. Thus we may consider that in all the cases in which the velocity did not exceed that rate, the pressure in the cylinder was the same as in the boiler, and, consequently, that in reckoning it in that proportion, we had the exact measure of the power then applied by the engine.

CHAPTER V.

GENERAL THEORY OF THE MOTION OF LOCOMOTIVE ENGINES.

ARTICLE I.

OF THE VELOCITY OF THE PISTON.

In endeavouring to calculate the effect of steam engines, that is to say, the velocity of the piston under a given load, the calculations have until now rested on two *data*, the pressure of the steam in the boiler and the resistance of the load on the piston; one being considered as representing the power exercised by the engine, and the other the resistance opposed by the load.

This mode appears exact at first sight, and seems to embrace all the *data* of the problem; but the mistake committed in that respect ought to have been discovered, since every formulæ obtained in that way is easily demonstrated false by experience.

It is particularly when we wish to apply that mode or those formulæ to that motion of locomotive engines, in order to calculate what load they are able to draw at a given velocity, or what velocity they will acquire with a given load, that we discover the formulæ give no rational result.

The cause thereof resides in the following fact, viz. that the pressure of steam in the boiler is by no means the *complete* expression of the power of the engine. It only indicates that power for a determined instant. It is indeed sufficient whenever it is required to compare the effort applied with the effect produced, during a very short instant, or in a case of equilibrium; but as soon as we have a continuation of motion, the pressure in the boiler is no longer sufficient to represent the power of the engine. This is nothing more than what is observed continually in mechanics. In a case of equilibrium, the measure of a force is the mass with which it equilibrates; but in a case of motion, the force is represented not only by the mass it sets in motion, but also by the velocity it is able to impart to that mass. In other words, the force is represented by its own intensity added to the velocity with which it is able to keep up that intensity. The same thing occurs here. The pressure in the boiler indicates the mass with which the engine can equilibrate; but it is the velocity of generation of the steam that indicates the motion the engine is able to impart to that mass.

It is, in fact, evident that the power of the engine resides at the same time, both in the greater or smaller quantity of steam generated, and in the degree of pressure or elastic force of that steam. The power consists thus in the quantity of water the engine is able to transform into steam in a given time, for instance in a minute, which we shall call the evaporating power of the engine, and in the degree of pressure of the steam.

In that valuation we see that the pressure is only the means by which to ascertain the state or intenseness of the power, at the moment its quantity is measured; and this explains the reason why, when the motion is not to last, and that in consequence the quantity need not be considered, the pressure is sufficient to represent the power. But this is not the case in a continued motion.

When an experiment is to be made with an engine, however weak it may be in regard to evaporating power, it will be easy, by charging the valve with 50 lbs. per square inch, to fill the boiler with steam at that effective pressure. If then we attach to the engine a load of 100 t. which would produce, by supposition, on the piston, a resistance of 46 lbs. per square inch, atmospheric pressure included; shall we say that the engine must necessarily draw that load with a certain fixed speed, which will only depend on the pressure of steam in the boiler and the resistance on the piston? No, assuredly. For if it should happen that the engine transform in a minute a cubic foot of water into steam at the pressure of the boiler, it may by that evaporation suffice to produce a certain speed; but if, all things remaining the same, it only evaporates half the quantity, it is clear that it will only be able to fill the cylinder half as many times in a minutes, and that consequently the pressure in the boiler may remain strictly the same, whilst the speed of the engine with the same load will necessarily be reduced to one half. We see, thus, that neither the pressure in the boiler, nor the supposition that that pressure be maintained in the same state in the different cases of motion, are sufficient to represent completely the power of the engine.

It is thus the evaporation of which the engine is capable that rules its effect, and which must consequently give us the measure of that effect.

If, by analogy with other boilers already tried, and by a comparison of the extent of the heating surfaces, we calculate beforehand what mass of steam a boiler is able to generate in a minute, at a given pressure, we shall then begin to get an idea of the power of which it disposes, and which the engine is able to carry into action.

If, better still, we fill the boiler with water, and produce by some manner or other, in the fire place, a fire as intense as it generally is when the engine is at work, so that we may thus ascertain its evaporating power, then only shall we know what the engine, to which we may join that boiler, will be able to execute in a given time.

The pressure in the boiler, taken by itself, can only solve one of the questions we have to consider: that is to say, the greatest load the engine is able to draw, on account of the necessity which exists that the resistance on the piston should never exceed the pressure in the boiler, as in that case the resistance would be greater than the moving power and no motion would be generated. But, that one case excepted, we must necessarily have recourse to the evaporating power, the pressure being only one of the elements of the force which is to be computed. The separate influence of each of those two elements in the result is as follows:—

The greatest possible load is marked by the degree of pressure in the boiler.

And the greatest speed with that load, or with any other, is given by the evaporating power.

It is therefore by employing both these elements that we shall be able to solve the question.

With that view we shall successively consider three different points.

The resistance produced on the piston by a given load;

The pressure of the steam in the cylinder in consequence of that resistance;

And, finally, the determination, by experiments of the evaporating power of the engines.

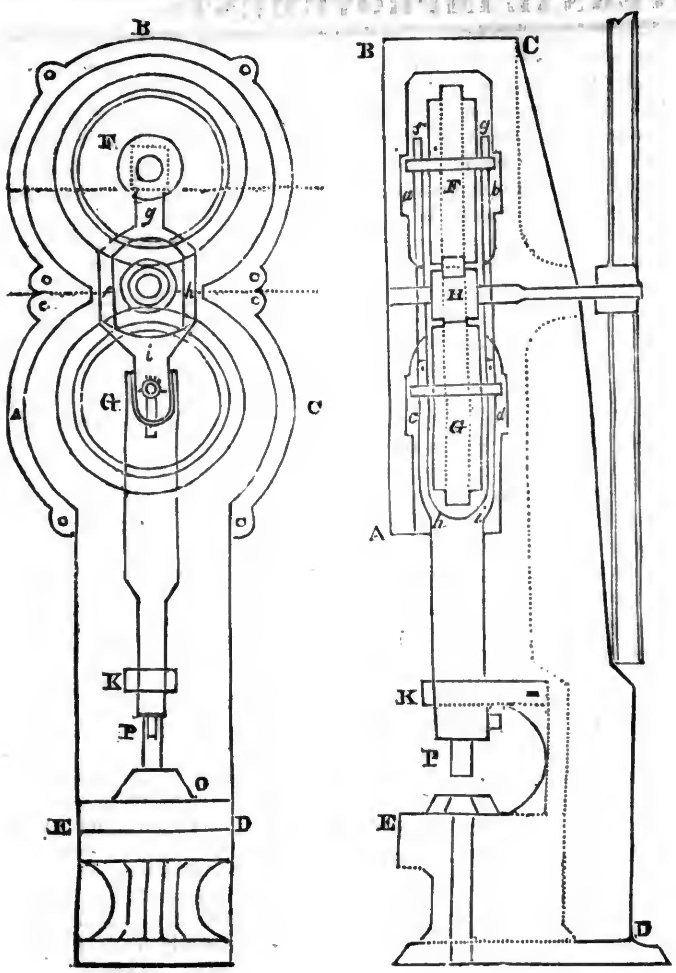
These foundations once established, the effect of an engine may easily be calculated by comparing the force of traction the load requires, which fixes the power the engine must expend, with the mass of power of which it is able to dispose; that is to say, its evaporating power.

(To be Continued.)

HOSKING'S PORTABLE PUNCHING PRESS.

(From the Third Report of the Cornwall Polytechnic Society.)

This machine is intended to facilitate the repairs of steam-packet boilers; it is sufficiently compact to admit of being readily conveyed to any dock or yard where its services may be required. Figs. 1 and 2, are



two vertical sections through the centre of the press, at right angles to each other, in which A B C D E, is a substantial iron frame, cast in two parts, having a space between them to contain two slightly eccentric cog-wheels F and G, whose arbors work in the wrought iron frame $f\ g\ h\ i$, which is firmly connected with the punch P. These wheels are driven by the pinion H, which, like the wheels, may be said to consist of three parts; a central part containing the cogs, and two outside cylindrical portions, whose circumferences in each case coincide with the pitch lines; these, by rolling on each other, keep the cogs at a proper and uniform distance, and prevent the undue strain and irregularity of action which would otherwise attend the eccentricity of the wheels, and consequently vertical movement of thetr centres.

For the purpose of keeping the centres of the wheels in the same vertical plane with the centre of the punch, their arbors are continued into a groove cast in the framing, and shewn at $a\ b\ c\ d$, together with the guide k.

The action of this machine will now be readily understood. Motion being given to the fly-wheel, is communicated by the pinion of the wheels F G, which are so arranged that the longest working radius of one, and the shortest of the other, shall be in contact with the pinion at the same time; when the longest radius of the wheel G, is with the pinion, the punch will be at its greatest depression; and when this wheel has made half a revolution from that point, it will be at its greatest elevation The material to be punched should then be placed on the stand O, and at the next half revolution of G, the piece would be forced out.

It is obvious that this machine possesses many other advantages than its portability; and we are inclined to think that in connexion with the steam-engine, it would be found greatly superior to the screw-press generally used for this purpose.

AGRICULTURE, &c.

From the Southern Agriculturist.

ON THE PRIDE OF INDIA TREE, AS AN ARTICLE FOR FENCING.

Dear Sir,—At your request, I furnish you with my observations on the Pride of India Trees, as an article of fencing, in places where timber is scarce and of indifferent quality. I have, myself, been at some pains in cultivating this high valuable tree; and bringing it to that state of perfection, which I have heard it attains, in its native clime. The result of my experience is, that it may be made one of the most useful and profitable fencing and timber trees known to the southern plantation. Our country is becoming, every year, more thickly settled, and as cultivation is pushed on, the vast primeval forests which cover the land, must necessarily disappear before the woodman's axe. The consequence is, that in a few years we will begin to feel the want of the necessary wood and timber for our farming purposes, and see the utility of setting out plantations of the more valuable forest trees. Indeed, I am aware of the existence of this want of timber on some of our sea-islands, and fertile rice lands, and it is particularly to the planters of thos sections that I address these remarks.

The best method of cultivating the Pride of India, that I have yet discovered, is the following. Run a plough in a straight furrow, and return, ploughing up another furrow to the one made, then take a hoe, and at the distance of eight feet, open a hole about one foot wide along the ridge, which fill with well rotted manure from the stable, or heap of compost, into which drop four or five berries. This should be done in March or April. Cover them lightly and attend the young plants as you would cotton, keeping down grass and weeds, and pulling up the weak and slender shoots, leaving but one of the most healthy and vigorous. Go over this twice in the course of three months, with a plough, turning over the furrow to the plants. The young trees will rapidly grow to the height of six or eight feet. During this time, you must occasionally strip off the leaves and lateral shoots, in order to train the stems to a certain length. Keep them merely straight twigs to which they will naturally tend, until the next spring, when you will direct them to grow as upright as possible, keeping down weeds and grass as in the year before. In this year they will attain the thickness of about twelve inches in circumference; and by the next spring the height of twelve or fifteen feet. The growth may, however, be improved by the use of the hoe and manuring. They may now be permitted to put out lateral limbs, suffering the most vigorous to continue, and taking off the weak ones while young, with a pruning knife. This will preserve the quality and beauty of the timber, making it fit in fifteen years for all manner of furniture.

The value of the wood cannot be too highly appreciated. It may be sawed into boards from twelve to eighteen inches wide, fit for almost any purpose, or into wainscoting of the most beautiful shades. It is a light, sonorous wood, not apt to split, and capable of a very high polish. It is entirely divested of any resinous matter, and thereby fitted to receive the most beautiful varnishes. It possesses powerful vermifugous qualties, and thereby fitted for all furniture of the bed chamber, as no bugs or any other insect will infest it. The texture or quality of the wood may be improved by being grown on land of a clay bottom, but will grow well on the loosest sandy loam. It should be raised from the seed in the manner I have described. If transplanted, its tap-roots will never grow, and the quality of the wood is much impaired. Besides, it will be more apt to be blown down, being supported only by lateral roots, these taking their sole pabulum from the rich loam on the surface, and giving to the wood a soft spongy texture.

As an article for fence posts, I can safely recommend it as one of the cheapest and most durable. In this latter quality it approximates more nearly to cedar than any wood I know. It may be planted where the fence is intended to be run, and your rails may be nailed to the body of the tree. The superfluous branches will afford an excellent fire-wood.

The foilage of this tree affords a wholesome provender for cattle. Horses, cows, hogs, sheep, &c. will eat the leaves greedily. When dried and mixed with hay, I know of no better medicine for cattle of every kind. Such are the vermifugous qualities of the entire tree, that I never fail to give it to my animals every spring. A few leaves given to horses once or twice a week, will afford them a most beautiful coa

of hair. A decoction of its root administered in small doses to children every morning for nine days, will effectually destroy worms in them.

A correspondent of yours has already testified as to the excellence of Pride of India leaves and berries as a manure; and also as a preventive to bugs. To his testimony, I can safely add my own. I have tried both experiments, and have experienced the most beneficial results.

With every wish for your success, Mr. Editor, I subscribe myself

COLBERT.

STEAM COTTON MILL.—An extensive steam cotton manufactory is about to be established at Portsmouth, N. H. A committee, previovsly appointed to inquire into the feasibility of the undertaking, reported the following facts:—

The estimated cost of all the machinery for a mill of 10,000 spindles, including gearing, tools, hydraulic apparatus, two Steam Engines of 60 horse power each, and land and buildings, is $164,000; viz:—

Machinery complete, at $10 per spindle,	$100,000
Bobbins, pickers, shuttles, boxes,&c.,	3,000
Belting, main shafting, and drums,	12,000
Cloth room, Presses, and Counting Room,	4,000
Steam apparatus for heating Mill,	1,200
Forcing Pump and Fire Apparatus,	800
Painting, Clothing Cards and Starting Mill,	5,000
Repair Shop and tools,	2,000
Two 60 horse power Engines, Engine House and Boilers,	12,000
Estimated Cost of Land and Buildings,	24,000
Making the amount of fixed capital	$164,000

From actual experience, it is ascertained that the fuel and water to operate the Mill one year would cost about $4000. It is also estimated that a Milll of this capacity would turn off 9000 lbs. of cloth per week, at a profit of $700, or nearly $37,000 per year. This estimate of the profits of the establishment was made by a person having an extensive knowledge of the manufacturing business; but we think it is much less than what would be realized.

At Middlesbro', a few years ago an obsecure fishing village, now become a considerable sea-port town on the river Tees, below Stockton—on laying the foundation for an Exchange, it was stated, among other important facts connected with railways, that that the projectors of the Stockton and Darlington railroad, only ventured to anticipate, as the greatest possible export of coal from the Tees, a quantity not exceeding 10,000 tons per annum;—this successful undertaking has not been ten years in operation, and yet, during the past year, between four and 500,000 tons of coals had been exported from that river.—[Sunderland Herald.]

SOME HINTS ON THE IMPORTANCE OF IMPROVING COTTAGE GARDENS. BY AN OLD FLORIST.

In looking over the last number of your Magazine, I was much pleased with an article from your correspondent, Mr. R. Murray, respecting the neglected state of cottage gardens, or perhaps, more properly the gardens of people in moderate circumstances in life, in the immediate vicinity of Boston. This is an important subject for discussion, and one which requires to be handled by persons who are competent to suggest methods for improving them. I have observed, in travelling through the villages in this neighborhood, many places that lay entirely waste, or but very little improved, that might, by bestowing upon them a small portion of time and care, be made a great source of amusement, if not of profit, to the proprietor or occupant This state of things is apt to strike the eye of persons unaccustomed to such, very unfavorably; and they oftentimes judge precipitately. It is very rare in Britain to see the gardens, even of the poorer cottagers, lie so neglected. A small, neat flower garden in front of the house, in which a few choice flowers are grown, and with the honeysuckle, jessamine, &c., climbing over the walls, and running up the sides and over the door, adds very much to the appearance of the premises, especially if the house is an indifferent one. I have frequently thought, when the subject has occurred to me, that this must in some measure be owing to the very long cold winters which are experienced in this climate, and which prevents gardening from being carried on here but a limited part of the year. Yet, however, I have found, that many plants which I should have expected that the cold winters would have killed, live through them with but little or no protection, and flourish as well as in England.

The horticultural and floral societies which abound throughout Britain, have tended greatly to encourage gardening among the people: numerous prizes are awarded to individuals who are not members, but who produce any thing worthy of exhibition. I have never attended a meeting, but what a part of the room has been set off for the productions of the cottagers; and at certain times, the secretary and two or three members visit all the gerdens within several miles of the place where their meetings are holden; a report is drawn up of the state in which they find them, and a prize is awarded to the person who keeps his under the highest cultivation. By this means emulation is produced, and the neighbor of the person who has gained a prize, begins to devote his leisure hours to the garden, rather than idle them away in places of dissipation; his family also receive more of his company, and the money that would perhaps have been uselessly spent, is applied to some good purpose. I do not know of any thing that ever gave me more pleasure, in travelling through the country, than to see a man, in the cool of evening, cleaning and watering his little garden, with his children playing about him.

I am not aware whether all florists' flowers can be successfully cultivated here; more particularly the picotee, carnation, auricula, polyanthus and ranunculus. They all live through the winters in England without protection, though some persons possessing valuable collections generally give them some covering during a few days of severe weather which sometimes occurs. Whether such flowers can be grown with equal success here, I am not able to state, but undoubtedly many of your readers who are more acquainted with the subject than myself, will give their opinions respecting it. I have always been an admirer of the flower garden, and for many years spent my leisure hours in cultivating many choice kinds, although I never carried it to the extent that many of the "fancy" do. Those persons who have become so thoroughly carried away into the love of florists' flowers as to walk twenty or thirty miles in a hot day in July, to get a sight of a new carnation, and having been gratified with such a view, will almost sell their coats from their backs to obtain a plant, may be truly said to be enthusiasts in the highest degree; but to that class I did not belong; nor do I wish to see any person in this commuity become so deeply imbued with such a feeling; it would be carrying things too far, and would have an injurious rather than a good effect. But I think that if mechanics, and especially persons employed in manufactories, would spend their leisure hours in the garden, where they have one, and where one could be obtained, they would find it a place of innocent and healthful amusement, and of time well spent. There only wants to be a few examples set, and a stimulous will then be given; and I have no doubt but that florists' flowers of every kind could be produced, and made to take the place of the weeds your correspondent complains of. I feel unable to do that justice to the subject which it requires, and hope that there are many of your readers, who see its importance, and will not neglect to occasionally remind us of it; at a future time, I may state something upon the culture of some kinds of flowers as gathered from my own practice; but as I have now trespassed too much upon your room, to the exclusion of more useful matter, with my best wishes for the success of your Magazine, and a hope that you may be rewarded for your labors, I subscribe myself,

AN OLD FLORIST.

Boston, Feb., 1836.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95 tons of	1 inch	by	½ inch.		FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.
200	do	1¼	do	½ do	
40	do	1¼	do	⅜ do	
800	do	2	do	½ do	
800	do	2½	do	⅝ do	
	soon expected.				

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted. MOSES LONG.

General Agent of Col. S. H Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

PROSPECTUS

OF VOLUME II. OF THE

CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

*** All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.

feb 20—ytf

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

21—tf JAMES G. KING, President.

AMES' CELEBRATED SHOVELS, SPADES, &c.

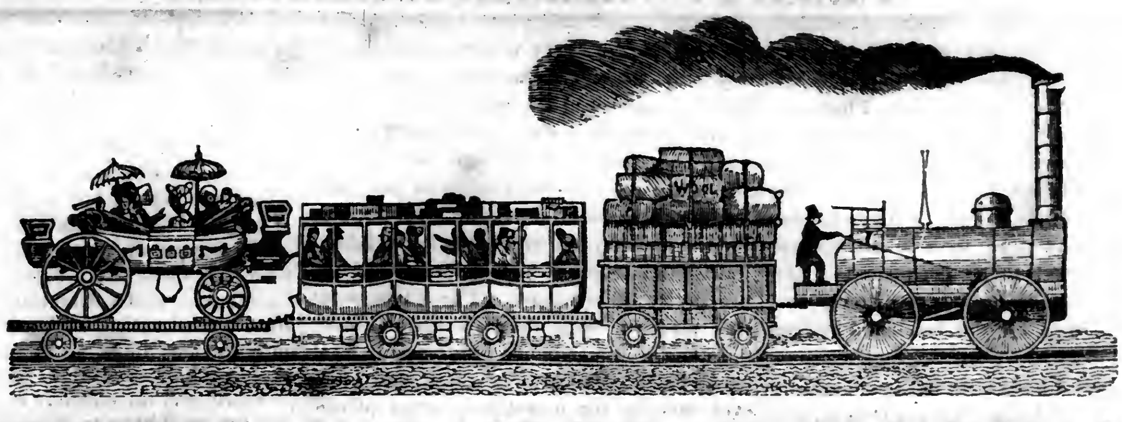
300 dozens	Ames' superior back-strap Shovels			
150	do	do	do	plain do
150	do	do	do	cast steel Shovels & Spades
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.

BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, JUNE 11, 1836. [VOLUME V.—No. 23.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 11, 1836.

At the annual election of Directors for the Hudson and Berkshire Railroad Company, the following named gentlemen were elected:—

James Mellen, John Delafield, Governeur Kemble, Rufus Reed, Oliver Wiswall, Ambrose L. Jordan, Charles B. Boynton, Samuel Anable, Elihu Gifford, William A. Dean, Robert A. Barnard, Silas Sprague, and Seneca Butts.

At a subsequent meeting, the Board elected James Mellen for their President, Elihu Gifford, Vice President, Levi A. Coffin, Treasurer, and J. W. Fairfield, Secretary.

RAILROADS FROM SYRACUSE.

At the last session of the Legislature, Railroads were incorporated radiating in almost all directions from Syracuse, in the county of Onondaga. Perhaps there is no point in the State so prominent for the intersection of Railroads, from opposite directions, as this. It is very central, and from the south line of the State to the St. Lawrence River, through this point, there will be a line of continuous Railways, of at least 160 miles in length, crossing the Railroad from Buffalo to Albany. Syracuse is equi-distant (150 miles) from Albany and Buffalo. It is also about central between the south line of the State, and the St. Lawrence River.

The Auburn and Syracuse Railroad, 25 miles in length, with a capital of $400,000 all subscribed, is now in the course of construction, and will be completed next year.

This is a part of the great Western Road to Buffalo. It commences at Auburn, a flourishing village, 7 miles from the canal, and passes through a fertile, wealthy, and populous district, to Syracuse. The transportation of property alone over this Road, consisting of that which is to be shipped upon the Canal, at Syracuse, and the merchandize for Auburn, and the county south of it, which will leave the Canal at its commencement, will, furnish a business that would warrant the construction of the Road, exclusive of passengers. The same remarks may also be made in relation to passengers. Should the prospective number of passengers be estimated only as they actually have increased, for a few years past, that business alone will be ample to pay 7 per cent. upon the capital. But the continued throng of travellers from Buffalo to Albany, increasing in numbers proportioned to the extent of country, and the rapidly increasing population of the West; aided by the facilities which Railroads will offer, will soon, like the Erie Canal, task this line to its utmost capacity; making the stock among the most desirable in the market; and the village—or *city*, as it soon will be—of Syracuse, one of the most populous and flourishing west ot the Hudson river.

From Syracuse to Utica, a distance of from 50 to 54 miles, a Railroad has been authorised, and the stock is soon to be offered. The capital is $800,000. The Canal, passing through the upper part of Utica, is without a lock between the two places, though within the village of Syracuse, there is a lockage of 26 feet. This Road is to connect with the *Utica and Schenectady*, and the *Auburn and Syracuse Railroads*.

Probably there is not a foot difference in the elevation between the two ends of the Road, and at no intermediate point is it necessary to make any rise, unless it may be the trifling elevation necessary to cross the Canal. It is the most favorable route in the State for cheapness of construction, and for making a good Road. With no large streams to cross; no hazard of high water to injure embankments; it is over an extended plain, within a convenient distance of the Canal, having all the facilities of that channel for the transportation of materials, it must be unsurpassed as a useful public road, and its stock must always stand high. This Road has the privilege of carrying freight as well as passengers. The enormous subscription to the Utica and Schenectady Road, and the steady premium which its stock has sustained, shows the confidence which the public entertain of it as an investment, and, of consequence, its immense advantage, although it is not permitted to carry freight except during the winter.

Favorable as may be the opinion of that Road, it is believed that the Syracuse and Utica should equal it in public confidence, and that it will afford a return equal to any other.

From Syracuse to Brewerton, at the foot of Oneida Lake, a distance of 14 miles north, a Railroad has been chartered with a capital of $80,000. The books of subscription have not been opened. This is on the direct route from Syracuse to Watertown, and Cape Vincent, the former of which is but 65 miles distant. The route of this Road is highly favorable, and it is believed that it can be constructed at an expense not exceeding its capital. That it will be extended to Watertown and the St. Lawrence River, there is not a doubt.

In the neighborhood of Syracuse, at a distance of 3 to 4 miles, are very extensive quarries of stone for building. They have been used upon the Canal to a great extent, and the Commissioners and Engineers give them a preference over any other stone upon the line of the Canal. They have been taken for locks more than 60 miles West, and are *required* to be used for the new aqueduct at Rochester. It is believed that they will be used for the locks and bridges from Rochester to Utica.

These stones have been used for building in Oswego—in Lyons, Ithica, Owego and Rochester. They are capable of a beautiful polish, and some highly finished articles have been made of them.

To these quarries two Railroads have been chartered with a capital each of $75,-000. The stone required to be used on the canal will pay the cost of a Railroad to the quarries, and the good quality of the stone for building, will ensure full employment for the Railway.

From Syracuse to Binghamton, a distance of about 70 miles, a Railroad has been chartered with a capital of $500,000. This road is intended to connect with the New-York and Erie Railroad at Binghamton. It will follow the valley of the Onondaga Creek and the Tioughnioga branch of the Chenango River, and will be very straight. The country through which it will pass is highly favorable for its construction. A glance at the map of the State will show that at no point can a road diverge from the Erie Railroad to the canal with greater advantage than from *Binghamton.* Whatever advantages there may be in the Erie Railroad, in affording a convenient way of reaching the city of New-York, they all go to aid the Syracuse and Binghamton road. There is also a charter granted for a Railroad from *Owego*, at the head of navigation on the Susquehannah River, to Courtland Village; there to intersect the road from Binghamton, thus opening an easy communication both with the eastern and western divisions of the New-York and Erie Railroad, and at the same time with the valley of the Susquehannah, in Pennsylvania and of course with Washington city. By a reference to the map, it will be perceived that the most direct and natural route from Lake Ontario, at Oswego, to the city of Washington, is through Syracuse, Courtland Village, Owego, and thence down the Valley of the Susquehannah river—and also to New-York, the same route will be used to Courtland Village, where a branch will diverge to the New-York and Erie Railroad, at Binghampton, thus making *Syracuse* the most central point of business; and its own immense resources beneath the soil of salt, plaster, and hydraulic cement, will make it, and at an early day, one of the most business-like places in the interior of the State.

That these roads will soon be completed there is no question, and meeting as they do at a place in every other respect favorably situated, where the capital for an immense business in the manufacture of salt is ready furnished by nature, and the surrounding country is equal to any other in the State, not only for fertility of soil, and variety of agricultural productions, but also for tho industry and enterprise of its inhabitants; all which will add largely to the prosperity of Syracuse. The advance of this place in population, wealth and business has been steady and progressive. Real estate has continued to advance, and however inviting for investment other places may be, we are satisfied that actual observations will convince any intelligent man that Syracuse must become one among the largest, if not the largest, of the interior towns in the State.

MARBLE CEMENT.

An important improvement, which has been for several years in progress, is about being introduced to the more general notice of the public, and we believe into extensive use for building purposes. It is a composition or cement, of which the principal ingredient is marble or lime stone, which, when applied to the inner or outer walls of buildings, presents the appearance of polished marble, of the various hues and qualities which distinguish the beautiful material imitated. What would be thought of a magician who possessed the power of changing the sombre brick and stone walls of the buildings of a city, in one week, into substances resembling the most beautiful Grecian, Italian, Egyptian or Verd Antique Marble, or porphyry, like the rock of Gibraltar? Yet all this may be done by this invention of a humble citizen, of Orange county, in this State. This cement has been sufficiently tested by experiments on buildings, to satisfy practical men of its decided superiority over any other cement, stucco, or other hard finish for walls, hitherto known. In our next number we expect to be able to furnish the public with some interesting particulars, on this subject; and in the mean time we can state, that a company has been formed, in this city, to carry on the operations connected with the manufacture of this new cement, and its application to buildings. Those who are curious in these matters, may obtain further information in relation to it, by applying at this office, or at the office of Edwin Williams, over Leavitt, Lord & Co., Broadway.

PAMBOUR ON LOCOMOTION.

Continued from page 328.

CHAPTER V.

ARTICLE II.

OF THE RESISTANCE ON THE PISTON OWING TO A GIVEN LOAD.

We have already explained that when a load is attached to an engine, the *total* resistance which is opposed to the motion of the piston is composed, 1st, of the resistance of the load; 2nd, of the resistance of the engine; 3d, of the atmospheric pressure. By the same reason the *real* elastic force of the steam is not expressed by its effective pressure, but by its *total* pressure.

In the calculations we have hitherto made, having only to compare the power with the ressitance in cases of equality or equilibrium, and without admixture of any other consideration, were at liberty to deduct on both sides an equal quantity, that is to say, to take into account only the effective pressure, and the effective resistance. But now we shall have to consider the steam in regard to its volume; and, that volume being determined by the *total* pressure, we must keep that expression of the elastic force as well as the one which corresponds with it for the resisting force.

Thus the resistance on the piston is composed of the three resistances, of the load, the engine and the atmosphere. Of these three forces, that which is owing to the atmospheric pressure is exerted immediately and directly on the piston. It must therefore be moved with the same velocity as the piston itself. But with the two others it is different. We have already seen that, in a machine, the pressures produced on different points are in an inverse ratio to the velocity of those points. Here, the engine and its train require to be moved with a velocity greater than that of the piston, in the proportion of the circumference of the wheel to twice the length of the stroke. The intenseness of the pressure produced on the piston, by the resistance of the load and that of the engine, is therefore greater than those same resistances in the above-mentioned proportion of the velocity of the wheel to that of the piston.

Supposing M to represent the number of tons composing the total load, tender included, and n the resistance per ton, nM will be the resistance of the train. If besides F expresses the friction or resistance of the engine without load, and δ the additional friction per unit of load, $F+\delta M$ will be the friction of the engine at the moment it draws the load M.

Thus,—

$$F+\delta M+nM$$

will be the resistance opposed to the progress along the rails by the engine and its train.

This force producing on the piston a resistance augmented in the proportion of the circumference of the wheel, to twice the stroke of the piston, if D be the diameter of the wheel, l the length of the stroke, and π the ratio of the circumference to the diameter,

$$(F+\delta M+nM)\,\frac{\pi D}{2\,l}$$

will be the resistance on the piston owing of that force; that is to say, to the friction to the engine and its train.

In the same way, representing by d the diameter of the cylinder, $\frac{1}{2}\pi d^2$ will be the area of the two pistons, and

$$\frac{(F+\delta M+nM)\,\frac{\pi D}{2\,l}}{\frac{1}{2}\pi\,d^2},$$

or

Fig. 13.

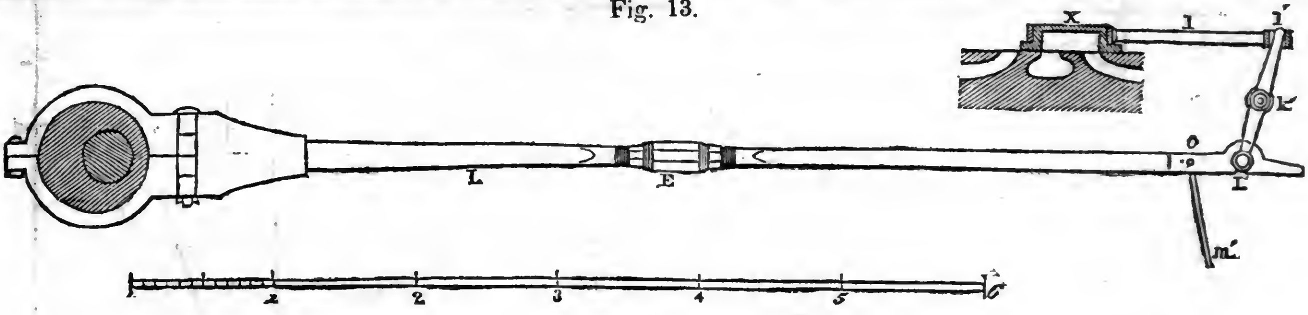


Fig. 14.

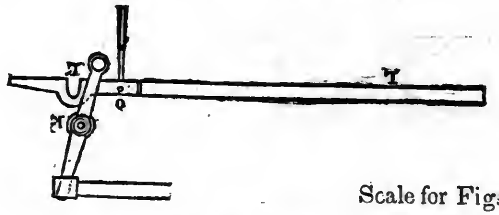
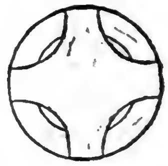
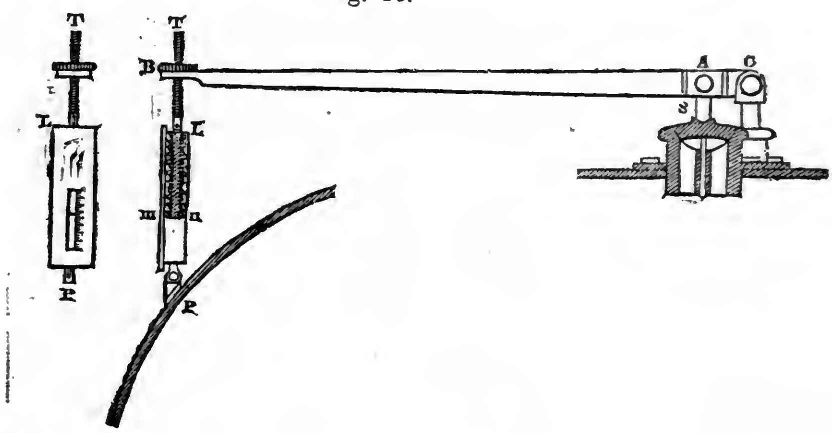


Fig. 15.



Scale for Figs. 15, 16, 17, and 19.

Fig. 16.



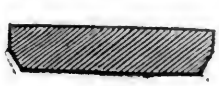
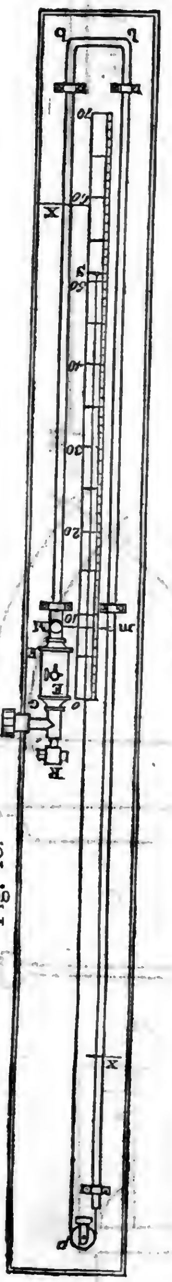


Fig. 18.



Scale for Fig. 18.

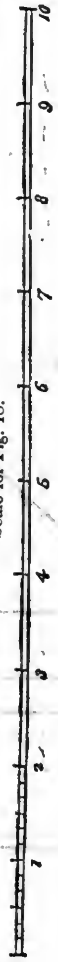


Fig. 19.

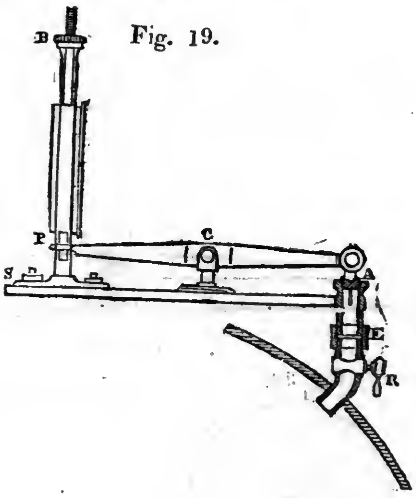


Fig. 17.

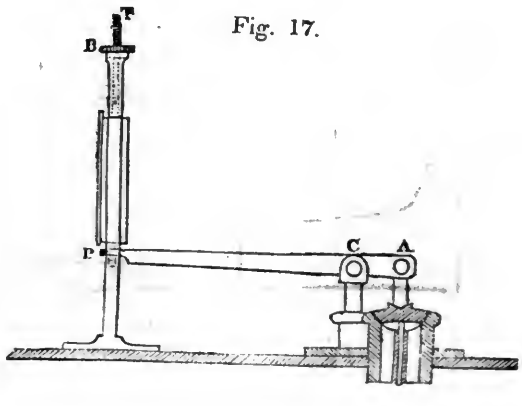


Fig. 20.

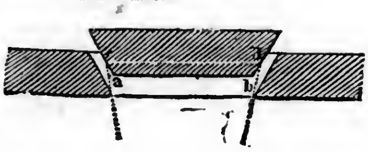


Fig. 21.

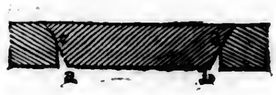


Fig. 22.

Fig. 23.

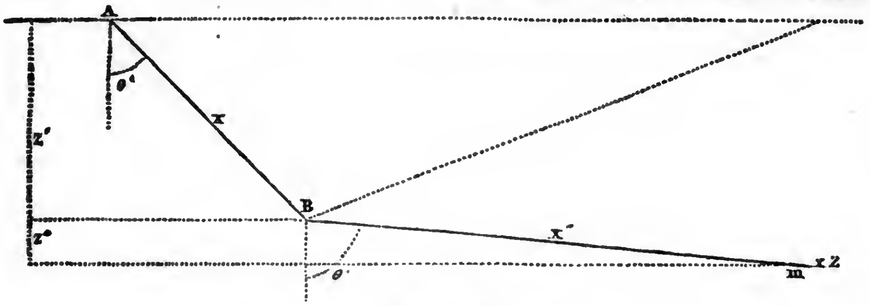


Fig. 24.

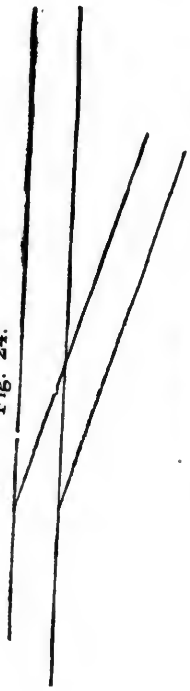
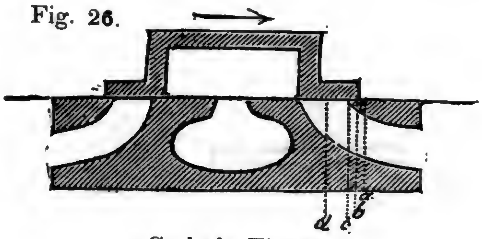
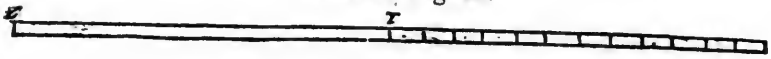


Fig. 25.

Fig. 26.



Scale for Fig. 26.



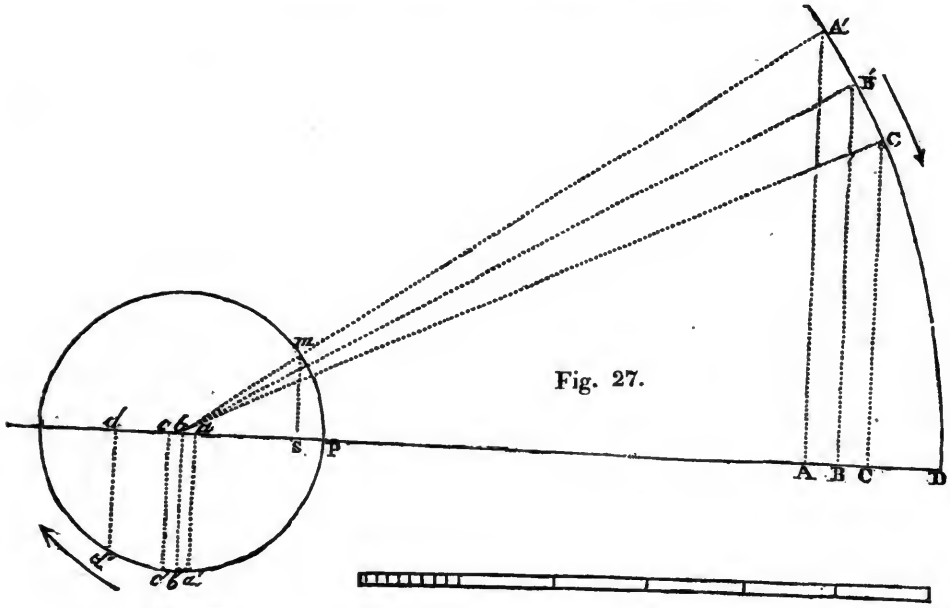


Fig. 27.

Fig. 28.

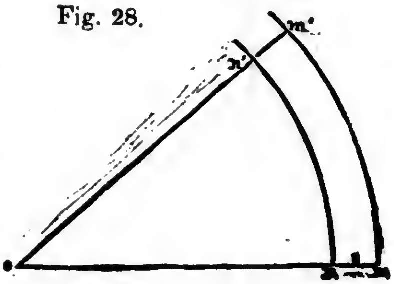


Fig. 29.

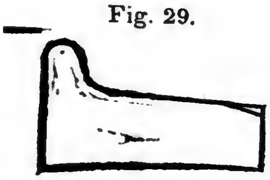
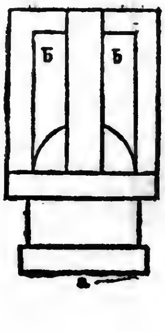


Fig. 30.

Fig. 31.

Fig. 34.



Fg 3..

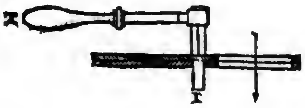
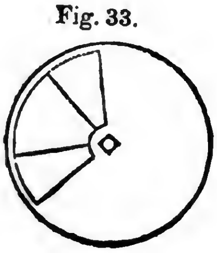


Fig. 33.



$$(F+\delta M+nM)\frac{D}{d^2 l}$$

will be the same force divided over the piston per unit of surface.

Adding to it, therefore, the atmospheric pressure per unit of surface, which we shall represent by ρ, we shall finally have, for the total pressure, owing to the resistance,

$$R=(F+\delta M+n M)\frac{D}{d^2 l}\mp\rho.$$

In this equation M is the weight of the load in tons, n is equal to 8 lbs. and $\delta=1$ lb. D, l and d are expressed in inches, F and ρ in pounds; thus the value of R, when found, is the pressure resulting on the piston, in pounds per square inch.

The quantities D, l and d might also be expressed in feet, and ρ in lbs. per square foot. In that case, the value of R, when found, will be the pressure per square foot on the piston. This way of expressing the resistance comes exactly to the same as the preceding one, and is sometimes more convenient for calculation.

Applying this to a load of 100 t., drawn by an engine with cylinders of 11 in. diameter, stroke 16 in., wheel 5 ft., friction 110 lbs., we have,—

100×8 lbs. = 800 lbs. resistance of the train in lbs.
110 lbs. friction of the engine without load.
100 lbs. additional friction, owing to the load.

1010 lbs. total resistance to the progressive motion of the wheels.

3.1416×60in. = 188.50 in. cirumference of the wheel expressed in inches.

2×16 in. = 32 in. double oi the stroke.

$\frac{188.5}{32}=5.887$, ratio of the velocity of the wheel and of the piston.

Thus 1010lbs. + 5.887 = 6,946 lbs. ressistance produced on the piston.

Besides $\frac{3.1416\times \overline{11}^2}{2}=190$ in. area of the two pistons in square inches.

Thus $\frac{5946 \text{ lbs.}}{190}=31.2$ lbs. resistance on the piston, divided over each square inch of its surface.

And, lastly 31.2 lbs. + 14.7 lbs. = 46 lbs. final resistance per unit of surface of the piston of an engine with cylinders of 11 in. diameter, &c. drawing a load of 100 gross tons, tender included.

ARTICLE III.

OF THE PRESSURE IN THE CYLINDER.

The resistance on the piston being known, we may deduce from it the pressure of the steam, at the instant it acts as a moving power in the cylinder. It is sufficient for that to observe what passes during the motion.

The steam, being at first shut up in the boiler at any degree of pressure, passes into the steam-pipes and from thence into the cylinders. When it arrives in those cylinders, the area of which is about ten times as great as that of the pipes, the steam must necessarily expand and lose in the same proportion of its elastic force. However, the piston is still immovable; so that the steam continuing to arrive rapidly, the equilibrium of pressure is quickly established between the boiler and the cylinder. The pressure then becomes the same in the two vessels, and the piston being impelled by the force of the steam, begins slowly to move. The motion is communicated to the engine and to its whole train, and the mass gets a certain speed. This acquired speed continuing a little longer than the cause which produced it, the consequence is, that, at the following stroke, the steam finds the piston already slowly driven in a retrogade direction, at the moment when it gives it a fresh impulse, which in its turn is communicated to the total mass, where it continues to accumulate. Thus, receiving at each stroke a fresh impulse, while it still keeps the preceding one, the piston accelerates, by degrees, its speed, and the train finally acquires all the velocity the engine is able to communicate to it.

We have said that, at the beginning o the motion, an equilibrium of pressure is established between the boiler and the cylinder; but, in proportion as the velocity of the piston increases, this piston recedes, in a way, before the steam, without giving it sufficient time to establish the equilibrium, so that the pressure in the cylinder must necessarily diminish.

Nevertheless, the increase of the velocity and the diminution of the pressure have their limits. It is observed in every machine that the speed, at first very small, increases by degrees, as we have said, but only to a certain point which it never passes, the moving power not being capable of a greater speed with the mass to be moved. If the machine is well constructed, and particularly if it is regulated by a fly-wheel, the velocity once acquired is maintained without alteration, although the action oi the moving power may continue to vary or to oscillate between certain limits, and the motion becomes perfectly uniform.

In the engines we consider, the mass of the train itself acts the part of a fly-wheel. That mass receives and stores up, in a manner, the additional velocity produced by the moving power at the time of its greatest action, in order to refund it afterwards, whenever the moving power happens to be in a moment of less force. It is from the difficulty of increasing and also of diminishing the speed of the mass, that the uniform motion results.

In regard to certain points of the engine, which, like the piston for instance, must necessarily vary in velocity during their oscillations, the uniformity of which we are speaking, consists in an exact periodical motion, which causes the velocity at each point of an oscillation to be precisely the same as it was at the same point of the preceding one. The result of this is, that if we take the duration of one of these oscillations as the unit of time, the motion will be strictly uniform.

As soon as the motion has acquired uniformity, which always takes place after a very short time and which is the regular state of the engine while travelling, the moving power, which at the beginning o the motion, was obliged to make an effort necessarily greater than the resistance, needs at present only to expend a force just sufficient to keep the resistance in equilibrium. For, if the moving power were to apply a greater or smaller force, the motion would be either accelerated or retarded, whilst, in fact, it is uniform.

From that moment, consequently, the pressure of the steam *in the cylinder*, which is the effort applied by the moving power, must be equal to the pressure of the resistance against the piston, which is the effort made by the resistance. This principle has been already demonstrated less extensively in another place.

We know thus the pressure at which the steam is expended by the cylinder, and as we also know the volume of the cylinder, we shall be able from both to conclude the absolute expense of power which takes place at each stroke of the piston. It is that expense, which, compared with the total mass of steam of which the engine can dispose, will give us, without any difficulty, the means of determing the velocity of the motion.

ARTICLE IV.

OF THE EVAPORATING POWER OF THE ENGINES.

§ 1. *Experiments on the Evaporating Power of the Engines.*

We have yet to determine the chief element of the question, viz. the evaporating power of the engines or the quantity of water they are able to transform into steam, under a determined pressure, in a given time.

With that view we undertook a series of experiments on the quantity of water evaporated by the engines of the Liverpool and Manchester Railway, during their journey from one of those towns to the other.

All the tenders on that Railway having exactly the same dimensions and an uniform shape, one of them was weighed, first empty and then loaded, whereby was ascertained that every inch of water in the tank corresponded exactly with a weight of 206.5 lbs. Then we proceeded in the following manner:—

We first ascertained, by means of the glass tube, at what height the water stood in the boiler at the moment of starting; and then we also measured the exact height of

the water in the tender. At the end of the journey, or at the intermediate station, if the engine stopped to take in fresh water, we first filled the boiler to the same height where it stood before setting off, and then we measured the water remaining in the tender. The difference between the height in the tender gave the consumption of water during the journey.

When describing these experiments, in order that the reader may see at once before him all the elements that have any importance in the question, we shall give the load of the engine, the time it took to complete the journey, which shows the velocity, the distance being 29½ miles, the state of the spring-balance from which the pressure results, and finally the temperature of the water in the tender at the moment of starting. We shall explain hereafter the column containing the total rising of the valve, which would permit all the steam generated in the boiler to escape.

In those experiments, we have mentioned the state of temperature of the water in the tender, because that circumstance must more or less facilitate the generation of steam, as it is easier to bring to the boiling point water already warm than cold water. However, as the temperature we mark in the tender, exists only at the moment of starting, and as it can remain thus only during a very small part of the journey, which lasts an hour and a half to two hours, it really has but a very inconsiderable influence on the result, of which the above experiments are, besides, sufficient proof.

We have also set down the pressure under which the steam was generated in each experiment. Water not being able to evaporate under a high pressure, unless by means of a higher temperature, we have reason to suppose that, *cæteris paribus*, the engine must be able to evaporate less water under a more considerable pressure. But as we shall see below, in a table we shall give on the volume and temperature of the steam, that between the degrees of pressure at which the engines constantly work, viz. between 50 and 60 lbs. effective pressure per square inch, the difference of temperature is only nine degrees by the thermometer, or 4½ degrees difference for the mean pressure, we shall easily be convinced that the influence of the pressure on the quantity of water evaporated must be almost imperceptible. Besides, when we employ a less elevated pressure, the steam generated under that pressure occupies more space, the boiler is too small to contain it, and the valve is consequently more subject to blow. The result is, that the engineman accustomed to regulate himself by the valve, seeing it continually blow, does not animate his fire so much as in the case where the valve is fixed at a higher pressure. The circumstance, therefore compensates for the former one, and frequently surpasses it.

EXPERIMENTS ON THE EVAPORATING POWER OF THE ENGINES.

Number of the experiment.	DATE.	Name of the engine.	Load of the engine tender included	Water evaporated. In lbs.	Water evaporated. In cubic feet.	Total duration of the journey.	Delays on the road included in that time.	Average state of the spring-balance.	Rising of the valve sufficient to give issue to all the steam generated in the boiler.	Average effective pressure during the experiment in lbs. per square inch.	Temperature of the water in the tender at starting.	Velocity of the engine in miles per hour.	Evaporation per hour in each experiment.	Heating surface: Exposed to the action of radiating caloric.	Heating surface: Exposed to the action of communicative caloric.
			tons.	lbs.	cubic ft.	hours.				lbs.		miles.	cubic ft.	sq. feet.	sq. feet.
I . .	1834. July 22	Vulcan	39.07	4646	74.34	1.17'	3'	31...32.5	5	54.5	just lukewarm	22.99	57.92	34.45	307.38
II . .	July 23	Atlas	195.50	8260	132.16	3.17	15	50...50.7	4	53.7	cold . . .	8.99	40.25	57.06	217.88
III . .	Aug. 4	—	127.64	5937	94.99	1.58	0	50...50.1	4	53	cold . . .	15.00	48.30	—	—
IV . .	July 31	—	40.15	5524	88.38	1.54	0	24...25.5	4	30	cold . . .	15.53	46.52	—	—
V . .	July 24	Fury	56.16	4878	78.05	1.30	0	31.2...32.6	5	57	cold . . .	19.67	52.03	32.87	307.38
VI . .	July 24	—	48.80	5446	87.14	1.35	0	31.2...32.7	5	57	cold . . .	18.63	55.03	—	—
VII .	July 26	Firefly	41.40	6143	98.29	1.40	5	14.5...14.5	3	44	almost cold . .	17.70	58.97	43.91	362.60
VIII .	July 26	—	41.40	6040	96.64	1.23	5	16.6...17.3	3	49	lukewarm . .	21.33	69.86	—	—
IX . .	Aug. 1	Vesta	33.15	4130	66.08	1.5	0	20. ...21.3	3.5	51	very hot . .	27.23	61.00	46.00	256.08
X . .	Aug. 15	Leeds	88.34	5989	95.82	1.35	0	31. ...32.2	5	54	just lukewarm	18.63	60.52	34.57	307.38
XI . .	Aug. 15	—	37.51	5317	85.07	1.20½	3	26.5...28.5	5	49	very hot . .	21.99	63.41	—	—
											Means	18.88	55.82	43.12	288.35

We see, consequently, in the related experiments, that the speed is the only thing that has a constant and perceptible effect on the generation of steam.

The cause of this effect of the speed is, that in those engines the steam, in issuing from the cylinders, is conducted to the chimney, where it creates an artificial current of air, and acts exactly in the same manner as the bellows in giving activity to the fire. Every jet of steam represents a stroke of the bellows; and it is consequently clear, that the more rapid the motion of the engine, the more cylinders of steam will be thrown into the chimney in a minute, and the more violently also will the fire be excited.

By examining the experiments, we find, in fact, that the greater the velocity of the motion, the more considerable was the evaporation; and for that reason it is necessary, in endeavoring to determine the evaporating power of the engines, to take them at their average velocity.

The speed of 18½ miles per hour, which is the average speed of our experiments, fulfils tolerably well that condition for the Liverpool engines. We must, therefore, consider the corresponding evaporation, which was equal to 55.82 cubic feet per hour, as the average evaporation of the engines employed.

Nevertheless, we see that some of those engines have evaporated 60 or 62 cubic feet of water per hour, which makes a cubic foot per minute, or a pound of water per second.

§ 2. *Of the evaporating Power per unit of heating Surface.*

However, as the different engines that figured in the experiments differed in regard to their heating surface, we can determine precisely the evaporating power only, by comparing the effects of evaporation with

the dimensions of the surface which produces them.

That is the object of the two last columns we added to the preceding table, which repeat the dimensions of the heating surfaces of the engines, so as they were given with more particulars in our first chapter (Chap. I. Art. II. § 3.)

By the mean results of those two columns we see that the average evaporation of 55.82 cubic feet of water, was produced by a heating surface consisting of 43.12 square feet exposed to the action of the radiating caloric, and 288.35 square feet exposed to the communicative heat. This is, therefore, the extent of evaporating surface to which we must refer the effect produced.

If we admit, in consequence of the experiment related in our first chapter (Chap. I. Art. II. § 3,) that each unit of surface exposed to the communicative heat produces the third part of the effect that same surface would produce if exposed to the radiating caloric, the heating surface above may be represented by 139.24 square feet exposed to the immediate or radiating action of the fire; and as those 139.24 square feet have produced in an hour the evaporation of 55.32 cubic feet, we see that each square foot has evaporated a volume of water expressed by 0.401 cubic foot.

Thus at a velocity of 18½ miles per hour, which is nearly the average speed of the engines, each square foot of heating surface, exposed to the radiating action of the fire, evaporates in an hour a volume of water of 0.401, or a little more than $\frac{4}{10}$ of a cubic foot. This is the expression of the *evaporating power of the engines per unit of heating surface.* Multiplying this, for each engine, by the extent of the heating surface, we shall find the total evaporating power of the engine.

§ 3. *Of the effective evaporating Power of the Engines.*

We must however remark, that although all that water is transformed into steam, there is only a part of it applied to the working of the engine. To be convinced of this fact, we need only examine the valves of the engines while working. We see them constantly emit a considerable quantity of steam, which, instead of entering the cylinders, escapes immediately into the atmosphere. This loss is a defect which it would perhaps not be difficult to correct, and, if corrected, would tend considerably towards an economy of fuel.

The plan in contemplation on the Liverpool Railway of replacing the present cylinders of the engines by others of a greater diameter, will at least have that advantage, that in case of considerable loads, it will render available all the steam generated in the boiler.

In the experiments of which we have given an account, not only is that loss perceptible, but it is even susceptible of being to a certain degree appreciated.

Under the head "*State of the Spring-balance,*" we have inscribed in the table above according to the observation in each experiment, the point of departure of the spring-balance, and the point at which it rose by blowing. The interval between these two degrees gives the rising of the valve that took place during the experiment, to which rising was owing the escaping of the steam. Thus, in the first experiment, the valve of the VULCAN fixed at 31 as point of departure, rose to 32½ by the blowing; consequently, the rising of the valve was of 1½ degree on the balance. The same for the others.

In the following column we have given the quantity of rising sufficient for the valve of each of the engines to give issue to all the steam the engines are able to generate. This point may have been already observed in our experiments on the pressure. We have seen, that whatever care be taken to animate the fire, the valve can never rise beyond a certain point, because then it gives issue to all the steam generated. An exact knowledge of this point was easy to acquire by observation in the numerous experiments on the velocity of the engines we are going to relate.

Thus we found, for instance, that the ATLAS engine, travelling at its greatest speed, and stopped all of a sudden, at the instant it was generating the most steam, raised its valve from 50 degress to 54 degrees; and that the passage resulting from that rising was sufficient to evacuate all the steam. In the same manner, the LEEDS, VULCAN, and FURY, raised in similar circumstances their valve from 31 to 36, VESTA from 20 to 23½, and FIREFLY from 17 to 20; the second valve of these engines being, besides, at the points indicated for them in our experiments on pressure. These degrees of rising naturally depend, 1st, on the quantity of steam generated by each engine, and the diameter of the valve; 2nd, on the dimensions of the levers and the size of the divisions of the balance, which makes a degree by the balance correspond with a greater or a lesser rising; and, lastly, on the second valve, which may give more or less issue to the steam.

These circumstances explain the differences that appear to exist between the engines. In the ATLAS, the second valve gave no issue to the steam, and the first was only 2½ in. in diameter; but the divisions of the balance of that engine being very great, on account of the proportions of the lever, four divisions of the balance are equal to a considerable rising of the valve, which was sufficient to evacuate the steam. In the LEEDS, VULCAN, and FURY, the second valve did not rise in the pressures we employed; but the first valve, which is the one we consider here, was 3 in. in diameter. In the VESTA, the second valve gave issue to the steam as well as the first; the consequence of which was, that a rising of 3.5 degrees of the balance was sufficient for the evacuation of the steam. Lastly, in the FIREFLY, only one of the valves blew, but at the time of the experiments that engine was in a very bad condition. Its boiler was leaky, the water ran out into the fire-place, where it evaporated, and a very small quantity of steam was really collected in the boiler.

Repeated experiments having, therefore determined these points in a positive manner, it now becomes possible, with the elements we have at our disposal, to appreciate the quantity of steam that escaped during the above-mentioned experiments. It is sufficient for that to compare the two columns, one of which shows the rising that really took place, and the other the rising that would have been sufficient for the evacuation of all the steam. By that means, we shall find that the average rising that took place during the experiments was 12 on 46.5. A quarter of the steam was, therefore, lost through the valve—we might even say a little more, particularly considering that the FIREFLY engine was then in a bad condition—and lost some of its steam through the leaks of its boiler.

On the other hand, that loss of steam is not accidental, but inherent to the construction itself of those engines; and among all the experiments on the velocity that we shall relate below, there will scarcely be found a single instance in which that effect was not produced; and when it was not, the reason was that the fire was not excited to the highest possible degree. It is therefore necessary to establish a distinction between the evaporating power of the engine, and what we shall call their *effective* evaporating power; that is to say, the part of that power which is really applied to the working of the engine.

From the experiments above, we find that of all the steam generated in the boiler, three quarters only enter into the cylinders.

Thus, the evaporating power per square foot of heating surface exposed to the radiating caloric, having been found to be 0.401 cubic foot, the available part of it, or the *effective evaporating power expressed in cubic feet of water evaporated in an hour per square foot of surface, is* 0.301 *cubic foot, or* $\frac{3}{10}$ *of a cubic foot.*

Finally, returning to the mean of the above experiments, the evaporating power was in each hour 55.82 cubic feet; consequently, the *effective* evaporating power, taken as an average for all the engines, is 41.87 cubic feet.

—

ARTICLE V.

OF THE PROPORTIONS OF THE ENGINES, AND THEIR CORRESPONDING EFFECTS.

§ 1. *Analytical expression of the Velocity of the Engine with a given Load.*

With these elements it is easy to determine the velocity which an engine is able to acquire with a given load.

Supposing, for instance, we have a load of 100 t., tender included, attached to an engine with cylinders of 11 in. diameter, stroke 16 in., wheels 5 ft., friction 110 lbs., *effective* pressure of the steam in the boiler 50 lbs. per square inch, and finally effective evaporating power, such as we have found it for the average of the Liverpool engines, that is to say, 41.87 cubic feet of water evaporated in an hour.

We have already seen above (Chap. V. Art. II.,) that the *total* resistance which that load opposed to the motion of the pis-

ton in the case of that engine was 46 lbs. per square inch; and we have also seen that, in consequence of that resistance, the total pressure of the steam, when arriving in the cylinder, was also necessarily 46 lbs. per square inch.

The mass of water evaporated is 41.87 cubic feet per hour, or 0.70 cubic feet per minute. This water is immediately transformed, in the boiler, into steam, at the effective pressure of 50 lbs. per square inch or at the total pressure of 65 lbs. per square inch.

But we know the volume of the steam generated under a determined pressure. Tables of that volume have been formed from experiment, and one will be found below, § 11. According to these tables, the steam, generated under a total pressure of 65 lbs. per square inch, occupies 435 times the space of the water which produced it. Thus the water transformed into steam at the total pressure of 65 lbs. per square inch, and spent each minute in the motion, formed a volume of

$$0.70 \text{ c. ft.} \times 435 = 304 \text{ cubic feet.}$$

This steam, penetrating into the cylinders, is then reduced to a pressure of 46 lbs. Its temperature, however, remains the same, because the pipes that conduct it to the cylinders and the cylinders themselves are immersed in the boiler, or surrounded by the flame that comes out of the fire-place. We know that the space occupied by the steam, when its temperature remains the same, augments in an inverse ratio to the pressure. At the moment it arrives in the cylinders, that same mass of steam occupies consequently a greater space in the proportion of 65 to 46.

Thus its total volume is then

$$304 \times \frac{65}{46} = 430 \text{ cubic feet.}$$

Now, the area of the two cylinders is 190 square inches or 1.32 square foot; thus the above volume of 430 cubic feet of steam, passing through the cylinders in a minute, must necessarily cross them with a velocity of

$$\frac{430}{1.32} = 326 \text{ feet per minute.}$$

which gives us, consequently, the velocity of the piston in feet per minute with the supposed load.

To deduce from that the speed of the engine in miles per hour, we must observe that an hour contains 60 minutes, and thus that the speed per hour will be 60 times as great; a mile containing 5280 ft., the produce must be divided by that number in order to have the speed expressed in miles; and finally the speed of the engine, according to the proportion of the stroke to the diameter of the wheel, is 5.887 times that of the piston.

We shall consequently have

$$\frac{326 \times 60}{5280} \times 5.837 = 21.83 \text{ miles, velocity of}$$

the engine per hour.

Thus we see that the evaporation supposed above, must necessarily produce a velocity of $21\frac{3}{4}$ miles per hour for the engine; that is to say, that a locomotive, engine, with the above-mentioned proportions is able, if in a good condition and with a well-animated fire, to draw a load of 100 t., tender included, with a velocity of $21\frac{3}{4}$ miles an hour.

The same mode of calculation may serve for any other load or any other engine. Thus, in general, making again use of the letters already employed in our research of the resistance on the piston, viz.

M representing the number of tons of the load.

n the resistance of the load per ton.

F the friction of the engine without load.

δ its additional friction for each to of the load.

D the diameter of the wheel.

d the diameter of the cylinder.

l the length of the stroke.

And ρ the atmospheric pressure per unit of surface.

$$R = (F + \delta M + nM)\frac{D}{d^2 l} + \rho,$$

will be the pressure of the steam per unit of surface in the cylinder as above demonstrated (Chap V. Art. II.)

If, besides,

P express the total pressure of the steam in the boiler;

s, The effective evaporating power of the engine expressed by the number of cubic feet the boiler is able to evaporate in a minute at the pressure P,

And m the ratio of the volune of steam, at the degree of pressure P, to the volume of water,

$$m \times s$$

will be the total volume of steam generated in a minute at the pressure P of the boiler.

The steam, arriving in the cylinder passes from the pressure P to the pressure R, and changes its volume in an inverse ratio to the pressures; so that

$$ms \times \frac{P}{R}$$

is the space occupied by the steam when arrived in the cylinders.

This volume of steam, crossing the cylinders in a minute, if we divide it by the area of the cylinders, we shall have the speed it must necessarily have, and consequently the velocity it will communicate to the piston.

Now the area of the two cylinders is $\frac{1}{2}\pi d^2$; thus the velocity per minute will be,

$$\frac{ms\,P}{\frac{1}{2}\pi d^2 R}.$$

In order to effect that division, the area of the cylinders ought necessarily to be expressed in units similar to those of the volume s. The area of the cylinders must be then expressed in square feet and not in inches; and the same condition is consequently required also for R, P, and ρ. So in the calculation we must express the pressures in lbs. per square foot, which puts them at the same rate as if expressed in the usual manner.

Passing from this expression to the velocity of the engine, we know that it is to the velocity of the piston in the proportion of the circumference of the wheel to twice the stroke, thus the speed of the engine is

$$v = \frac{ms\,PD}{R\,d^2 l};$$

or, putting for R its value found above, and passing from the speed per minute to the speed per hour, in multiplying by 60,

$$V = 60\,\frac{ms\,PD}{(F + \delta M + nM)\,D + \rho d^2 l}.$$

It must be remarked that 60 s is equal to S, or the evaporating power *per hour*; that is to say, that by employing this value it is no longer necessary to multiply by 60, and the reckoning will be simplified in its application.

The formula will then be,

$$V = \frac{m\,PSD}{[F + (\delta + n)M]\,D + \rho d^2 l}.$$

This will consequently be the general expression of the velocity of the engine per hour; expression in which everything is known by measures taken on the engine, even the evaporating power S, which results from the extent of the heating surface computed as above. m, which is the volume of the steam generated under the pressure P, is found in a table like the one below (Chap. V. Art. V. § 11.)

By means of this formula, and by measures simply taken on the engine, it will therefore be easy to determine immediately the effect we may expect from it.

In that expression, the evaporating power S being expressed in cubic feet the resulting speed will also be expressed in feet. If we wish to have it in miles, as a mile contains 2580 ft., it will be sufficient to divide by that number, and the result will be the speed of the engine in miles per hour.

We shall see further on that the produce mP is almost invariable; and consequently we learn by the inspection of this formula, that the velocity of an engine with a given load increases with the heating surface and the diameter of the wheel, and diminishes, on the contrary, when the diameter of the cylinder and the stroke of the piston augment.

§ 2. *Analytical expression of the Load that an Engine can draw at a given Velocity.*

If, on the contrary, we wish to know the load a given engine can draw at a determined speed, it is sufficient, in the foregoing equation, to consider V as known and to draw from it the unknown quantity M.

It will then be,

$$M = \frac{m\,PSD - \rho d^2 l V}{(\delta + n)\,VD} - \frac{F}{\delta + n}.$$

After the manner that the calculation has been established, it is clear that the value we shall find for M, will be the number of tons of the *total* load, that is to say, tender included.

§ 3. *Of the Heating Surface that must be adopted to obtain from an Engine a determined Velocity with a given Load.*

The same equation may also serve to determine any one of the indeterminate quantities in the general problem of loco-

motive engines. Thus, for instance, it will show the extent of heating surface, or the evaporating power necessary to enable an engine to draw a known load at a fixed speed. For that, we have only to draw from the general equation the value of S.

It will be,

$$S=\frac{V\,[(\delta+)\,M\,D\,n\,F\,D+\rho\,d^2\,l]}{m\,P\,D}.$$

The result thus obtained will be the effective evaporating power of the engine in cubic feet of water per hour; and as we have seen (Chap. V. Art. IV. § 3) that the effective evaporating power is equal to $\frac{3}{10}$ of the heating surface expressed in square feet, we shall easily obtain the last by multiplying the result by the fractional number $\frac{10}{3}$.

§ 4. *Of the Maximum Load of an Engine with a given Pressure.*

We found above (§ 2) the expression of the load an engine is able to draw at a given velocity; and the less the velocity, the more considerable may be the load. We must, however, add that in all cases, for the motion to be possible, the resistance on the piston must not be greater than the force that is to move it. Consequently, the resistance we have expressed by R must, at most, be equal to P. This observation fixes the limits of the possible load, with a determined pressure. Beyond that point the equation may continue to give results, but they will no longer suit the question. The limit of the load with the pressure P will thus be known by the equation R = P; or,

$$[F+(\delta+n)\,M]\,\frac{D}{\rho\,d^2\,l}+\rho=P,$$

which gives

$$M=\frac{(P-\rho\,d^2\,l}{(\delta+n)\,D}-\frac{F}{\delta+n}$$

This equation will give the maximum load of the engine, including the weight of the tender, subservient, however, to the conditions of adhesion explained hereafter, in Chap. VIII.

§ 5. *Of the Velocity of the Engine corresponding with the Maximum Load.*

Putting that value of M in the formula that gives the speed, we have the speed corresponding with the maximum load. After the necessary reductions we find—

$$V=\frac{m\,S\,D}{d^2\,l}.$$

If we write this expression under the following form—

$$V\ \frac{m\,S}{\frac{1}{2}\pi d^2}\times\frac{\pi D}{2l},$$

we shall perceive at first sight, that it is exactly the speed produced by the passage in the cylinders of the steam of the boiler, when that steam undergoes no reduction of pressure. In fact, $\frac{m\,S}{\frac{1}{2}\pi\,d^2}$ is the mass of steam produced *at the pressure of the boiler*, divided by the area of the two cylinders; that is to say, the speed which its passage in the cylinders, without alteration, produces for the piston; and multiplying that quantity by $\frac{\pi D}{2l}$ which is the proportion of the velocity of the engine to that of the piston, the result will naturally be the relative speed of the engine.

We also see that in the case of a maximum load, the pressure of the steam in the cylinder will be the same as in the boiler, and that its velocity will be the very velocity at which the steam is generated in the boiler; results which besides are, of themselves, evident to an attentive mind, and which have already been pointed out.

In regard to the limit of speed with small loads, the engine-men never urge it so as to risk an accident, by too great a velocity in the motion of the piston, or other parts of the mechanism. Only one single instance, in the experiments we shall relate below, will be found, in which the engines attained a speed of 35 miles an hour. This velocity is the greatest that has been observed, until the present moment, except during some extremely short intervals. When the train is too light, the engine-men take care partially to shut the regulator, and not to animate the fire to its highest pitch, as we shall mention hereafter.

§ 6. *Of the Diameter that ought to be given to the Cylinder, to render an Engine capable of attaining a fixed Maximum Load.*

The same equation from which we have concluded above (§ 4) the limit of possible loads with a given pressure, may also serve to determine the diameter that ought to be given to the cylinders of an engine to render it capable of drawing a fixed load at a certain pressure.

$$d=\sqrt{\frac{D\,[(\delta+n)\,M+F]}{(P-\rho)\,l}}.$$

This diameter will be expressed in feet, according to the manner the calculation was made. It will be easily reduced to the common expression in inches.

§ 7. *Of the Length that ought to be given to the Stroke of the Piston of an Engine, the Cylinders of which have already a fixed Diameter, so as to enable that Engine to draw a certain Maximum Load.*

In the same manner, also, if the diameter of the cylinder has already been chosen on account of some other consideration, we may, in a certain degree, produce the same effect; that is to say, render the engine able to attain the maximum load required, by adopting for the stroke of the piston a suitable length. In that case the equation gives—

$$l=\frac{D\,[(\delta+n)\,M+F]}{(P-\rho)\,d}.$$

This measure of the stroke will be expressed, according to the adopted measures, in feet and decimals of feet; one may transform it, as usual, in inches.

§ 8. *Of the Diameter that ought to be given to the Wheel of an Engine, so as to enable it to draw a fixed Maximum Load.*

We may also obtain the same result by reducing, in a suitable proportion, the diameter of the wheel, by which the speed of the engine will be diminished, and a greater power of traction given to it. The equation will, in that case, give for the diamet of the wheel—

$$D=\frac{(P-\rho)\,d^2\,l}{(\delta+n)\,M+F}.$$

It is understood that this method can only succeed within certain limits, and that the diameter of the wheel cannot be reduced beyond certain dimensions, fixed by the other requisites of the business.

§ 9. *Of the effective Pressure necessary in the Boiler of an Engine, the Dimensions of which are already fixed, in order that the Engine may draw a certain Maximum Load.*

Finally, if the length of the stroke, the diameter of the cylinders, and that of the wheel are already fixed, we may calculate what is the pressure that must be produced in the boiler to enable the engine to attain the maximum load required. The same equation resolved in that case, in regard to the quantity P considered as unknown, gives—

$$P-\rho=\frac{D\,[(\delta+n)\,M+F]}{d^2\,l}.$$

This pressure will be expressed, according to the adopted measures, in pounds per square foot, but, by taking the $\frac{1}{144}$ part of it, we may reduce it to the usual expression of pounds per square inch.

The same would take place in regard to any other research. These deductions are easily found;—we shall not stop any longer on this point. It is scarcely necessary to add, that the values given by those equations are only applicable to the questions, in as far as they are not in opposition to the practical rules of construction. Thus, the pressure determined above must in no case exceed the resistance of which the metal of the boiler is capable; neither must the diameter of the wheel be large enough to put the engine in danger in going off the rails, nor small enough to destroy its speed, &c. &c.

§ 10. *Synoptical Table of the preceding Formulæ.*

In a view to facilitate practical researches, we shall collect here those different formulæ into a table.

The signs employed having the following significations, viz.:—

M, representing the number of gross tons of the load, tender included.

n, the resistance per ton of the load, or according to the determination already made, n = 8 lbs.

F, the friction of the engine without load, taken, according to the average of the above experiments, in case the engine is not yet constructed; that is to say, at 15 lbs. per ton of its presumed weight. In case the engine is already constructed, and one wishes to obtain a very accurate result, F must be determined by a direct experiment made on the engine itself.

δ, the additional friction of the engine per ton of load, or according to the determination hereabove, δ = 1 lb.; and, consequently, $(\delta+n)$ = 9 lbs.

D, the diameter of the wheel, expressed in feet.

d, the diameter of the cylinder, also expressed in feet and decimals of feet.

l, the length of the stroke, in feet and decimals of feet.

P, the *total* pressure (or atmospheric pressure included) of the steam in the boiler, expressed in pounds per square foot; that is to say, 144 times the pressure per square inch.

ρ, the atmospheric pressure expressed in pounds per square foot as above, that is to say, $\rho = 2117$ lbs.; and, consequently $(P - \rho)$, the effective pressure of the steam in the boiler, being expressed in the same manner, viz., in pounds per square foot.

S, being the *effective* evaporating power of the engine per hour, or otherwise, according to the described experiments, S being the $\frac{3}{10}$ of the number of square feet in the *reduced* heating surface. (It will be recollected, that the *reduced* heating surface itself consists of the sum of the heating surface of the fire-place, more the third part of the heating surface of the tubes.)

m, being the ratio of the volume of the steam at the *total* pressure P, to the volume of water that has produced it, according to the known tables, one of which will be found in one of the following paragraphs.

V, finally, being the velocity of the engine in feet per hour, that velocity being necessarily expressed in that manner for the general harmony of the calculation; but as a mile contains 5280 feet, it can easily be reduced to the speed in miles, and *vice versa*.

These different signs being thus well understood, and the letters n and δ being replaced by their values, 8 lbs. and 1 lb., the formulæ above give the following table :—

SYNOPTICAL TABLE OF THE PRACTICAL FORMULÆ OF LOCOMOTIVE ENGINES.

QUESTIONS TO BE SOLVED.	FORMULÆ.
1. *Velocity* which an Engine of known proportions will take, when working at a given pressure, and drawing a determined load. The result being the speed in feet per hour, the speed in miles will be obtained by dividing by 5280 :—	$V = \frac{mPSD}{(F + 9M)D + \rho d^2 l}$
2. *Load* that a given Engine will be able to draw, with a known pressure, and at a determined velocity. This load will be expressed in gross tons, tender included :—	$M = \frac{mPSD - \rho d^2 lV}{9VD} - \frac{F}{9}$.
3. *Heating Surface* that must be given to the boiler of an Engine, in order that it may draw a known load with a fixed velocity. The equation gives the effective evaporating power per hour, from which the heating surface may be deduced by multiplying by the fractional number $\frac{10}{3}$:—	$S = \frac{V[(9M+F)D + \rho d^2 l]}{mPD}$.
4. *Maximum load* that an Engine is able to draw at a determined pressure. This load is expressed in gross tons, and includes the tender :—	$M = \frac{(P-\rho)d^2 l}{9D} - \frac{F}{9}$.
5. *Velocity* of an Engine, with its *maximum* load. This speed being expressed in feet, the speed per mile will be its $\frac{1}{5280}$ part :—	$V = \frac{mSD}{d^2 l}$.
6. *Diameter* that must be given to the *cylinder* of an Engine not yet constructed, in order that, if necessary, it may draw a certain maximum load. The diameter being expressed in feet and decimals of feet, its expression in inches will be found in multiplying by 12 :—	$d = \sqrt{\frac{D(9M+F)}{(P-\rho)l}}$.
7. *Length of stroke of the Piston* that may replace the diameter of the cylinder and produce the same effect of maximum load. This stroke will be expressed in feet, and may be transformed into inches, as above :—	$l = \frac{D(9M+F)}{(P-\rho)d^2}$.
8. *Diameter of the wheel* of an Engine, in order to render it able to draw the same maximum load :—	$D = \frac{(P-\rho)d^2 l}{9M+F}$.
9. *Effective pressure* that must be produced in the boiler of a given Engine, in order to render that Engine capable of drawing a certain maximum load. This pressure being expressed in pounds per square foot, the pressure per inch will be its $\frac{1}{144}$.	$(P - \rho) = \frac{D(9M+F)}{d^2 l}$.

We must remark that these formulæ are not such as are called *empiric* ones; that is to say, imaginary suppositions, corresponding more or less exactly with experience. They are, on the contrary, rigorous deductions from the most solid principles of mechanics; their elements have been determined by direct experiments, and their results will soon be confirmed in the same way.

In all cases, these formulæ suppose the engine drawing its load *on a dead level*. If it be required to apply them to the case of an inclined plane, it will suffice to take for M, not the nominal load of the engine, but its real load; that is to say, not merely the resistance of the wagons, but their resistance *in ascending the inclined plane in question*, as will be seen in Chap. VII. Art. II.

§ 11. *Table of the Volume of the Steam generated under different degrees of Pressure, necessary for the application of the Formulæ.*

The use of the formulæ we have obtained, necessitating a knowledge of the volume of the steam at different degrees of pressure, we subjoin here a table which we have calcuted from 5 to 5 lbs. pressure. The intermediate degrees may be easily filled up; but it would be an unnecessary operation, as we shall see that the pressure in the boiler has so little influence on the speed, that we may, in our calculations, take from the table the pressure nearest to the one we require, provided we also take the volume corresponding with that approximate pressure.

The reason of the little influence the pressure has on the result is, that in proportion as the pressure augments, the volume of the steam diminishes, so that the produce mP, that the equation contains, remains constant for such values of P as are very near to each other. We shall very shortly be witnesses of the fact, which will be explained in the calculation we shall make of the velocity of the engine at different pressure.

TABLE OF THE VOLUME OF THE STEAM GENERATED UNDER DIFFERENT PRESSURES.

Total Pressure expressed.		Corresponding temperature by Fahrenheit's thermometer.	Volume of the steam compared to the volume of the water that produced it.
In lbs. per square inch.	In atmospheres.		
lbs.		degrees.	
15	1.021	212.6	1,670
20	1.361	227.9	1,282
25	1.701	240.3	1,044
30	2.041	250.8	883
35	2.381	260.0	767
40	2.721	268.1	678
45	3.061	275.4	609
50	3.401	282.0	553
55	3.742	288.1	506
60	4.082	293.8	468
65	4.422	299.1	435
70	4.762	304.0	407
75	5.102	308.7	382
80	5.442	313.1	360
85	5.782	317.3	341
90	6.122	321.3	324
95	6.463	325.1	308
100	6.803	328.8	294

§ 12. *Of the combined Proportions that ought to be given to the parts of an Engine, in order that it may fulfil several conditions at the same time.*

We have given, above, separate from each other, the different practical formulæ of locomotion; but we may also combine those formulæ with one another. To give an example of this, and at the same time a practical application of the results obtained hitherto, we shall suppose that it is required to build an engine capable of drawing a certain given maximum load, and, at the same time, capable of attaining a certain speed, with another load also known.

In this case we may determine the diameter of the cylinder, according to the first condition; and the heating surface of the boiler according to the second. Letting, therefore, M′ be the given maximum load, M″ the second load mentioned above, and V″ the velocity of the engine corresponding with that second load, we shall have simultaneously the two following equations:—(See § 6 and 3.)

$$d = \sqrt{\frac{D\,(9\,M' + F)}{(P - \rho)\,l}}$$

and

$$S = \frac{V''\,[(9 \times M'' + F) + D\,\rho\,d^2\,l]}{(m\,P\,D)}$$

The first equation will give the diameter of the cylinder; and then, introduced in the second equation, it will fix the wanted value of S.

This case is evidently that of a railway on which it would be required that the average trains should have on a level a certain regular speed, and that, at the same time, the engines might ascend with those trains, and without any extra help, an acclivity occurring on a point of the road.

Let us then suppose that it is wanted to build an engine with coupled wheels, capable of drawing a train of 100 gross tons, at a speed of 20 miles an hour on a dead level; and that it is required, at the same time, that that engine be able to ascend without extra aid, and with the same load (reducing, however, its speed,) a plane inclined in the proportion of $\frac{1}{200}$.

We know that an engine working upon a level undergoes, from its load, a certain degree of resistance, which proceeds from the friction of the wagons; but in going up an inclined plane, the load presents not only that same friction of the wagons, but also a surplus of resistance proceeding from the tendency of the train to roll back towards the foot of the plane. The force that draws the train backwards, depends on the weight of the train and on the inclination of the plane. It is the gravity along the plane, and is equal to the mass that is to be moved, divided by the number that marks the inclination of the plane.

On an inclination of $\frac{1}{200}$, the gravity of a weight of 112 t., which is the weight of the train and engine together, is in pounds.

$$\frac{112 \times 2240}{200} = 1254 \text{ lbs.}$$

Now, 1254 lbs.. at the rate of 9 lbs. per ton (including the increase of friction in the engine,) represents the resistance of $\frac{1254}{9} = 139$ t. *on a dead level.* The surplus of resistance occasioned by the inclination of the plane is, therefore, equal to the traction of 139 t. on a level. Consequently, the *total* traction on the rising ground will be 139 t. + 100 t. = 239 t.

Thus, in this case, the load on the inclined plane will be - - - M′ = 239 t. And the load on the dead level M″ = 100 t.

The engine being supposed to weigh 12 t., with coupled wheels, will have a friction of about 180 lbs. If, besides, we suppose it to have a wheel of 5 feet, with a stroke of 16 in. or 1.33 ft.; and if we wish the effective pressure (P — ρ) in the boiler, during the ascent, not to exceed 60 lbs. per square inch, or, in other words, 8640 lbs. per *square foot*, the first equation will give, for the diameter of the cylinder—

$$d = \sqrt{\frac{5\,(9 \times 239 + 180)}{8640 \times 1.33}} = 1 \text{ foot.}$$

Thus the cylinder must have 1 ft. or 12 in. in diameter.

This value must be introduced in the second equation with the other data of the problem. Observing, moreover, that during the journey one may reduce the effective pressure in the boiler to 50 lbs. (or 65 lbs. total pressure) per square inch, which gives for the corresponding volume of the steam m = 435 (see the table given in the preceding paragraph,) the second equation will give—

$$S = 20 \times 5280\,\frac{(900 + 180)\,5 + 2117 \times 1 \times 1.33}{435 \times (65 \times 144) \times 5} = 42.65$$

By which we see that the effective evaporating power S of the engine must be 43 cubic feet of water per hour. And, as we know, by the experiments related above, that the effective power is equal to $\frac{3}{10}$ of the reduced heating surface, this surface must be $43 \times \frac{10}{9} = 143$ square feet.

Finally, this last condition will be fulfilled by giving, for instance, to the fireplace a heating surface of 50 square feet, and to the tubes a surface of 280 square feet.

This example indicates sufficiently the manner in which the calculation is to be made. It would be the same with any other combination that might occur. Evidently, nothing is required but to bring together the different equations concerning the different unknown quantities, and to express that they exist simultaneously.

ARTICLE VI.

PRACTICAL TABLES OF THE PROPORTIONS AND EFFECTS OF THE ENGINES.

§ 1. *A Practicable Table of the Diameter of the Cylinder and Pressure of Steam, necessary to enable a Locomotive Engine to draw a given Maximum Load.*

We have just calculated, in a special case, the diameter necessary for the cylinder of an engine working at a given pressure, so that it may draw a certain maximum load. In continuing the same calculation through a series of different cases, after the formula § 6, we form the following practical table, which will show either the diameter of the cylinder when the pressure is given, or the pressure in the boiler, when it is the diameter of the cylinder which is determined, or, finally, the maximum load when the two other *data* are fixed beforehand.

It must be understood that the engines will not be able to draw the loads marked in the table, unless the rails are in such a state as to offer a sufficient adhesion to the wheels; without which condition, the movement could not be effected, as will be explained in Chap. VIII.

A PRACTICAL TABLE OF THE DIAMETER OF THE CYLINDER AND PRESSURE OF STEAM CORRESPONDING TO GIVEN MAXIMUM LOADS.

DESCRIPTION OF THE ENGINE.	Max. load in gross tons tender includ.	Diameter of the Cylinder, in inches, the pressure per square inch in the Boiler being				
		50 lbs.	55 lbs.	60 lbs.	65 lbs.	70 lbs.
	tons.	in.	in.	in.	in.	in.
Engine with wheel - - 5 ft.	100	8.8	8.4	8.0	7.7	7.4
Stroke of the piston 16 in. or 1.33 ft.	125	9.7	9.2	8.8	8.5	8.2
	150	10.5	10.0	9.6	9.2	8.9
Weight - - - 8 tons.	175	11.3	10.8	10.3	9.9	9.5
or presumed friction - 120 lbs.	200	12.0	11.5	11.0	10.5	10.2
	225	12.7	12.1	11.6	11.1	10.7
	250	13.4	12.7	12.2	11.7	11.3
Engine with wheel - 5 ft.	200	12.2	11.6	11.1	10.7	10.3
Stroke of the piston, 16 in. or 1.33 ft.	225	12.9	12.3	11.8	11.3	10.9
	250	13.5	12.9	12.3	11.9	11.4
Weight, - - - 12 tons.	275	14.1	13.5	12.9	12.4	11.9
or presumed friction - 180 lbs.	300	14.7	14.0	13.4	12.9	12.4
	325	15.3	14.6	14.0	13.4	12.9
	350	15.8	15.1	14.4	13.9	13.4
Engine with wheel - - 5 ft.	200	11.5	10.9	10.5	10.0	9.7
Stroke of the piston 18 in. or 1.50 ft.	225	12.1	11.5	11.0	10.6	10.2
	250	12.7	12.1	11.6	11.1	10.7
Weight - - - 11 tons.	275	13.3	12.7	12.1	11.6	11.2
or presumed friction - 165 lbs.	300	13.8	13.2	12.6	12.1	11.7
	325	14.4	13.7	13.1	12.6	12.1
	350	14.9	14.2	13.6	13.0	12.6

§ 2. *A Practical Table of the length of Stroke of the Piston, and Diameter of Wheel, necessary to enable an Engine to draw a fixed Maximum Load at a given Pressure.*

In solving the formula § 7, in a series of cases adapted to the engines the most in use, the following table is formed, which will show, at first sight, either the length of stroke of the piston, or the diameter of the wheel which an engine ought to have, for it to draw a maximum load at a given pressure; or, again, the maximum loads corresponding to given dimensions for the length of stroke of the piston and diameter of the wheel.

A PRACTICAL TABLE OF THE LENGTH OF STROKE AND DIAMETER OF WHEEL, CORRESPONDING TO GIVEN MAXIMUM LOADS.

Description of the Engine.	Maximum load in gross tons, tender included.	Length of Stroke, in inches, the diameter of the wheel being			
		3 ft.	4 ft.	5 ft.	6 ft.
	tons.	in.	in.	in.	in.
Engine with cylinders 11 in. or 0.917 ft.	150	8.7	11.7	14.6	17.5
Weight - - - - - - - - 8 tons.	175	10.1	13.4	16.8	20.2
or presumed friction - 120 lbs.	200	11.4	15.2	19.0	22.8
Effective pressure per sq.	225	13.8	17.0	21.3	25.5
inch in the boiler - - 50 lbs.	250	14.1	18.8	23.5	28.2
Engine with cylinders 12 in. or 1 ft.	200	9.8	13.0	16.3	19.5
Weight - - - - - - - 10 tons.	225	10.9	14.5	18 1	21.8
or presumed friction - 150 lbs.	250	12.0	16.0	20.0	24.0
Effective pressure per sq.	275	13.1	17.5	21.9	26.3
inch in the boiler - - 50 lbs.	300	14.3	19.0	23.8	28.5
Engine with cylinders 13 in. or 1.083 ft.	200	8.4	11.2	14.0	16.8
Weight - - - - - - - 11 tons.	225	9.3	12.5	15.6	18.7
or presumed friction - 165 lbs.	250	10.3	13.7	17.2	20.6
Effective pressure per sq.	275	11.3	15.0	18.8	22.5
inch in the boiler - - 50 lbs.	300	12.2	16.3	20.4	24.4
	325	13.2	17.6	22.0	26.4
	350	14.1	18.8	23.6	28.3
Engine with cylinders 14 in. or 1.166 ft.	250	8.9	11.9	14.9	17.9
Weight - - - - - - - 12 tons.	275	9.8	13.0	16.3	19.5
or presumed friction - 180 lbs.	300	10.6	14.1	17.7	21.2
Effective pressure per sq.	325	11.4	15.2	19.0	22.8
inch in the boiler - - 50 lbs.	350	12.3	16.3	20.4	24.5
	375	13.1	17.4	21.8	26.2
	400	13.9	18.5	23.2	27.8

§ 3. *A Practical Table of the Area of Heating Surface capable of producing a given Velocity with given Loads.*

In order to faciliate practical researches, we shall extend, to a certain number of the most ordinary cases, the calculation of the heating surface capable of producing predetermined effects.

The table which we are thus going to form after the formula in § 3, may serve, not only to determine the heating surface capable of producing desired effects, but also the velocity of given loads, when the heating surface is already determined.

The table supposes the engine working at 50 lbs. effective pressure, per square inch, in the boiler. As, however, the pressure has no perceptible influence on the velocity, as will be seen hereafter, if the engine works at a higher pressure, it will be able to attain a more considerable maximum load; but for all the loads of the table, it will, nevertheless, require the same heating surface in order to produce the same velocity. In consequence, the table may serve for any pressure, either above or below 50 lbs. The only difference will be in the maximum loads, which, agreeable to the pressure, will be greater or smaller than those fixed in the table.

By recurring to § 10 of the preceding Article, it will be seen in what manner the area of heating-surface is to be computed.

A PRACTICAL TABLE OF THE HEATING-SURFACES CAPABLE OF PRODUCING A GIVEN VELOCITY WITH GIVEN LOADS.

DESCRIPTION OF THE ENGINE.	Load in gross tons, tender included	Area of heating-surface of the boiler, in square feet the desired velocity in miles per hour being				
		10 miles.	15 miles.	20 miles.	25 miles.	30 miles.
	tons.	sq. ft.	sq. ft.	sq. ft.	sq. ft.	sq. ft.
Engine with wheel - - - - 5 ft.	25	36	54	71	89	107
Stroke of the piston 16 in. or 1.33 ft.	50	46	68	91	113	136
Cylinders 11 inches, or - 0.917 ft.	75	55	83	110	138	165
Weight - - - - - - - 8 tons.	100	65	97	130	162	194
or presumed friction - 120 lbs.	125	75	112	149	186	223
Effective presssure per sq.	150	84	126	168	210	252
inch in the boiler - - - 50 lbs.	165	90	135	180	225	...
Engine with wheel - - - - 5 ft.	50	51	76	101	126	151
Stroke of the piston 16 in. or 1.33 ft.	75	60	90	120	150	180
Cylinders, 12 inches, or - - 1 ft.	100	70	105	140	175	210
Weight - - - - - - 10 tons.	125	80	120	159	199	239
or presumed friction - - 150 lbs.	150	90	134	179	223	268
Effective pressure per sq.	175	99	149	198	248	297
inch in the boiler - - - 50 lbs.	196	107	161	215	268	...
Engine with wheel - - - - 5 ft.	50	56	83	111	138	166
Stroke of the piston 16 in. or 1.33 ft.	75	65	98	130	163	195
Cylinders 13 inches, or - - 1.083 ft.	100	75	112	150	187	224
Weight - - - - - - - 11 tons.	125	85	127	169	211	253
or presumed friction - - 165 lbs.	150	94	141	188	235	282
Effective pressure per sq.	175	104	156	208	260	...
inch in the boiler - - - 50 lbs.	200	114	171	227	284	...
	225	124	185	247	...	...
	231	126	189	251	...	...
Engine with wheel - - - - 5 ft.	50	61	91	121	151	181
Stroke of the piston 16 in. or 1.33 ft.	75	70	106	141	176	211
Cylinders 14 inches, or - - 1.166 ft.	100	80	120	160	200	240
Weight - - - - - - - 12 tons.	125	90	135	180	224	269
or presumed friction - - 180 lbs.	150	100	149	199	249	298
Effective pressure per sq.	175	109	164	218	273	...
inch in the boiler - - - 50 lbs.	200	119	178	238	297	...
	225	129	193	257	...	...
	250	139	208	277	...	...
	269	146	219	291	...	...
Engine with wheel - - - - 5 ft.	50	62	92	123	153	184
Stroke of the piston 18 in. or 1.50 ft.	75	71	107	142	178	213
Cylinders 12 inches, or - - 1 ft.	100	81	121	162	202	242
Weight - - - - - - - 11 tons.	125	91	136	181	226	271
or presumed friction - - 165 lbs.	150	100	151	201	251	301
Effective pressure per sq.	175	110	165	220	275	...
inch in the boiler - - - 50 lbs.	200	120	180	239	299	...
	221	128	192	256	...	...

4. § *A practical Table of the Velocity of Engines with given Loads, and, vice versa, of the Load corresponding to a given Velocity.*

We have just given some examples of cases, in which it is wished to build an engine for a particalar end. The contrary case naturally presents itself afterwards. The question is, what effect may be expected from a given engine, that is to say, from an engine already constructed, and the dimensions of which can be measured.

In order to give here a practical and extensive application of the formulæ which resolve this question, we shall calculate, after the formula, § 1, a table of the velocity which engines, similar to those of Liverpool, viz. with 11 and 12 in. cylinders, will acquire with given loads. By that means, the experiments, which we are going to make on the Liverpool engines, will serve to verify, *by facts*, the accuracy of the formulæ, which we have deduced from principle.

As we think that this table, like the preceding ones, may be useful to practical men, in showing them the results, without obliging them to make the calculation, we shall extend it further to engines of different powers, such as are most in use on railways.

It will be remarked, that this table, giving the velocity corresponding to known loads, naturally furnishes also the loads of the engine, when, on the contrary, the velocity is given *a priori*. In like manner, as we have necessarily been obliged to confine ourselves, in each column, to the limit of load which the engine is capable of drawing at the pressure indicated, after the formula in § 4; so it follows that the same table gives equally the maximum loads for each pressure, as well as their corresponding velocity.

In the last column, the state of the regulator is indicated as follows: when it is entirely open, we write 1; when only half open, ½; etc. This relates to the following tables, as well as to this one:

A PRACTICAL TABLE OF THE VELOCITY OF THE ENGINES WITH GIVEN LOADS, AND OF THE LOAD CORRESPONDING TO A GIVEN VELOCITY.

Description of the engine.	Load in gross tons tender included.	Velocity on a level in miles per hour, the effective pressure per sq. in. in the boiler being			State of the regulator.
		50 lbs.	55 lbs.	60 lbs.	
	tons.	miles.	miles.	miles.	
Engine with cylinders 11 in. or 0.917 ft.	25	40.07	40.38	40.60	1
Stroke of the piston 16 in., or 1.33 ft.	50	31.34	31.58	31.76	1
Wheel - - - - - - - - 5 ft.	75	25.74	25.93	26.06	1
Friction - - - - - 110 lbs.	100	21.83	22.00	22.12	1
Area of heating surface 140 sq. ft.	125	18.96	19.10	19.21	1
Or effective evaporating	150	16.75	16.88	16.97	1
power per hour - - 42 cu. ft.	166	15.39	15.71	15.80	1
	175	...	15.12	15.21	1
	184	...	14.58	14.66	1
	202	...	...	13.67	1
Engine with cylinders 12 in., or 1 ft.	25	34.45	34.71	34.91	1
Stroke of the piston 16 in., or 1.33 ft.	50	27.80	28.01	28.16	1
Wheel - - - - - - - 5 ft.	75	23.29	23.47	23.60	1
Friction - - - - - - 152 lbs.	150	20.05	20.21	20.32	1
Area of heating surface 140 sq. ft.	125	17.60	17.73	17.83	1
Or effective evaporating	150	15.58	15.80	15.89	1
power per hour - - 42 cu. ft.	175	14.14	14.25	14.33	1
	195	13.11	13.21	13.28	1
	200	...	12.98	13.05	1
	217	...	12.23	12.30	1
	255	...	...	10.91	1
Engine with cylinders 13 in., or 1.083 ft.	50	29.03	29.25	29.42	1
Stroke of the piston 16 in., or 1.33 ft.	75	24.68	24.86	25.00	1
Friction - - - - - - 165 lbs.	100	21.46	21.62	21.74	1
Area of heating surface 160 sq. ft.	125	18.98	19.13	19.23	1
Or effective evaporating	150	17.02	17.15	17.24	1
power per hour - - 48 cu. ft.	175	15.42	15.54	15.63	1
	200	14.10	14.21	14.29	1
	225	12.99	13.09	13.16	1
	231	12.75	12.84	12.92	1
	256	...	11.92	11.99	1
	281	...	...	11.18	1
Engine with cylinders 14 in., or 1.166 ft.	50	29.83	30.06	30.22	1
Stroke of the piston 16 in., or 1.33 ft.	75	25.69	25.88	26.03	1
Friction - - - - - - - 180 lbs.	100	22.56	22.73	22.86	1
Area of heating surface 180 sq. ft.	125	20.11	20.26	20.37	1
Or effective evaporating	150	18.14	18.28	18.38	1
power per hour - - 54 cu. ft.	175	16.52	16.64	16.74	1
	200	15.17	15.28	15.37	1
	225	14.02	14.12	14.20	1
	250	13.03	13.13	13.20	1
	269	12.37	12.46	12.53	1
	298	...	11.57	11.63	1
	327	...	...	10.85	1
Engine with cylinders 12 in., or 1 ft.	50	26.16	26.36	26.51	1
Stroke of the piston 18 in., or 1.50 ft.	75	22.57	22.74	22.87	1
Friction - - - - - - 165 lbs.	100	19.85	20.00	20.11	1
Area of heating surface 160 sq. ft.	125	17.71	17.85	17.95	1
Or effective evaporating	150	15.99	16.11	16.20	1
power per hour - - 48 cu. ft.	175	14.57	14.68	14.77	1
	200	13.39	13.49	13.56	1
	221	12.53	12.63	12.70	1
	246	...	11.73	11.80	1
	270	...	...	11.05	1

We remark here, as we have said above, that the whole influence of the pressure bears upon the limit of the load, but that its effect is almost insensible on the velocity. This result agrees with the principle; for if the pressure required on the piston to move the load, be, for instance, 46 lbs. per square inch, is it not true that, provided the steam be abundantly furnished at that pressure, by the heating surface, it is of little consequence whether it be at first collected in the boiler at a pressure of 75 lbs. or 65 lbs. or at any other degree? Finally, at the moment of acting, it must any how be transformed into steam at 46 lbs. pressure, and the speed will depend solely on the quantity of steam at 46 lbs. that the boiler will have furnished. The small advantage we observe here in favor of a greater pressure is only owing to the fire being in that case naturally more intense; a circumstance from which results, not that there is more water evaparated, but the same quantity, notwithstanding a higher pressure.

These tables show the effect that may be expected from an engine of given proportions, in regard either to the speed or to the load; but it is understood that the effect can only be produced if the engine is put in a situation to apply all its power.

If, for instance, instead of the fire being sufficiently animated, it is left to languish, the quantity of water evaporated per minute will be diminished, and at the same time the effect of the engine.

If the engine, instead of being in good order, loses its steam, either by leaks in the boiler, or round the piston, or by the stuffing boxes, or elsewhere, it is clear that the effect must also be proportionately diminished.

If, by diminishing the opening of the regulator, we let only a portion of the generated steam penetrate into the cylinders, the boiler continuing at first to furnish the same quantity, more steam will necessarily be lost by the valves without acting on the pistons. Afterwards, as soon as the diminution of the steam thrown into the chimney has moderated the fire, there will be less steam generated, and that will consequently regulate the velocity. This is the case of all small loads drawn by the engines. The speed is never suffered to augment sufficiently to risk an accident by too rapid a motion of the piston or other parts of the mechanism. When the engine-men perceive that the train would run too fast, they diminish the aperture of the regulator, and make a moderate fire, in order to maintain a reasonable speed. In all the experiments we shall have occasion to relate below, we shall only once see, as we have already observed, the speed rise to 35 miles an hour, which is the greatest speed to which the engines have been hitherto submitted, excepting for a very short instant.

In the above tables, the limits of load of the engines, with the indicative pressure, are fixed by the necessity of the resistance on the piston not being greater than the force that must move it, as we have already said. With that maximum load, we see that an eleven-inch cylinder engine, working at 60 lbs. effective pressure, will still maintain a velocity of 13½ miles; and a twelve-inch cylinder engine, with an effective pressure of 55 lbs., will still maintain a speed of 12 miles an hour. These velocities are those which will take place if the engine works in its right state; that is to say, if the valve is fixed for a pressure of 60 lbs. or 55 lbs. But if it should happen that the valve be only regulated for a pressure of 50 lbs., and the pressure of 60 lbs. or 55 lbs. be produced by an extraordinary rising of the valve and by dint of losing steam, that is to say, only because the steam above 50 lbs. cannot escape as quickly as it is generated, then it is clear that although the evaporating power of the boiler remains the same, the effective part of that power will be considerably reduced, and, consequently, also the velocity. It is for that reason that, in the experiments, we shall see the speed go sometimes down to two or three miles an hour. But the state of the valve must then be observed. The elevated pressure will be seen to be produced only by an enormous loss of steam, and it will be easy, by the rising of the valve, to account for the diminution of speed.

In the cases of *maximum* load, it is evident that the steam will be spent by the cylinder, at the same pressure at which it has been generated in the boiler, and that the peed of the piston will be equal to the uickness with which the steam is generatd. This fact has been proved in a genral manner in § 5 of the present article.

It may be verified here by calculating the velocity with which the quantity of steam, generated in a minute, would cross the cylinders without any alteration or reduction of pressure. The velocity of the engine resulting from it, will be found to coincide exactly with that indicated in the table. This is a proof that, in case the engine only advances at that speed, the pressure in the cylinder is equal to that in the boiler.

Those cases of limit roads are those of which we have made use to determine the friction of the loaded engine, and we see here the principle justified, of which we then made use, viz. that in case the speed of these engines is under 12 miles an hour, the pressure in the cylinder is the same as in the boiler.

We have one observation more to make, which is, that in the engines there always exists a small loss, which we have not taken into account in our calculation; that is to say, the loss of the steam which, at each stroke of the piston, fills the passages that lead from the slides to the cylinders. It would be easy to take it into account, by the measures taken on each engine, of the diameter and length of these passages; but this loss is very insignificant, and would only complicate the calculation without any advantage.

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ARTICLE VII.

CONFIRMATION OF THE ABOVE FORMULÆ BY EXPERIMENTS.

§ 1. *Experiments on the Velocity and Load of the Engines.*

As a verification of the formulæ we have laid down, and with a view to enable our readers to rest their calculations on material facts, we shall give here a series of experiments undertaken by us, in order to ascertain the speed with which the engines draw different loads at different degrees of pressure of the steam, in their daily and regular work.

These experiments were made on the Liverpool and Manchester Railway, the section of which, according to a levelling made in the month of August 1833, by Mr. Dixon, resident engineer, is as follows. We only give the part travelled over by the locomotive engines; there are, besides, under the city of Liverpool, three tunnels worked by separate stationary steam engines.

The railway, on leaving the station at Liverpool, until it terminates at Manchester, passes over the following distances and slopes:

Miles.		
0.53	dead level.	
5.23	descent - - -	at $\frac{1}{1094}$
1.47	ascent - - -	at $\frac{1}{96}$
1.87	dead level.	
1.39	descent - - -	at $\frac{1}{89}$
2.41	descent - - -	at $\frac{1}{2702}$
6.60	descent - - -	at $\frac{1}{849}$
5.62	ascent - - -	at $\frac{1}{1300}$
4.36	ascent - - -	at $\frac{1}{4257}$
29.48	miles.	

From these different inclinations, we see that the same train presents various degrees of resistance, according to the part of the road travelled over, because the gravity of the total mass in motion becomes an alleviation in the descents, and an additional obstacle in the rising ground.

The result is, that a train of 100 t., offers on a dead level a resistance of 800 lbs.; besides the friction of the engine; and that the same train, if it is, for instance, drawn by an engine weighing 10 t., will, on arriving at an ascent of $\frac{1}{96}$, offer a resistance of 3,366 lbs., which upon a dead level would be equal to the resistance of a train of 421 t.

In fact, if we observe that a ton weighs 2,240 lbs., we shall find for the resistance:

100×8 lbs. $=$ 800 lbs.; resistance owing to the friction.

$\frac{100 \times 2{,}240 \text{ lbs.}}{96} =$ 2,333 lbs. resistance owing to the gravity of the train, on a plane inclined at $\frac{1}{96}$.

$\frac{10 \times 2{,}240 \text{ lbs.}}{96} =$ 233 lbs. similar resistance owing to the gravity of the engine.

3,366 lbs. total resistance, (not including the friction of the engine,) equal to that of a load of $\frac{3366}{8} = 421$ t. on a level.

That is the manner in which we have calculated the real load of the engine on the different slopes it had to pass over during its journey.

The following column marks the pressure in the boiler, expressed first by the state of the balance, and then by its equivalent on the mercurial gauge. Thus, when the balance, fixed at 57, rose by the blowing to 58, we have written 57—58; and as for the ATLAS, for instance, that state of the balance corresponds with an effective pressure by the mercurial gauge of 61 lbs., we have written 57—58 = 61 lb.

We have also noted the state of the regulator; but we must add, that the handle of the regulator in these engines not turning on a graduated circle, as it would be better that it should, we have only been able to estimate the degree of opening of the regulator at sight and by approximation.

The speeds have been carefully taken down, by inscribing in minutes and quarters of minute the time when the engine passed before every quarter-mile stone of the road. These stones are numbered all along the way. At the same moment we noted the pressure in the boiler as marked on the valve balance.

The weight of the wagons was taken *exactly* in tons, cwts., quarters, and pounds. The tender cartwrights were not weighed, but they are reckoned at their average weight of $5\frac{1}{2}$ t. when a fresh supply of water is taken in on the road, and 5 t. only in the contrary case.

We have marked the state of the weather, because it is a known fact that with the wind a-head, and still more with a side-wind that presses the flange of the wheels against the rails, the resistance of the train is augmented. Finally we have also mentioned the temperature of the water in the tender, in order that the reader may judge of the influence of that circumstance; and we have given the date of each of the experiments as a means of verification.

(To be Continued.)

¶I witnessed at the capitol with great pleasure on Monday last, Mr. Smith Cram's (of the city of New-York) invention for overcoming an elevation in Railroad transportation of 440 feet to the mile. It was performed with expedition by a single stroke perpendicular engine, which in point of power suffers much in comparison with a double stroke Locomotive Engine.

His plan, as exhibted, puts at rest all doubt as to the practicability of ascending and descending hills from 450 to 600 feet to the mile, with certainty and security. As to the certainty of overcoming elevation and inclination, the cog-wheels and ratchets as arranged satisfactorily show. As to the security, it is to be found in the introduction of his hydrostatic cylinder attached to the car which is designed to check the train of cars in ascending should any accident befal the engine, and to regulate their velocity in descending, or check them altogether. The accuracy of the principle in both cases is perfectly clear, and promises to be of incalculable value in the present age of improvement; and I doubt not it will be generally adopted upon the score of economy as to time and money; but above all in the preservation of human life, which his plan so effectually guarantees, in comparison with the present mode of overcoming a trifling elevation by stationary power, committing our lives to the hazard of a single rope.

FULTON.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95	tons of	1 inch	by	½ inch.	FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.
200	do	1¼	do	½ do	
40	do	1¼	do	⅜ do	
800	do	2	do	½ do	
800	do	2¼	do	½ do	
	soon expected.				

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tilison,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted. MOSES LONG.

General Agent of Col. S. H Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO,

PROSPECTUS OF VOLUME II. OF THE CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wilderness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

TERMS.—The AMERICAN will be published SEMI-WEEKLY, at $4 per annum, if paid at the time of subscribing; $5 if paid at the expiration of six months, or $6 if payment is delayed to the end of the year.

*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

*** All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by

D. K. MINOR.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.

feb 20—ytf

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

21—tf JAMES G. KING, President.

AMES' CELEBRATED SHOVELS, SPADES, &c.

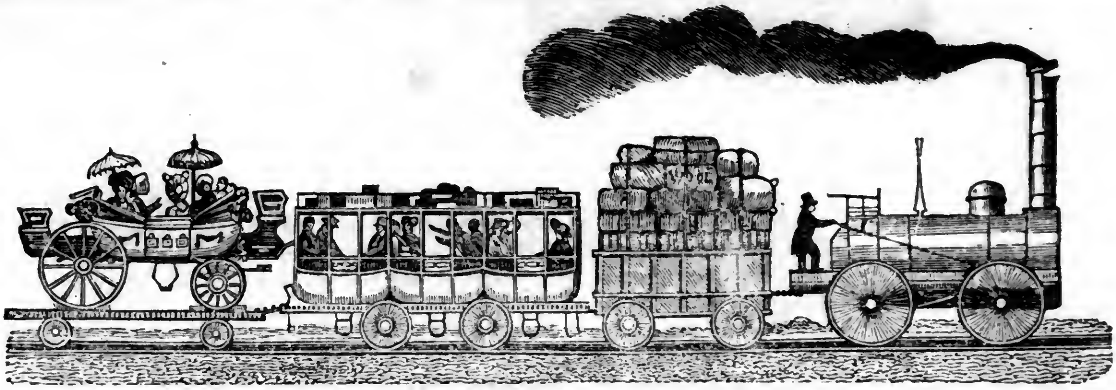
300 dozens	Ames' superior back-strap Shovels			
150	do	do	do plain	do
150	do	do	do caststeel Shovels & Spades	
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.,
No. 2 Liberty street, New-York.

BACKUS, AMES & CO,
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, JUNE 18, 1836. [VOLUME V.—No. 24.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 18, 1836.

We give in this Number, a part of the Appendix to Pambour on Locomotion; it will be concluded in the next number.

From the Mechanics' Magazine.

The following Questions, which were proposed in a late number of the Mechanics' Magazine, are, in consequence of some mistakes then made in them, again offered for consideration, with some modifications and additions.

QUESTIONS RESPECTING WATER-WHEELS, AND HEATING AND VENTILATING DWELLING HOUSES, OR OTHER BUILDINGS.

Can a stream of water be used to as much advantage, or made to do as much work, upon a horizontal wheel as upon a vertical one; and if so, what is the best construction for one, and what the cost of building it?

Can the same quantity of water that is let, in a thin sheet, upon a vertical wheel, (that is a wheel upon a horizontal shaft,) be made, in any way, to produce the same effect, when let in solid column upon a horizontal wheel, on a vertical shaft?

What have been the results of the experiments upon water wheels, made under the direction of the Franklin Institute, at Philadelphia? What kind of wheel was found best adapted to, or most effective under any given head and fall?

What is the best and most economical mode of heating dwelling-houses, schools, and lecture rooms, factories or other large buildings? By introducing heated air from a furnace—by pipes, heated by steam, carried around the sides of each room, or by similar pipes filled with boiling water?

What is the requisite size of a furnace to heat a room or a house of any given dimensions? What should be the size of the flue, for warm air, for heating the whole house; and what that of the branch flue for each particular room?

What is the best construction for the furnace-pipes, &c. upon the hot air, steam, or hot water plan; and what quantity of fuel (wood or coal) will be consumed per hour, if the fire be kept up, day and night, upon each plan, and what the cost?

What are the requisite dimensions of the furnace, boiler, pipes, &c. to be properly proportioned to the size of the whole building and to each room; and what the whole cost?

Are pipes of hot water, which are used to such advantage in England, sufficient for the purpose in a country where the winters are so intensely cold as ours sometimes are?

D*** F*****.

The following communication is in reply to some queries published in a late number, and now re-published in consequence of several errors in the first publication. The information it furnishes appears to be the result of the observations of a practical man.

We may here remark that some successful observations on heating by steam, are contained in a work, lately received by us, and from which we shall extract much interesting matter on this and other subjects, as soon as we can dispose of the matter already on our hands.

NEW MODES OF HEATING BUILDINGS.

MR. MINOR:—In No. 38, p. 98, of the Magazine, your correspondent D*** F***** inquires what is the best and most economical mode of heating large buildings. As no one more able has replied to this inquiry, in the succeeding numbers, I venture to trouble you with a few casual observations made by me during a few years residence in London; and to request the publication of them, in case you think them likely to be of sufficient use to warrant their appearance in your valuable work.

All the methods I have seen may be divided into two classes,—those in which water intervenes between the fire and the atmosphere,—and those in which the fire is uncovered, or separated from the atmosphere merely by plates of iron. To the second of these there is a well known objection, that the quality of the air is injured by contact with heated iron, in so great a degree as to cause headache and unpleasant sensations in the eyes and even in the skin generally. By some this is said to be owing to a change in the electric state of the air; by others, to the absorption of oxygen by the heated metal:—the remedy they both propose is, to evaporate water; but it has not been shown to my satisfaction, that this entirely removes the evil, or that it does not introduce a dampness that is not always desirable. Besides, this principal objection, there are frequently gases, dust, smoke, and unpleasant odors, arising from stoves and open fires, and particularly from those complicated and expensive rattle-traps, called air-furnaces. From my own observation, and from the verbal reports of many who have used them, and from all that I have read on the subject, it appears that the first class of contrivances are not liable to injure the air, as the others do, by giving it the power of causing headache,

&c by surcharging it with vapor, or dust, gases, or any thing else objectionable;—except that in the case of heating by steam, I have read a statement that it sometimes causes an unpleasant odor; owing, probably to the particular metal of which the pipes are made; for the complaint is not applied generally to this method.

So much for the *quality* of the heat obtained by these different methods:—I will now state what little I know of its cost. An obvious advantage of furnaces, stoves, etc., is, that if they are well constructed, you may burn in them almost any kind or quality of fuel, and thereby save the difference between the cheapest and dearest, (supposing, of course, that they are not in your parlors, or exposed to view.) Another advantage is, that you may dispense with the incumbrance of chimnies, and a great deal of expensive ornamental work, amounting, I am told, to a thousand dollars in many houses. But as to the comparative cheapness in respect to fuel of "hot air," "steam," and "hot water," I can only mention a fact reported in the London Journal of Arts and Sciences: that in one case, where hot water was introduced into a house that had previously been heated by hot air, the saving of fuel was one third; but this was not considered a fair test, as the air-furnace had not been well constructed.

At this moment, while I am writing, I have a smoke coming from an air-furnace flue in the corner of my room; by which I am prompted to censure the quackery of the unscientific persons who make these things in such a way that they get filled with dirt, and do not give you a chance to clean them, or remove the oxidised pipe, without pulling down a great quantity of brick-work. The one I have, though economical in respect to fuel, is a nuisance in all other respects, and was still worse before I made a better arrangement of the smoke-pipe, which the stupid constructor had run, after an ascent of two and a half feet, horizontally, for eighteen feet, to its insertion into the kitchen chimney, the large fire-place of which was open immediately under it. Though I consider it for the general good, and therefore for every man's particular interest, to be rather gentle in censuring the well intended blunders of half-ingenious, and wholly unlearned men, yet the number of these nuisances, so expensive at first, and so liable to get out of order, and so difficult to repair, is so rapidly increasing, that I feel bound to give my feeble evidence against all that I have ever seen of them. The fundamental principle on which they are made, is good; but in their construction all simplicity is eschewed, as if complication and multitude of parts were a proof of genius, and not strong presumptive evidence of the want of it. The only arrangement on this principle that I remember to have seen, that is free from the objections just enumerated, was a simple stove, (Dr. Nott's, I believe,) placed in a fire-proof closet about four feet square, with a door of sufficient size to admit a person, in the top of which were perforations, through which the heated air passed to the rooms above.

As to the original cost of hot water and steam apparatus, and the quantity of heating surface necessary in each, I am not able to say much. It is stated in the "Encyclopedia Americana" that one square foot of steam-pipe has been found sufficient to heat two hundred cubic feet of air; but this may have been for the English climate. In Perkins' hot water, called the "high pressure" apparatus, rolled iron pipes are used, hermetically sealed, so that the water is confined and heated to 350° or higher,—consequently much less pipe is required than in those where they are kept at 212°, or a very little over. In London these iron pipes are frequently used for gas, instead of lead, which answers the purpose quite well; so I presume their cost cannot much exceed that of lead pipe. One great advantage of this "high pressure" method is, that all your boiling may be done without the cost and dirt of an extra fire, and in wooden or any other vessels, simply by projecting the pipe from the wall a foot or so, bending it downwards, and making a coil, and returning it upwards and back to the wall. The high temperature of the water circulating within the pipe, will casue that in any vessel placed under it to boil rapidly. It is hardly necessary to state that the pipe, after running and coiling in the partitions of the rooms to be heated, returns into itself somewhat below the level of the fire; so that the water which has given off part of its heat, being denser than that which has but just passed through the fire, gravitates with greater power, and forces up the other, and thus keeps up a constant circulation. Your correspondent will find these various methods detailed at length, in those volumes of the London Mechanics' Magazine, and the London Journal of Arts and Sciences, published since 1827, which volumes he may get from Francis' Library, under Peale's Museum.

It may be well to mention that Mr. Perkins is an American, and perhaps has a patent right in this country. There are other modifications of the hot water principle invented by Englishmen, and therefore not patented here, and which the laws of honor will allow us to use freely, so long as the legal enactments restricting commerce in the products of genius and industry in the two countries are allowed to remain in force.

Your obt. servt.,

J. K. F.

New-York, June 4, 1836.

NOTE.—I had almost forgotten the ques- whether the heat from water pipes is sufficient for the coldest weather in our winters? There will be no difficulty on that score if your pipe is long enough, and your fire hot enough. I have been told that Mr. Perkins says he can heat a whole parish from one fire.

From the Mechanics' Magazine.

STEAM, *versus* WATER.

Few persons even in this age of inquiry and improvement seem to be aware of the vast superiority of steam over every other form of motive power. Many are still, by this assertion, reminded of the anecdote of the famous Brindley. In giving evidence before a Committee of the House of Commons on the subject of Canals, he spoke of their superiority as a mode of communication in such decided terms, that a member asked for what he thought rivers were intended? he unhesitatingly replied, "*to feed canals.*" Now, though we say that the manufacturer will one day "feed his boiler from the falls," we think that the assertion is not a bold one, and that it does admit of proof.

Some time ago, our attention was directed to a comparison of the expense of the two forms of power in the village of Lowell, possessed of the best water power in the Union. The expense of Steam to Water was said to be as 100 to 125.

We have since often had this subject in mind, in reference to the more improved use of steam, and particularly to the economy of the rotary engine of Avery.

Pursuing the comparison, we have collected some of the more prominent disadvantages of the usual hydraulic system, and the corresponding advantage of steam power.

The first item of cost is that of the water right, over and above the value of the ground as increased by any other advantages of locality. This expense is in no case trifling, and sometimes is positively enormous. There is of course no corresponding item of expenditure in the use of steam, an engine working as well on the top of a hill as in the bottom of a valley.

2d. The outlay upon wheels, dams, and other hydraulic works. This is often much greater than would be necessary for the average pressure, provided it were constant—that is, we are to erect works to support much more water than we have supplied through three quarters of the year. Freshets, &c. are to be provided against, at an increased cost. It is well known that in some locations the provision for such contingencies is no small portion of the whole capital employed.

It is this expense, other things being equal, that is to be compared with the cost of an engine, and the comparison is favorable to the latter.

3d. After every precaution, damages from floods are of constant occurrence, and their repair is exceedingly costly.

4th. The delay caused by freshets, &c., producing a stoppage from the too great supply of power.

5th. The delay in seasons of drought, when the supply is insufficient.

These last are most vexatious occurrences, preventing work often times when most is to be done, and the uncertainty arising from the possibility of such delays and accidents, is a constant care to the manager of such an establishment, whereas to the consumer of steam, the perfect certainty of the amount and regularity of the supply of power is a great auxiliary in conducting business.

For a steam engine, the only use of water is a sufficiency for the boiler; and in these days of economy of heat and steam, a very small quantity of fuel is used, and but little water. We have seen a rotary engine, estimated at 15 horse power, evaporating but 40 gallons per hour.

6th. Delay in winter, and in our uncertain climate this may sometimes be considerable, and in an establishment of great extent perhaps fatal.

To balance all these expenses, peculiar to the use of hydraulic power, there is, as far as we can recollect, but one peculiar to that of steam, namely, *fuel*. Now in saw mills this expense is nothing, and in all instances much less than formerly.

Our persevering countryman, Dr. Nott, has already succeeded in greatly reducing this item of cost—and he does not yet appear to be satisfied.

As regards fuel, Avery's Engine has immense advantages over others, inasmuch as the quantity of water used is less than in any other case. The elasticity of the steam operates more advantageously than in any other construction, the small quantity of water used being a proof of this.

In the engine above referred to, the cost for coal was rather less than $1 for ten hours.

It is almost needless to observe that, in many large establishments, manufactories, &c., the application of a portion of the steam to heating, &c., nearly, if not quite, compensates the cost of fuel. The certainty and uniformity of this method of drying goods, have fully established its superiority. Indeed, in the art of dyeing, certain colors owe their brilliancy to the rapid and high heat of steam, and they could be produced in no other way. While speaking of this use of steam, we must notice an engine erected in the Astor Hotel. This is a small engine of 5 horse power; its use is to pump water from the different cisterns to all parts of the house—supply the baths with hot and cold water—clean knives—brush shoes—roast and grind coffee; and the steam cooks the various dishes in the kitchen, and also dries the clothes, which by this method of proceeding are ready for use with unprecedented despatch.

To these and numberless other uses is this engine turned, saving an immense number of servants, a great quantity of fuel, and a vast deal of time.

(The exhaust steam pipe of this engine is over 300 feet long.)

One of the greatest advantages of steam power, in many cases, is, that it admits of change of locality, without injury to the machinery, and often with benefit to the employer.

In this respect again Avery's Engine stands pre-eminent. The machinery is beautifully compact, and consequently portable. An engine of 15 horse power is hardly a load for a horse, the whole weighing less than 600 pounds.

Let us suppose, that a man purchases a piece of timber land, of prime quality, but unfortunately (as is thought) away from any water course.

Let him procure an Avery's Engine; and this, connected with his saw mill, can be placed upon wheels and moved, by the engine itself, if he pleases, to any part of his land. (Mills capable of such an arrangement, and very compact, are now easily to to be procured.)

Let him locate his mill near a spring, and commence operations. The waste and rubbish, that in most cases is a drug, is entirely consumed by the engine; the ground is cleared, and nothing is to be removed but the perfectly formed timber.

Among other useful applications of such an engine, in the forest itself, no one can be equal in beauty of operation to the valuable *stave machine* of Philip Cornell, N. Y. (A drawing and description of this machine will be found upon the next page.) This machine promises to be of great service. With such an arrangement as that of the saw mill above mentioned, nearly if not quite double the usual number of staves can be cut from the timber before transportation, and these are already dressed and ready for use, either for liquids or solids.

These are only a few of the very many useful applications of this sort of traveling machines. Others will suggest themselves to our readers.

It must be very evident that, whatever brings into use property of little or no value, enabling the produce of such land to compete successfully with that of much better, must add to the wealth of the landholder, or timber merchant, a sum equal to the cost of the best land.

Thus a greater uniformity of value would result, and of consequence a more equal competency to those on or away from great water courses and canals.

Our object is to draw attention to this question, and we should be much gratified if any of our friends would furnish us with such information on the subject as they may have at their command.

This information from various quarters, when collected, might furnish results equally useful and interesting—and we shall feel most happy in becoming the medium of their communication to the public.

AGRICULTURE, &c.

From the Genesee Farmer.

Brief hints for spring work.—Apply manure to corn and potato crops, and not to grain crops.

Let manure be buried as soon as possible after spreading.

When rotted or fermented manure is applied, let it be as thoroughly mixed with the soil as possible.

Wheat thrown out of the ground by frost, should be pressed in again by passing a roller over it.

Ploughing heavy soils when wet, does more injury than if the team were standing idle.

In ploughing green sward deeply, the furrows must always be at least one half wider than deep, else the sods will not turn well.

New meadows should now be rolled.

All grain fields seeded to grass should be rolled.

Barley should be sown as early as possible, upon a light and moderately moist soil, at the rate of one and a half to two bushels per acre, according to the size of the seed.

A roller should be passed over it as soon as it is harrowed, to press the soil arouud it, and smooth the field.

Barley seed may be freed from intermixed oats by pouring water upon it, when the oats will float, and be skimmed off.

Oats require strong rich soil, good culture, and early sowing.

Preserved leached and unleached ashes which have accumulated during the winter, to be applied to corn in the hill.

To prevent corn being touched by crows, stir the seed with a sufficient quantity of heated tar, and then roll it in plaster, lime or ashes.

Plaster is always most efficacious on light and thin soil—on meadow and clover ground, the earlier it is sown the better.

Plaster when applied to cultivated ground, is best when worked into the soil.

Sowing it broadcast upon Indian corn after it is up, has increased the crop 25 per cent.

Every farmer should attempt the field culture of root crops—he may raise as much cattle food from one acre, as from five acres of meadow.

Farmers who have heavy rich soil, will succeed best with mangel wurtzel—those who have sandy soil, with ruta baga. They should try both.

Sow garden crops in drills where practicable, in order that the weeds may be cleared with a hoe.

Different varieties of melons and squashes should be planted at the greatest possible distance, in order to prevent intermixing and crossing.

Loosen the soil with a spade round fruit trees growing in grass land.

Examine the roots of peach trees and remove all the grubs. Their presence is shown by the gum oozing out.

The last Albany Cultivator says—"Mr. Asa Carter, of Champion, Jefferson Co., has shown us a specimen of silk manufactured by his daughter, who never saw a silk worm, nor a silk reel, till last summer. This is a pretty good evidence that there is no great art or mystery in managing silk worms."

One pound of potash dissolved in two quarts of water and applied to trees, will effectually destroy the bark louse, &c.

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the Engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour.	Effective pressure in the boiler in pounds per square inch, by the state of the Spring-balance.	State of the Regulator.	Remarks.
1834.		tons.	miles.	lbs.		
July 14, ATLAS, from Liverpool to Manchester,	level - - - - -	124	17.14	57...58 = 61	$\frac{3}{4}$	The engine was helped on the inclined plane at $\frac{1}{96}$ by three engines with cylinders of 11 in. diameter.—Weather fair and calm.—Water cold in the tender.
in 1 h. 31′, - - with 25 wagons - - - 118.90 t.	descent $\frac{1}{1091}$	90	21.17	57...... = 60	$\frac{3}{4}$	
delays 19′ - - tender - - - - - 5.50	descent $\frac{1}{849}$	80	23.72	57...60 = 63	$\frac{3}{4}$	
	ascent $\frac{1}{1300}$	154	18.75	57...59.5 = 62.5	$\frac{3}{4}$	
1 h. 50′ 124.40 t.	ascent $\frac{1}{4257}$	133	17.89	57...58 = 61	$\frac{3}{4}$	
ATLAS: cylinder - - - 12 in.; stroke - - - - 16 in.; wheel - - - - 5 ft. (6 wheels, 4 coupled); weight . - - - 11.40 t.; friction - - - 152 lbs.; heating surface (fire-box 57.06 sq. ft.; tubes 217.88 sq. ft.)						
July 16, ATLAS, from Liverpool to Manchester,	level - - - - -	105	15.00	50...52 = 54	$\frac{3}{4}$	The engine was helped on the inclined plane at $\frac{1}{96}$ by two engines with 11 in. cylinders.—Weather fair and calm.—Water rather lukewarm in the tender.
in 1 h. 25′, - - - with 20 wagons - - - 99.25 t.	descent $\frac{1}{1094}$	75	21.43	50...51 = 54	$\frac{3}{4}$	
delays 5′, tender - - - - - 5.50	descent $\frac{1}{849}$	67	25.07	50...52 = 55	$\frac{3}{4}$	
	ascent $\frac{1}{1300}$	129	22.64	50...51.25 = 54.25	1	
1 h. 30′ 104.75 t.	ascent $\frac{1}{4257}$	112	19.63	50...... = 53	$\frac{3}{4}$	
July 17, ATLAS, from Liverpool to Manchester,	level - - - - -	71	20.00	50...... = 53	$\frac{1}{2}$	The engine was helped on the inclined plane at $\frac{1}{96}$ by one engine with 11 in. cylinders.—The axle-box of one of the wagons too tight.—Weather fair and calm.—Water very hot in the tender.
in 1 h. 27′, - - - with 15 wagons - - - 65.4 t.	descent $\frac{1}{1094}$	50	24.54	50...51 = 54	$\frac{1}{2}$	
delays 3′, tender - - - - - 5.5	descent $\frac{1}{849}$	44	26.13	50...... = 53	$\frac{1}{2}$	
	ascent $\frac{1}{1800}$	89	21.51	50...52 = 55	$\frac{1}{2}$	
1 h. 30′ 70.9 t.	ascent $\frac{1}{4257}$	76	20.81	50...... = 53	$\frac{1}{2}$	

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the Engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour.	Effective pressure in the boiler in pounds per square inch, by the state of the Spring-balance.	State of the Regulator.	Remarks.
1834.		tons.	miles.	lbs.		
July 17, ATLAS, from Manchester to Liverpool,						The engine ascended, without help, the inclined plane at $\frac{1}{89}$. On the remainder of the way, the engine drew two wagons more.—Weather fair and calm.—Water very hot in the tender.
in 1 h. 26′ - - - with 8 empty wagons	descent $\frac{1}{4257}$	26	26.47	50...51 = 54	$\frac{1}{3}$	
and 3 loaded - - - - 22.45 t.	descent $\frac{1}{1300}$	22	31.43	50...50.5 = 53.5	$\frac{1}{3}$	
delays 3′ tender - - - - - 5	ascent $\frac{1}{849}$	36	27.93	50...52 = 55	$\frac{1}{3}$	
	ascent $\frac{1}{89}$	114	14.00	50...53 = 56	1	
1 h. 29′ 27.45 t.						
July 23, ATLAS, from Liverpool, to Manchester	level - - - - -	196	9 23	50...50.5 = 53.5	1	The engine was helped on the inclined plane at $\frac{1}{96}$ by four engines, three with 11 in. cylinders, and one with 14 in. cylinders.—Weather fair and calm.—Water cold in the tender.
in 3 h. 2′ - - - with 40 wagons - - 190 t.	descent $\frac{1}{1094}$	142	14.12	50......... = 53	1	
delays 15′ tender - - - - 5.5	descent $\frac{1}{849}$	127	16.21	50......... = 53	1	
	ascent $\frac{1}{1300}$	240	8.00	50...51.75 = 55	1	
3 h. 17′ 195.5 t.	ascent $\frac{1}{4257}$	209	5.87	50...51.5 = 54.5	1	
July 23, ATLAS, from Manchester to Liverpool,						
with 8 wagons - - - - - - 33.90 t.	ascent - $\frac{1}{89}$	199	6.00	50...52 = 55	1	Weather calm.
tender - - - - - - - - - - - 5.50						
39.40 t.						
July 31, ATLAS, from Liverpool to Manchester,	level - - - - -	67	20.00	30......... = 33.5	1	The engine ascended the inclined plane at $\frac{1}{96}$ with its train in two trips Weather fair and calm —In this experiment, the pressure was purposely varied. On the total delay, 26′ were employed in making an experiment.
in 1 h. 44′ - - - with 14 wagons - - - 61.65 t.	descent $\frac{1}{1091}$	59	21.82	30......... = 33.5	1	
delays 52′ tender - - - - - 5	descent $\frac{1}{849}$	53	23.26	30...30.33 = 34	1	
	ascent $\frac{1}{1300}$	96	19.75	25...27.75 = 31	1	
2 h. 36′ 66.65 t.	ascent $\frac{1}{4257}$	84	14.16	20...21.5 = 25.5	1	

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the Engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour.	Effective pressure in the boiler in pounds per square inch, by the state of the Spring-balance.		Remarks.
1834.		tons.	miles.	lbs.		
July 31, ATLAS, from Manchester to Liverpool,	level - - - - -	40	16.38	20...23 = 27.25	1	The engine ascended the inclined plane at $\frac{1}{89}$ without help.—Weather calm.
in 1 h. 54′ - - - with 8 wagons loaded	descent $\frac{1}{4257}$	37	19.53	20...20.5 = 25	1	In this experiment, as in the former one, the pressure was lowered on purpose.
and 4 empty - - - - 35.15 t.	descent $\frac{1}{1300}$	29	23.00	20...20.75 = 25.25	1	
delay ... tender - - - - - 5	ascent $\frac{1}{849}$	57	16.08	20...20.75 = 25.25	1	
	ascent $\frac{1}{89}$	202	7.50	45...47.5 = 51	1	
1 h. 54′ 40.15 t.	ascent $\frac{1}{1094}$	53	15.79	20...20.25 = 24.75	1	
Aug. 4, ATLAS, from Liverpool to Manchester,	level - - - - -	128	15.00	50...... = 53	1	The engine was helped on the inclined plane at $\frac{1}{96}$ by two engines, one with 11 in. cylinders, and the other with 14 in. cylinders.—Weather fair and calm.—Water cold in the tender.
in 1 h. 58′ - - - with 25 wagons - - 122.64 t.	descent $\frac{1}{1094}$	92	17.14	50...... = 53	1	We have seen in the experiments on the friction of the engines, that that day, ATLAS had a friction of 194 lbs. instead of 152 lbs.
delay ... tender - - - - 5	descent $\frac{1}{849}$	82	20.52	50...... = 53	1	
	ascent $\frac{1}{1300}$	158	15.38	50...50.5 = 535	1	
1 h. 58′ 127.64 t.	ascent $\frac{1}{4257}$	137	15.24	50...... = 53	1	
Aug. 4, ATLAS, from Manchester to Liverpool, with 9 loaded wagons						
and 7 empty - - - - - 38.76 t.	ascent $\frac{1}{89}$	219	3.75	57...58.75 = 61.75	1	Weather fair and calm.
tender - - - - 5.50						
44.26 t.						
July 24, FURY, from Liverpool to Manchester,	level - - - - -	56	17.14	31...32 = 55	$\frac{3}{4}$	The engine ascended the inclined plane without help.—Weather fair and calm.—Water cold in the tender
in 1 h. 30′ - - - with 10 wagons - - - 51.16 t.	descent $\frac{1}{1094}$	40	18.00	31...32 = 55	$\frac{3}{4}$	
delay ... tender - - - - 5	ascent $\frac{1}{96}$	244	6.31	32...35 = 65.5	1	
	descent $\frac{1}{849}$	35	23.28	31...32 = 55	$\frac{3}{4}$	
1 h. 30′ 56.16 t.	ascent $\frac{1}{1300}$	70	21.82	31...32.5 = 55.5	$\frac{3}{4}$	
	ascent $\frac{1}{4257}$	60	21.17	31...32 = 55	$\frac{3}{4}$	

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the Engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour.	Effective pressure in the boiler in pounds per square inch, by the state of the Spring-balance.	State of the Regulator.	Remarks.
1834.		tons.	miles.	lbs.		
FURY: cylinders - - - 11 in.; stroke - - - - - 16 in.; wheel - - - - - 5 ft.; weight - - - - 8.20 t.; friction - - - - 109 lbs.; heating surface { fire-box 32.87 sq. ft.; tubes 307.38 sq. ft. }						
July 24, FURY, from Manchester to Liverpool,	level - - - - -	49	17.50	31...32 = 55	$\frac{3}{4}$	The engine ascended the inclined plane without help.—Weather fair, a sidewind blowing tolerably hard at intervals.—Water cold in the tender
in 1 h. 35′ - - - with 10 wagons - - - 43.80 t.	descent $\frac{1}{4257}$	45	21.43	31...32 = 55	$\frac{3}{4}$	
delay ... tender - - - - 5	descent $\frac{1}{1300}$	36	22.00	31...32 = 55	$\frac{3}{4}$	
	ascent $\frac{1}{849}$	68	18.62	31...32 = 55	$\frac{3}{4}$	
1 h. 35′ 48.80 t.	ascent $\frac{1}{89}$	228	15.00	32...36 = 67	1	
	ascent $\frac{1}{1094}$	63	18.46	31...32 = 55	$\frac{3}{4}$	
Aug. 4, FURY, from Manchester to Liverpool,	level - - - - -	38	25.00	28...30 = 52.5	1	The engine went up the inclined plane without help.—Weather fair and calm.
in 1 h. 15′ - - with 8 1st class coaches 32.97 t.	descent $\frac{1}{4257}$	35	25.71	28...31 = 54	1	
delays 9′ tender - - - - 5	descent $\frac{1}{1300}$	28	26.94	28...30.25 = 53	1	
	ascent $\frac{1}{849}$	53	24.61	28...30 = 52.5	1	
1 h. 24′ 37.97 t.	ascent $\frac{1}{89}$	183	13.33	28...33 = 55	1	
	ascent $\frac{1}{1094}$	50	24.82	28...30 = 52.5	1	
Aug. 15, FURY, from Manchester to Liverpool,	level - - - - -	138	10.91	31...32.5 = 55.5	1	The engine only travelled that part of the road with this train. Its fire was in its greatest activity only towards the end of the journey. It had, besides, the impulse proceeding from the descent of the plane at $\frac{1}{96}$.—Weather fair.—Rails muddy.
with 28 wagons - - - 132.73 t.	ascent $\frac{1}{1094}$	176	13.33	31...32.5 = 55.5	1	
tender - - - - - 5.50						
138.23 t.						

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the Engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour	Effective pressure in the boiler in pounds per square inch, by the state of the Spring-balance.	State of the Regulator	Remarks.
1834.		tons.	miles.	lbs.		
July 26, FIREFLY, from Liverpool to Manchester, in 1 h. 35′ - with 8 1st class coaches 36.40 t. delays 5′ tender - - - - 5 1 h. 40′ 41.40 t.	level - - - descent $\frac{1}{849}$ ascent $\frac{1}{1300}$ ascent $\frac{1}{4257}$	41 25 52 45	24.00 25.45 21.29 21.33	17... ... = 50 15... ... = 45 15... ... = 45 11... ... = 35	1 1 1 1	The engine was in bad order, and was going to be repaired. It was helped on the inclined plane at $\frac{1}{96}$ by another engine with 11 in. cylinders. Weather fair.—Water almost cold in the tender.
FIREFLY { cylinders - - - 11 in. stroke - - - - 18 in. wheel - - - - - 5 ft. weight - - - - 8.74 t. friction - - - - 119 lbs. heating surface { fire-box 43.91 sq. ft. tubes 362.60 sq. ft.						
July 26, FIREFLY, from Manchester to Liverpool, in 1 h. 18′...with 8 1st class coaches 36.40 t. delay 5′ tender - - - - 5 1 h. 23′ 41.40 t.	level - - - descent $\frac{1}{4257}$ descent $\frac{1}{1300}$ ascent $\frac{1}{849}$ ascent $\frac{1}{1094}$	41 38 31 58 54	25.71 23.68 24.44 23.44 24.82	17...18 = 50.33 15.. ... = 45 17...18 = 50.33 17...18.5 = 50.5 17.. ... = 50	½ ½ ½ ½ ½	The engine was in bad order. It was helped on the inclined plane at $\frac{1}{89}$ by an engine with 11 in. cylinders.—Weather rainy; wind tolerably strong against the direction of the engine.
Aug. 1, VESTA, from Liverpool to Manchester, in 1 h. 22′ - - - with 10 wagons - - - 43.72 t. delays 30′ tender - - - - 5 1 h. 52′ 48.72 t.	level - - - descent $\frac{1}{1094}$ descent $\frac{1}{849}$ ascent $\frac{1}{1300}$ ascent $\frac{1}{4257}$	49 34 30 61 52	24.00 29.09 27.00 23.56 25.71	20...21.5 = 52 20...21 = 50 20...21 = 50 20...21.5 = 52 20...21 = 50	1 1 1 1 1	The engine ascended, without help, the inclined plane, at $\frac{1}{96}$, until about 60 yds. from the top. It was hauled up the remainder of the ascent.—Weather calm.—Water warm in the tender.

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour.	Effective pressure in the boiler in pounds per square inch, by the state of the Spring-balance.	State of the Regulator.	Remarks.
1834. VESTA { cylinders - - - 11⅛ in. stroke - - - - - 16 in. wheel - - - - - 5 ft. weight - - - - 8.71 t. friction - - - - 187 lbs. heating surface { fire-box 46.00 sq. ft. tubes 256.08 sq. ft.		tons.	miles.	lbs.		The delay of 30 minutes on the road was occasioned by an experiment made on the engine.
Aug. 1, VESTA, from Manchester to Liverpool, in 1 h. 5½′ - - with 5 loaded wagons and 5 empty - - - - 28.1g t. delay ... tender - - - - 5 1 h. 5½ 33.15 t.	level - - - descent $\frac{1}{4257}$ descent $\frac{1}{1300}$ ascent $\frac{1}{849}$ ascent $\frac{1}{89}$ ascent $\frac{1}{1094}$	33 30 24 47 165 44	29.00 30.00 34.74 28.93 14.11 28.80	20...21 = 50 20...21 = 50 20...21 = 50 20...21 = 50 20...22.5 = 55 20...21 = 50	1 1 1 1 1 1	The engine ascended the inclined plane at $\frac{1}{96}$ without help.—Weather fair. Wind moderate, in favour of the motion.—Water very hot in the tender.
Aug. 16, VESTA, from Manchester to Liverpool, in 1 h. 42′ with 20 wagons - - - 88.35 t. delays 1 h. 10′ tender - - - 5.50 2 h. 52′ 93.85 t.	level - - - descent $\frac{1}{4257}$ descent $\frac{1}{1300}$ ascent $\frac{1}{849}$ ascent $\frac{1}{1094}$	94 87 71 129 121	15.00 18.46 24.00 12.10 18.75	20...21.5 = 52 20...22 = 53.25 20...22 = 53.25 20...22.5 = 55 20...21.5 = 52	1 1 1 1 1	The engine drew a part of its train on the inclined plane at $\frac{1}{89}$. The remainder was drawn by an additional engine.—Weather fair and calm.—Water lukewarm in the tender. The delays that occurred in th journey were occasioned by several trials made with the engine.
Aug. 16, VESTA, from Manchester to Liverpool, with 8 wagons - - - 31.75 t. tender - - - 5.50 37.45 t.	ascent $\frac{1}{89}$	183	3.25	20...23.5 = 58	1	Weather calm.—Water lukewar in the tender.—These eight wagons were part of the train of the former experiment.

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour.	Effective pressure in the boiler in pounds per square inch, by the state of the Spring-balance.	State of the Regulator.	Remarks.
1834.		tons.	miles.	lbs.		
Aug. 16, Vesta, from Manchester to Liverpool, with 8 loaded wagons and 4 empty - - - - 34.05 t. tender - - - - 5.00 ——— 39.05 t.	ascent $\frac{1}{89}$	189	3.00	20...23 = 56.5	1	Weather fair and calm.
Aug. 15, Leeds, from Liverpool to Manchester, in 1 h. 35′ - - with 20 wagons - - - 83.34 t.	level - - -	88	18.26	31...32.75 = 54 75	$\frac{3}{4}$	The engine was helped for the passage of the inclined plane at $\frac{1}{96}$ by an engine with 14 in. cylinders.—Weather calm.—Water rather less than lukewarm in the tender. The regulator was not quite opened, because the engine is subject to prime, that is to say, to drive the water of the boiler into the cylinder with the steam.
delay ... tender - - - 5	descent $\frac{1}{1094}$	64	20.72	31...32 = 54	$\frac{3}{4}$	
——— ———	descent $\frac{1}{849}$	57	24.00	31...32 = 54	$\frac{3}{4}$	
1 h. 55′ 88.34 t.	ascent $\frac{1}{1300}$	109	20.34	31...32 = 54	$\frac{3}{4}$	
	ascent $\frac{1}{4257}$	95	18.82	31...32 = 54	$\frac{3}{4}$	
Leeds: cylinder - - - 11 in. stroke - - - - 16 in. wheel - - - - 5 ft. weight - - - - 7.07 t. friction - - 108 lbs. heating surface: fire-box 34.57 sq. ft.; tubes 307.38 sq. ft.						
Aug. 15, Leeds, from Manchester to Liverpool, in 1 h. 17½′	descent $\frac{1}{4257}$	37	24.54	28...30 = 51.5	$\frac{3}{4}$	The engine ascended, without help, the inclined plane at $\frac{1}{89}$. Weather fair and calm.—Water very hot in the tender.
delay 3′ — 1st half of the way: 8 wagons 34.38 t.	descent $\frac{1}{1300}$	30	30.00	25.. 27 = 46.5	$\frac{3}{4}$	
tender - - 5.50	ascent $\frac{1}{849}$	55	25.31	25...27 = 46.5	$\frac{3}{4}$	
——— 1 h. 20½′ ——— 39.88 t.						
2d half of the way: 7 wagons 29.65 t.	level - - -	35	22.50	25...27 = 46.5	$\frac{3}{4}$	
tender - - 5.50	ascent $\frac{1}{89}$	168	10.00	28...29 = 48.5	$\frac{1}{2}$	
———	ascent $\frac{1}{1094}$	46	25.71	28...32 = 54	$\frac{3}{4}$	
35.15 t.						

EXPERIMENTS ON THE VELOCITY AND LOAD OF THE ENGINES.

Date of the Experiment and Designation of the Engine and its load.	Inclination of the road.	Load of the engine reduced to a level.	Velocity in miles per hour.	Effective pressure in the boiler, in pounds per square inch, by the state of the Spring-balance.	State of the Regulator.	Remarks.
1834.		tons.	miles.	lbs.		
Aug. 15, Leeds, from Liverpool to Manchester,	level - - -	38	21.81	25...18 = 47.5	$\frac{3}{4}$	The engine, while ascending, without help, the inclined plane at $\frac{1}{96}$ with its load, stopped near the top. It was hauled up the remainder of the ascent Weather fair and calm.—Water lukewarm in the tender. The delay that occurred on the road was occasioned by a trial made with the engine.
in 1 h. 29′ - - with 7 wagons - - - 33.52 t.	descent $\frac{1}{1094}$	27	29.09	31...32 = 54	$\frac{3}{4}$	
delay 36′ tender - - - 5	descent $\frac{1}{849}$	23	28.96	25...28 = 47.5	$\frac{3}{4}$	
——— ———	ascent $\frac{1}{1300}$	48	21.43	15...16 = 29	$\frac{3}{4}$	
2 h. 5′ 38.52 t.	ascent $\frac{1}{4257}$	41	18.75	25...27 = 46.5	$\frac{3}{4}$	
July 22, Vulcan, from Manchester to Liverpool, with 9 1st class coaches - - 31.07 t. tender - - 5 ——— 34.07 t.	ascent $\frac{1}{89}$	188	11.42	31...36 = 57.5	1	Weather calm.—Water scarcely lukewarm in the tender on leaving Manchester.
Vulcan: cylinders - - - 11 in. stroke - - - - 16 in. wheel - - - - 5 ft. weight - - - - 8.34 t. friction - - - 136 heating surface: fire-box 34.45 sq. ft.; tubes 307.38 sq. ft.						
July 22, Vulcan, from Liverpool to Manchester, with 9 1st class coaches - - 36.32 t. tender - - 5 ——— 41.32 t.	ascent $\frac{1}{96}$	186	18.75	31...36 = 57.5	1	Weather fair.—A very slight wind against the motion of the engine.—Water cold in the tender.

These experiments show better than any possible reasonings, what may be expected of locomotive engines in a daily work. That is the reason why we have joined them all together in this place.

Their coincidence with the table of velocities, deduced from calculation, will be remarked.

§ 2. *Of the Velocity of the Maximum useful Effect.*

We have seen above (Chap. V. Art. V. § 2) that the load an engine is able to draw, at a given speed, is expressed by

$$M = \frac{m\,SPD - \rho\,d^2\,lV}{(\delta + n)\,V\,D} - \frac{F}{\delta + n}.$$

If we multiply the two members of this equation by V, we have

$$MV = \frac{m\,S\,P\,D - \rho\,d^2\,l\,V}{(\delta + n)\,D} - \frac{F\,V}{\delta + n}.$$

The produce MV, of the load multiplied by the velocity with which that load is drawn, represents the *useful effect* produced by the engine in the unit of time. We see consequently, here, that that useful effect will be so much the greater as the speed is less; for in the second member that speed only appears in the negative terms. As, on the other hand, the engine cannot without considerable loss of steam, move at a velocity less than that which corresponds to the quickness with which the steam is generated in the boiler, it follows that the *maximum* of useful effect will take place at that speed.

By examining the above table, under the same point of view, we ascertain by experience what has already been proved by calculation, viz., that the greatest useful effect is produced at the least velocity.

Let us take, for instance, an engine with an eleven-inch cylinder, working 10 hours a-day. At its greatest speed, of 30 miles an hour, it will be able, with an effective pressure of 50 lbs. per square inch in the boiler, to draw 50 t.; and at its least speed, with an equal pressure in the boiler, it will draw 160 t.

By drawing trains of 50 t. at a velocity of 30 miles an hour, it will, in its 10 hours' work, have drawn 50 t. to a distance of 300 miles, or, in other words,

15,000 t. to the distance of one mile.

By drawing trains of 160 t. at a speed of 15.5 miles an hour, it will, in the same space of time, have taken 160 t. to a distance of 155 miles, which is equal to

24,800 t. to the distance of one mile.

There is, consequently, a considerable advantage to be reaped, in making the engines, if possible, work with the greatest loads, which correspond with the least speeds. It must be remarked, that the difference between the two effects would have been still greater, if from each load we had deducted the tender, as making, in regard to the useful effect, a part of the engine, and not of the train.

It is scarcely necessary to add, that when the speed becomes the express condition of the haulage, as, for instance, in respect to passengers, these considerations are no longer applicable. We speak here only theoretically.

The difference we have found in the useful effect produced, is owing to the circumstance that in the two cases the resistance proper to the engine remained nearly the same, while in the first case it had to be moved 300 miles, and in the second only 155 miles. The same is true in regard to the atmospheric pressure, which forms a part of the resistance on the piston. The engine having travelled in one circumstance double the distance of the other, was naturally obliged to give a double number of strokes of the piston; and as at each of these strokes of the piston the atmospheric pressure must be overcome, we see that the expense of moving power necessary to conquer the resistance of the atmosphere is in the proportion of the numbers 300 and 155; that is to say, that that force, as well as the force required to move the engine, is in proportion to the velocity of the motion. This is a further proof that, in calculating the effect of these engines, one cannot, as is usually the case, neglect, in all circumstances, the atmospheric pressure; and that it is only in those cases in which the speed is not taken into account that that simplification can take place without mistake.

If we sometimes find calculations of the power of locomotive engines, or any other sort of steam engines, in which there appears what is termed *lost power;* that is to say, calculations according to which it would appear that these engines produce in practice only one-third or even a quarter of what is termed their *theoretical power;* and if that difference between practice and theory be at present so generally established, that it is taken as a rule to say that *practical horses* are only the third part of *theoretical horses,* the reason is, simply, that this supposed theoretical power is wrongly calculated. All the different circumstances of which we have spoken above have not been duly taken into account. Before all calculations, the atmospheric pressure has been deducted; the resistance of the engine, or its increase in proportion to the load, has been omitted; and, above all, the pressure on the piston has been calculated as equal to the pressure in the boiler, though we have seen how different they are from each other. With so many causes of error, it is not surprising that results should have been obtained, which are contradicted by experience; or, in other words, that one should construct very good engines without being able to calculate their power or effects. But if we take into account all the resistances really conquered, and the velocity of their points of application; if we take the pressure in the cylinder as it really is, instead of considering a power as applied when it is not; in that case we shall obtain a most remarkable result, applicable, moreover, to all sorts of steam-engines, viz. that all the power applied is to be traced in the effect produced, and that there is not one single pound of which the use may not be pointed out.

CHAPTER VI.

OF SOME ACCESSORY DISPOSITIONS AND THEIR EFFECT.

ARTICLE I.

OF THE REGULATOR.

§ 1. *Effect of the opening of the Regulator.*

Three accessory parts or dispositions are still to be considered, which have a considerable influence on the effect of locomotive engines; these are the *regulator,* the *blast-pipe,* and the *lead* of the slide, which we are going to describe successively.

We have observed that the pipe, which leads from the boiler to the cylinders, may be either completely or partially shut by means of a cock or regulator. When the regulator is quite open, the steam enters into the cylinder as freely as the area of the pipe through which it must necessarily pass. Then the speed is as great as the generation of steam permits. If, by means of the regulator, we diminish a little the entrance of the pipe, the steam may take at first a greater velocity, which surplus of velocity may allow, as before, the egress of all the steam generated. In that case the effect will remain the same as in the former one, and as long as the width of the passage is not out of proportion with the generation of the steam, there will be no diminution in the effect of the engine.

If, however, we continue to shut the passage, we shall necessarily arrive at last at a point where it will be so narrow, that it will form a considerable obstacle to the admission of the steam. From that moment, only a portion of the steam generated in the boiler will be able to get into the cylinders, and consequently the effect produced will be diminished in the same proportion.

Having called *effective* evaporating power the mass of steam the engine is able to introduce into the cylinders in a unit of time, we clearly see that the motion imparted to the regulator causes a diminution in the effective evaporating power of the engine; and then the formula, such as we have given it above, shows why the effect is diminished.

In fact, we find in practice that the same train will be drawn by the same engine at different speeds, according to the size of the aperture of the regulator. This is the method invariably used on the Liverpool Railway to prevent the trains, when they are too light, from being carried along with greater rapidity than the preservation of the engines, the carriages, and the Railway can allow. This manner of regulating the speed is so far advantageous, that, if on the road there occur either a slight inclination or any obstacle whatever, one may, by opening the regulator, and animating at the same time the fire, restore to the engine its full power, and enable it to pass over the obstacle without diminishing its speed.

The size of the aperture of the regulator is, therefore, to be taken into account, when the question is to ascertain the effect of the engine. That is the reason why we have noted it in the experiments related above.

We should have preferred the handle of the regulator to have turned on a graduated circle, in order to be able to measure exactly the degree of opening, and compare it with the corresponding effects; but, with the present construction of the engines, it is only by approximation that we can judge of the size of the aperture.

§ 2. *Of the Steam Pipes.*

Carrying still further the same principle, on the free motion of the steam, we see that between two engines, perfectly similar in other respects, there must be an advantage in favor of that one in which the steam-pipes have a more considerable area. It is, however, clear, that as soon as we have attained a diameter sufficient for the passage of all the steam that a boiler is able to generate, at the greatest speed with which the engine is required to go, nothing further is to be gained by augmenting still more that diameter. It is for the same reason that we have seen, a little while ago, that that passage may be reduced to a certain degree without loss of effect, which is owing to the opening having been originally greater than was necessary.

Experience has fixed the diameter that must be given to the steam-pipes, and would quickly give notice if it were not observed; for if it should happen, for instance, that an engine, running with all its speed, should still emit steam through its safety-valve, that would be a proof that the area of the passage is too small for the quantity of steam the boiler is able to generate.

§ 3. *Table of the Dimensions of the Steam-Pipes in some of the Engines of the Liverpool and Manchester Railway.*

There exists, then a suitable diameter, harmonizing with the evaporating power of the engine, or with the dimensions of the boiler. It is for that reason we give here the diameter of the steam-pipes, in the engines we have submitted to experiment, and in some others, the proportions of which were given at the beginning of this work. The steam-pipes considered here are those which lead separately from the boiler to each slide-box. Those which lead afterwards from that box to the interior of the cylinders have a corresponding area, although of a different form. Their dimensions will be, for instance, 1 inch broad to 7 inches long, which will present the same surface, as a tube of 3 inches diameter.

DIAMETER OF THE STEAM-PIPES IN SOME OF THE ENGINES OF THE LIVERPOOL AND MANCHESTER RAILWAY.

Name of the Engine and Number of its construction.	Diameter of the Cylinder.	Stroke of the Piston.	Heating-surface: Exposed to the action of Radiating Caloric.	Heating-surface: Exposed to the action of Communicative Heat.	Inside Diameter of the Steam-Pipes.	Remarks.
	inches.	inches.	sq. ft.	sq. ft.	inches.	
SAMSON, No. 13	14	16	40.20	416.90	3.25	This engine is now under repair, and the steam-pipes will be 4 inches in diameter.
GOLIATH, No. 15	14	16	40.31	407.00	3.25	
ATLAS, No. 23	12	16	57.06	217.88	3.25	
VULCAN, No. 19	11	16	34.45	307.38	3.50	
FURY, No. 21	11	16	32.87	307.38	3.50	
VESTA, No. 24	11$\frac{1}{8}$	16	46.00	256.08	3.25	
LEEDS, No. 30	11	16	34.57	307.38	3.50	
FIREFLY, No. 31	11	18	43.91	362.60	3.00	

ARTICLE II.

OF THE BLAST-PIPE.

In describing the engine, we have said that the steam, after having produced its effect in the cylinder, is let into the chimney. It enters it in a jet, through a pipe turned upwards, and terminated by a narrow orifice, which is placed in the middle of the chimney-flue. The disposition of that pipe, called the *blast-pipe*, is represented in fig. 5.

The steam, at each jet, clearing before it the column of air that filled the passage of the chimney, leaves a vacuum behind it. This vacuum is immediately filled up with a mass of exterior air that rushes through the fire-place to occupy the space where the vacuum has been made. In consequence, after each aspiration thus produced, the fuel in the fire-place grows white with the intensity of the heat.

This effect is similar to that of a pair of bellows that would constantly animate the fire, and the artificial blast created by that means in the fire-place is so necessary to the work of the engine, that if the pipe happens to be broken, burnt, or leaky, the engine becomes almost useless; which shows that the ordinary draft of the chimney is very small in comparison.

It is easy to conceive, that the narrower the orifice, the more violent will be the current that escapes through it, and the greater its effect in animating the fire. The result is, consequently, a greater generation of steam in the same space of time, or an increase of power in the engine. This is, therefore, an important point to note when the effect produced by an engine is to be described; for if the diameter of the blast-pipe is changed, the evaporating power of the boiler will be changed also.

In the engines that served for the above experiments, the diameter of the orifice of the blast-pipe was 2$\frac{1}{4}$ to 2$\frac{1}{2}$ in., which is their usual dimension. The LEEDS engine must, however, be excepted from the general rule, the diameter of her blast-pipe being only 2$\frac{3}{16}$ in. As for the ATLAS engine, her blast-pipe was 2$\frac{15}{16}$ in. in diameter in all the experiments, except on the 4th of August, when it had been carried to 3$\frac{1}{16}$ in., in order to observe what reduction would result from that circumstance on the effect of the engine. Comparing that experiment with the others made with the same engine, the diminution of speed seems to have been nearly in the proportion of 15 to 17. The effect produced would thus be in the inverse proportion of the square of the diameter of the pipe, or of the area of the orifice; that is to say, in a direct ratio to the velocity with which the steam escapes into the chimney.

To those dimensions, therefore, as to one of the elements of production, must be referred the evaporation effected by the engines.

The generally adopted dimensions of 2$\frac{1}{4}$ to 2$\frac{1}{2}$ in. diameter for the orifice of the blast-pipe is the result of experience. It has been endeavored to diminish the aperture as much as possible, without putting a material obstacle to the escaping of the steam; that is to say, that the tube has been narrowed as long as the effect was seen to augment, and that a stop was put to the trial as soon as it was found that there was no more gain of power.

With an orifice 2$\frac{1}{2}$ in. in diameter, or 5 sq. in. area, and cylinders of 11 in. diameter, or 190 sq. in. total area; that is to say, with an orifice which is only $\frac{1}{38}$ of the area of the cylinders, we see, that in order that all the steam may get out by that passage, its speed in passing through the orifice must be 38 times as great as it was in the cylinder.

The velocity of the jet formed in the chimney will then be, for the dimension we consider, equal to 38 times the velocity of the piston, or in other words, equal to 6$\frac{1}{2}$ times the speed of the engine, this latter speed being nearly six times as great as that of the piston.

Thus the power of this additional means will be greater in proportion as the velocity of the engine itself will be more considerable. If, for instance, the engine travels 30 miles an hour, the velocity of the jet will be 195 miles an hour, or 286 feet per second; and as that velocity cannot be produced merely by the tendency of the steam to escape into the atmosphere, a part of the power of the engine itself must necessarily, in those great speeds, be spent in expulsing the steam; that is to say, in blowing the fire in the fire-place. Consequently, the increase of effect being produced by a sacrifice of power, a point will naturally come where the profit is balanced by the expense required to obtain it, and there all advantage will cease. This explains the point determined by practice as the limit of the narrowing of the orifice.

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ARTICLE III.

OF THE LEAD OF THE SLIDE.

§ 1. *Nature and Effects of the Lead.*

The third disposition which we have to discuss, is the *lead* of the slide.

In describing the different parts of the engine, we said that it is the slide that opens and shuts successively the passages above and below the piston, so as to apply the effort of the steam alternately on one side and on the other. If the engine were regulated, as it appears natural that it should be, the slide would keep the passage open to the steam until the piston had reached the bottom of the cylinder. At that instant the change would take place. The first passage would be shut, and the opposite passage opened. Then the motion of the slide would accompany exactly that of the piston. Their alternation would be strictly simultaneous.

But this is not the case; it has been found by experience, that the engine is capable of acquiring a greater speed when the motion of the slide precedes that of the piston; that is to say, when it opens the passages to the steam a little before the necessary moment. When the engine is regulated in that manner, at the moment the piston is going to begin a new stroke, the passages, instead of beginning to open, have already a certain degree of aperture. This premature degree of aperture is called the *lead of the slide*, because it indicates in how far the motion of the slide precedes that of the piston. In fact, we can conceive, that if the return of the slide is, for instance, a quarter of an inch in advance on that of the piston, the passages for the steam will have a quarter of an inch aperture when the piston touches the bottom of the cylinder.

The effect of that disposition, first on the speed and then on the load, are the two points we intend to examine here.

The common way of explaining the increase of speed the engine acquires when it has a little lead, is by saying, that by that means the steam is ready to act on the piston at the moment the piston begins its stroke. But it is not difficult to see, that if the steam really acts quicker at the beginning of the stroke, it is also sooner interrupted at the end of the stroke. The effect would thus only be, to add on one side what is substracted on the other. That explanation is, therefore, by no means satisfactory.

But the manner in which the calculation of the speed of the engines has been established here-above, gives us immediately the real explanation of the fact.

If the change in the passages of the steam, instead of occurring exactly at the end of the stroke of the piston, takes place, according to our supposition, at the moment the piston is still an inch from the bottom, from that instant no more steam enters the cylinder. In fact, on one side the passage is shut; it is true that it is open on the other, but the piston, which must necessarily finish its stroke, keeps the steam pressed back in the passages, from whence it cannot get out until the piston begins to take its retrograde direction. Thus, in regard to the quantity of steam admitted in the cylinders at each stroke of the piston, the length of that stroke is in reality diminished by an inch. We have seen that, to know the velocity of the piston, we must divide the mass of steam generated in the boiler by the area of the cylinders (Chap. V. Art. V. § 1,) and that the quotient will be the speed with which that volume of steam must necessarily pass through the cylinders, or the velocity of the piston. That will really give the velocity wanted, if the steam issues without any interruption; but if, as it is here the case, there occurs at each stroke a suspension in the issuing of the steam, it is evident that, for the same quantity of steam to go through the cylinders, a greater velocity of motion will be required. It is the generation of steam in the boiler that regulates and limits the speed; if, therefore, we suppose that the generation supplied m cylinders full of steam in a minute, when the total length l of the cylinder got filled with steam, that the length $l-\beta$ only gets filled, the same quantity of steam will fill per minute a number of cylinders expressed by $m \times \frac{l}{l-\beta}$. Then the speed of the piston will be augmented in the inverse proportion of the length of the cylinders that get full of steam.

We see why the lead is favorable to the speed. But if there be profit in that respect, there is loss in regard to the load that the engine is able to draw.

Suppose the line E D (fig. 25) represents the stroke of the piston, and that the stroke takes place in the direction of the arrow. The passage being shut on one side of the piston a little before it is opened on the other side, as we shall see below, let A be the point where the piston is, when the arrival of the steam is intercepted on the side E, and let C be the point where it is when the slide begins to admit the steam on the opposite side, that is to say, on the side D.

It is clear, that at the instant the piston reaches the point A, the moving power that produced the motion is suppressed. Moreover, when the piston, continuing its stroke by virtue of its acquired velocity, reaches the point C, not only has it ceased receiving any impulsion in the direction of the motion, but it suffers even an opposition from the steam admitted in a contrary direction. The piston, however, cannot stop. It must finish its stroke. It must, therefore, repulse that fresh steam that opposes it. As it necessarily spends in the conflict a force equal to that which the steam would have communicated to it, the consequence is, that during the space C D there is not only suspension of the action of the moving force, but even introduction of that moving force in a contrary direction, and in the same proportion destruction of the force previously acquired.

We see, therefore, that the effect of the moving power, in regard to the motion, is only produced on the length of the stroke, first diminished of A D, and then of C D; so that, if those two distances are represented by β and a, the effect we are really entitled to expect from the engine is only in proportion of a stroke $l-\beta-a$.

Now we have seen (Chap. V. Art. V. § 4) that the limit of load an engine can draw, is determined by calculating the pressure on the piston as equal to the pressure in the boiler, or expressed by —

$$M=\frac{(P-\rho_i)\,d^2\,l}{(\delta+n)\,D}-\frac{F}{\delta+n},$$

expression in which l represents the stroke of the piston. It is clear, that the limit of load will be smaller in proportion as the stroke is diminished, and that setting aside the friction of the engine, or the term $\frac{F}{\delta+n}$, the load will be reduced in proportion to the length of the stroke.

Thus we see what are the effects of the *lead*.

The *maximum* load the engine is able to draw becomes less considerable, and its diminution is very nearly in the proportion of $\frac{l-a-\beta}{l}$.

On the other hand, for all loads that remain below that limit, the engine increases its speed in the proportion of $\frac{l}{l-\beta}$.

The surplus of effect produced in the latter case is by no means surprising. It is the natural effect of the diminution of the stroke, which enables the same mass of steam generated in the boiler to supply a greater number of cylinders in one case than in the other; and the general formula of the velocity for a given load shows it at first sight. That formula is (Chap. V. Art. V. § 1.)

$$V=\frac{m\,P\,S\,D}{(F+\delta M+n M)\,D+\rho\,d^2\,l}.$$

The quantity l, which represents the stroke of the piston, only enters in the denominator. Thus, the shorter the stroke, the greater will be the velocity of the motion with the same load.

A similar effect may, besides, have been already observed in the engines. We mean the effect which results from the difference in the diameter of the cylinder. Between two engines, the cylinders of which have 12 and 11 inches diameter, all things being equal besides, the first will be able to draw a more considerable load; but with equal loads inferior to those limits, the 11-inch engine will have the greatest speed. These results are shown by the above-stated formula, and can be explained in the same manner as the effects of the lead.

§ 2. *Calculation of the Effects of the Lead.*

This is sufficient when we only wish to explain the causes of observed effects. But if we want to calculate *a priori*, and know exactly the effects of a given lead, it is necessary to ascertain the precise measure of the distances a and β. That is to say, that we must determine the situation of the piston corresponding with that of the slide, at the moment that it intercepts or opens the passages.

To be able to determine the comparative situations of the slide and the piston, four circumstances already explained in the description of the engine (§ 6, 7, 8,) and which form the connexion of motion between those two parts of the mechanism, must be clearly kept in mind. (See fig. 9 and 10.)

The slide moves backwards and forwards on the three apertures of the cylinder. It goes alternately from one of its

extreme positions to the other without stopping.

This motion is produced by the revolution of the radius of the eccentric round the axis of the axle tree, which makes the effect of a common crank. But as the communication between the eccentric and the slide takes place by means of a cross-head, the slide is pushed forward when the eccentric is behind, and *vice versa*.

The radius of the eccentric stands at right angles with the crank; the consequence is, that when the crank is horizontal, the eccentric is, on the contrary, vertical, and consequently the slide is in its middle position. *Vice versa*, when the crank is vertical, the eccentric is horizontal, and the slide in its extreme position.

Finally, the piston is exactly at the end of its stroke when the crank is horizontal. Thus, it results from the preceding article that the middle position of the slide corresponds with the end of the stroke of the piston. These different effects are represented in fig. 9 and 10.

From these coincidences we see that, when the slide is in its middle position (fig. 10), the eccentric is vertical, the crank horizontal, and the piston at the end of its stroke.

When the slide is in one of its extreme positions (fig. 9) the eccentric is horizontal, the crank vertical, and the piston in the middle of the cylinder.

We see, moreover, that if the slide had no lead at all, that is to say, if the eccentric were to stand rigorously at right angles with the crank, the middle position of the slide would correspond exactly with the end of the stroke of the piston. If it deviates a little from the perpendicular, that is to say, if the slide reaches its middle position a little before the piston gets to the bottom of the cylinder, the difference will exactly be the lead we are considering.

This being granted, let us take the slide when it is in its middle position, and consequently, when the eccentric is exactly in the vertical. At that moment all is shut, as we see represented in fig. 10 and 26. But the dimensions of the slides being such that on all the openings there exists a small lap, which is generally $\frac{1}{8}$ of an inch, we see the passages were already shut an instant before this, viz. $\frac{1}{8}$ of an inch before the slide had reached this position. Thus the direction of its motion being marked by the arrow, when the slide was in the position *a* (fig. 26) all the passages began to be shut, and the steam was consequently intercepted. This is then the point at which the action of the lead begins, or which corresponds with the point A of the stroke of the piston in fig. 25.

While the slide passes from the position *a* to the position *b*, and afterwards to the position *c*, every thing remains in the same state; but once arrived at the point *c*, the passage on the right side begins to open and admit the steam on the opposite side of the piston. This is then the point corresponding with the one we have designated by C in the motion of the piston.

After having passed that point *c*, the slide continues to open more and more a passage to the steam. If the lead is $\frac{5}{8}$ of an inch for instance; that is to say, if the slide opens the passage to an extent of $\frac{5}{8}$ of an inch, at the instant the piston finishes its stroke, then in measuring from the point *c* a distance of $\frac{5}{8}$ of an inch, we shall find the point *d* where the slide will be the moment the piston is at the bottom of the cylinder. This point will consequently correspond with the one designated by D in fig. 25; that is to say, it will correspond with the end of the stroke of the piston.

This correlativeness once established, we have to determine the unknown distances AD and CD, taken on the stroke of the piston, according to the distances *ac cd*, taken on the range of the slide. These last are in fact given, the second being the lead, and the first the same lead augmented by twice the lap *ab*.

Now, if we suppose the motion of the slide backwards and forwards to be 3 in., the eccentric must produce that motion, and consequently the interval between its centre and the centre of the axle must be $1\frac{1}{2}$ in. The centre of the eccentric describes consequently round the axle a circle, the diameter of which is 3 in., while the crank of the axle describes a circle, the diameter of which is 16 in., which we suppose to be the length of the stroke.

If, therefore, we take the point *b* (fig. 27) for the centre of the axis, and if round that point we describe a circle, the radius of which be $1\frac{1}{2}$ in., that circle will be the one described by the eccentric; and its diameter will be the space run over by the slide. If round that point we describe another circle with a radius of 8 in., it will be the circle described by the crank; and its diameter will be the stroke of the piston.

These points acknowledged, since the middle situation of the slide corresponds with the moment the eccentric is vertical, we see that that position of the slide is here the point *b*. As, besides, we have seen that in consequence of the slide lapping over the apertures, the steam is intercepted an instant before, if we take before the point *b* a space equal to the lap, we shall have the point *a* where the effect of the lead begins. In the same way, if we take beyond the point *b* another space, also equal to the lap, we shall have the point *c* where the passages open again. And, finally, at a distance from the point *c* equal to the lead, we shall have the point *d*, which corresponds with the end of the stroke of the piston.

Raising from these points perpendicular lines towards the circumference described by the eccentric, the points a', b', c', d', will be those described by the eccentric, while the slide takes the positions indicated by *a*, *b*, *c*, *d*.

But while the eccentric describes the arc a' d', the crank of the axletree describes necessarily an equal angle. As that crank must be horizontal or coincide with *b*D at the end of the stroke of the piston, if from the point *p* we trace arcs equal to d' c', d' b' and d' a', or in other words, arcs, the sines of which be, *dc*, *db* and *da*; and if we draw radii through the points thus determined, we shall evidently have in A′, B′, C′, and D′ the points where the crank was, while the eccentric passed through the points a', b', c' d'. Letting perpendiculars fall from the points A′, B′, C′, D′, on *b*D, we shall at last have in A, B, C, D, the corresponding situations which we sought for the piston.

Thus we recapitulate: while the slide passes from the point *a*, where it begins to intercept the steam, to the point *c*, where it opens the opposite passage, and to the point *d* end of the lead; the eccentric will run through the points a', c', d'; the crank, on its circle, will run through the points A′ C′ D′; and, finally, the piston will be successively at the point A, where it ceases to receive the impulse of the steam, at the point C, where it meets it opposing its motion, and at the point D, where it finishes its stroke.

Now, it will not be difficult to express by precise measure the spaces CD and AD, which we have represented above by a and ϵ.

For that purpose, it will be sufficient in practice to trace exactly, and by the scale, the fig. 27, and then to measure the resulting spaces CD, AD.

To obtain those same quantities by calculation, we have

$$AD = bD - bD \cos A'bD,$$

And, at the same time, expressing the arc A′*b*D by γ,

$$\text{Sin } \gamma = \frac{ms}{bp} = \frac{ad}{bp}.$$

But *b*D is the half stroke of the piston, which we have expressed by l; and *bp* is the half range of the slide, which we shall express by l'. If, besides, we call a the lead of the slide or *cd*, and let r represent the lap of the slide over the apertures or *ab*, *ad* will be expressed by $a + 2r$. Thus the quantity sought AB or ϵ will be

$$\epsilon = \frac{l}{2} - \frac{l}{2} \cos \gamma,$$

The value of γ being given by the additional equation,

$$\text{Sin } \gamma = \frac{a + 2r}{\frac{1}{2} l'} = \frac{2a + 4r}{l'}$$

In the same manner we shall have for CD, or a:

$$a = \frac{l}{2} - \frac{l}{2} \cos \gamma',$$

And γ will be known by the equation:

$$\text{Sin } \gamma' = \frac{2a}{l'}.$$

The quantities a and ϵ, of which we have made use in the preceding paragraph, will, consequently be determined by the stroke of the piston, the range of the slide, the lead, and the lap, all of which are known quantities. Thus we will be enabled to calculate immediately the effect of the lead, either on the speed or on the load.

Having seen that the speed of the engine will be increased in the proportion of $\frac{l}{l - \epsilon}$, the consequence will be for the augmentation of the speed a ratio of

$$\frac{l}{l - \epsilon} = \frac{l}{\frac{l}{2} + \frac{l}{2} \cos \gamma} = \frac{2}{1 + \cos \gamma}.$$

In the same manner, the limit of the load

of the engine will be reduced as if the length of stroke of the piston was no more than $l - a - \epsilon$, or

$$l - a - \epsilon = \frac{l}{2}(\cos\gamma + \cos\gamma');$$

And in these two values, the arcs γ and γ' will be given by the above equations, viz.

$$\sin\gamma = \frac{2a + 4r}{l'}, \text{ and } \sin\gamma' = \frac{2a}{l'}.$$

The use of trigonometrical signs might be avoided in these formulæ; but it would make them less convenient for calculation.

In order to apply them, let us take, for example, an engine with a 16 in. stroke, range of the slide 3 in., lap of the slide over the apertures ⅛ in., and let us suppose a lead of ⅝ in. given to the engine.

In that case,

$$\frac{2a + 4r}{l'} = \frac{7}{12} = 0.58333.$$

The arc, the sine of whch is $\frac{2a + 4r}{l'}$, is consequently the arc, the sine of which is 0.58333; or, taking the logarithms, it is the arc, the logarithm sine of which is 9.76591.

Seeking that arc in the tables, we find that the logarithm of its cosine is 9.90967; and finishing the calculation, we find

$$\epsilon = 8 \text{ in.} - 8 \text{ in.} \times 0.81222 = 1.50 \text{ in.}$$

In the same manner,

$$a = 8 \text{ in.} - 8 \text{ in.} \times 0.90906 = 0.73 \text{ in.}$$

Thus, we see that, in this case, the piston is at a distance of 1½ in. from the bottom of the cylinder, at the moment the action of the moving power is taken away from it; and it is at ⅜ in. when that same power is introduced against it. Fig. 27 constructed by the scale gives the same results.

From what has been said above, the speed will be augmented in the proportion of $\frac{l}{l - \epsilon}$ or $\frac{16}{14.5}$, for all the loads that do not pass the limit of power of the engine thus regulated.

And the limit of that load will be reduced, as if the stroke, from the length that it had, be reduced to the length,

$$l - a - \epsilon = 13.77 \text{ in.}$$

We find also, by supposing for the engine a lead of ⅛ in., that the space that the piston has still to travel, when the steam is intercepted, is 0.25 in.; and that the steam is introduced in a contrary direction, when the piston is still within 0.03 in. from the bottom of the cylinder. From thence results that, with the above lead, the speed is augmented in the proportion of $\frac{16}{15.75}$, and that the *maximum* load is diminished, as if the length of the stroke was reduced to 15.72 in.

Let us take, for an example, an engine like VESTA, viz.

d, diameter of the cylinder 11⅛ in., or 0.927 ft.; 1, stroke of the piston, 16 in., or 1.33 ft.; D, diameter of the wheel, 60 in., or 5 ft.; F, friction of the engine, 187 lbs.

The limit of the load being given by the formula (Chap. V. Art. V § 4),

$$M = \frac{(P - \rho)d^2 l}{(\delta + n)D} - \frac{F}{\delta + n},$$

We see that if the engine work at the effective pressure of 56.5 lbs. per square inch, as we shall have an example of it in a moment, the limit of a load will be

In case of no lead at all 187 t.
In case of a lead of ⅛ in. 183 t.
In case of a lead of ⅝ in. 158 t.

In these same circumstances, according to the formula (Chap. V. Art. V. § 1), the velocity of the engine will be as follows:—

The lead of 187 t. will be drawn at a velocity of 13.81 miles an hour.

The load of 183 t., which, if there had been no lead, would have had a speed of 14.03 miles, will have an augmentation of speed in the proportion of $\frac{16}{15.75}$, that is to say, that the speed will be 14.25 miles an hour.

Finally, the speed of the load of 158 t., which, with no lead, would have been 15.54 miles, will, in consequence of the lead, become 17.14 miles per hour.

We see by these results, that the effect of the lead, either in regard to the speed or to the *maximum* load, are only very perceptible when the lead is rather considerable.

(To be Continued.)

APPENDIX.

EXPENSES OF HAULAGE BY LOCOMOTIVE ENGINES ON RAILWAYS.

We have said that, in order to complete the knowledge of locomotive engines, we have still to consider them as a matter of speculation; that is to say, to examine the amount of the expenses attending the haulage by means of locomotive engines on railways. That research is the object of the present Appendix.

We shall draw the documents we have to present on that subject from the two most flourishing undertakings of the kind in England: the Liverpool and Darlington Railways. They will have, besides, the advantage of presenting examples of two very different sorts of conveyance: the one very rapid, and principally composed of passengers; the other slow, and composed of goods.

The expenses attending more especially the haulage by means of locomotive engines, are limited to the keeping in repair of the engines, the maintenance of the way, and the consumption of fuel. There are some other expenses, also, but they do not give occasion to discussion, and it will be sufficient to find their amount stated in the specified reports we subjoin at the end of this Appendix.

§ 1. *Expense for repairs of Locomotive Engines.*

In the outlays above enumerated, the expenses which must naturally first of all draw our attention, are those which attend the keeping in repair of the engines.

Before we enter into any calculations on that head, it is necessary to mention that what is meant by repairs to the engines, is nothing less than their complete re-construction; that is to say, that when an engine requires any repair, unless it be for some trifling accident, it is taken to pieces and a new one is constructed, which receives the same name as the first, and in the construction of which are made to serve all such parts of the old engine as are still capable of being used with advantage. The consequence of this is, that a re-constructed or repaired engine is literally a new one. The repairs amount thus to considerable sums, but they include also the renewal of the engines.

According to the tables at the end of this work, it will be seen that in the year ending on the 30th of June, 1834, the repairs of the engines of the Liverpool Railway cost:

From June 30, to December 31, 1833.
Materials for repairs - - - £3,755 3 7
Workmen - - - 4,401 4 10
Repairs out of the establishment - - - - 613 3 9
£8,769 12 2
From December 31, 1833, to June 30, 1834.
Materials - - £4,140 19 6
Workmen - - 5,432 8 8
9,573 8 2
£18,343 0 4

The question is now what was the work executed by those engines during that interval? By consulting the specified statements which will be found below, we see that the goods conveyed on that line during the year have been:

Between Liverpool and Manchester (30 miles) - - - 139,328 t.
On part of the line, making an average of 15 miles,* 24,934 t., which, on the whole, is equal to - - - - - - - - - 12,467
Sum - - 151,795 t.

In the tables we mentioned, we find some other haulage executed, such as that for Bolton and that of coals; but this work is executed by engines which do not belong to the company, and for that reason we do not take it into account in this place.

The above-mentioned weight is that of the goods conveyed, to which must be added the weight of the wagons. Now, on that railway, the average load of a wagon is 3.5 t., and the wagon itself weighs 1.5 t.; so the weight of the carriages that served for the above mentioned tonnage will be known by multiplying the number obtained, by the ratio $\frac{1.5}{3.5}$. And as, moreover, the engines, for want of sufficient returning traffic, are obliged to bring back half the wagons empty in one of the two directions, or ¼ of the whole, we shall have for the *gross weight* drawn by the engines in the course of the year—

Weight of the goods - - 151,795 t.
Weight of the corresponding wagons - - - - - 65,055
Weight of the wagons brought back empty - - - 16,264
233,114 t.

This is the tonnage of the goods, to which must be added that of the travellers. In the course of the year, 415,747 travellers were conveyed from one city to the other in 6570 journeys.† This makes an average of 64

*The distance to which the company carries the Wigan and Warrington trade, which make the principal part of this article, is 15 miles.

† This is the number of the travellers inscribed in the company's books. It includes neither the travellers put down nor those taken up on the road, the numbers of which balance each other.

travellers pet train. The coaches required for that number of travellers, including the empty carriages added to each train to be ready for any emergency, are six carriages of the first class, or five of the second.*

The weight of six first class coaches, including the mail, is - - 21 t.
The weight of a second class train of five carriages, including one glass coach, is - - - - 12.6

Lastly, for 13 trains of the first class there are 16 of the second. Thus the average weight of the carriages for every 64 travellers may be reckoned at 16.4 t.

Consequently, the total weight corresponding to the travellers conveyed was:

415,747 travellers at 15 per t. -	27,717 t.
Corresponding weight of the carriages - - - -	107,748
Luggage of the travellers, at 28 lbs. each - - - -	5,197
	140,662 t.

Thus the total definite weight, drawn by the engines belonging to the company during the year was—

Gross weight for goods -	233,114 t.
Gross weight for travellers -	140,662
	373,776 t.

We have already shown in this work (Chap. IX. § 2) that, taking into account the surplus of resistance occasioned by the gravity at the passage of the inclined planes of that line, the load must be considered as carried to a distance of 34 miles and a half on a level. Thus as a ton carried to a distance of 34.5 miles is equal to 34.5 t. carried to a distance of one mile, the draft here above it equal to 12,895,272 gross tons carried to one mile on a level.

For that haulage the repairs of the engines cost £18,343 0s. 4d., consequently the repairs, per gross ton carried to one mile on a level, amounted to

0.342*d*.

In order to execute this haulage, the engines made 6570 journeys drawing stage-coaches, that is to say, with a velocity of 20 miles an hour; and 5086 journeys, with goods, or with a velocity of 12.5 miles an hour. The average velocity of the haulage, was consequently, in miles per hour, 16.73 miles.

We have said elsewhere that the Liverpool and Manchester Railway Company possesses at present thirty locomotive engines. It must not be concluded, however, that that number is necessary in order to execute the above said haulage. Of these 30 engines about one-third are useless. They are the most ancient which, having been constructed at the first establishment of the railway, at a time when the company had not yet obtained sufficient experience in that respect, are found now to be out of proportion with the work required of them.

The engines actually in daily activity on the road amount to about 10 or 11, and with an equal number in repair or in reserve the business might completely be ensured. This is in fact what happens at present, the surplus, above that number, being nearly abandoned.

We shall complete we have just been saying on the Liverpool locomotive engines, by adding a document that will show what these engines are capable of executing in a daily work, and the improvement they have undergone in the course of the last few years, in respect to the solidity of their construction.

WORK DONE BY THE TEN BEST ENGINES OF THE LIVERPOOL AND MANCHESTER RIALWAY, DURING THE YEARS 1831, 1832, 1833, AND THE TWELVE FIRST WEEKS OF 1834.

Year.	Name of the Engine.	Totaldistance travelled by the Engine.	Total time the engine has been on the road, either in activity or in repair.
		Miles.	Weeks.
1831.	MERCURY -	23,212	52
	JUPITER -	22,528	44
	PLANET - -	20,404	52
	SATURN -	19,510	38
	MARS - -	18,645	50
	MAJESTIC -	18,258	52
	NORTH STAR	15,677	52
	NORTHUMBR'N	15,607	52
	PHŒNIX -	15,405	52
	SUN - -	13,434	37
	Sum - -	182,675	481
	Av. per week	380	
1832.	VULCAN -	26,053	52
	LIVER - -	22,651	43
	VENUS - -	20,464	52
	ETNA - -	20,399	52
	SATURN -	20,312	52
	VESTA - -	17,739	52
	VICTORY -	17,082	52
	PLANET -	16,885	52
	SUN - -	16,535	52
	FURY - -	15,603	52
	Sum - -	193,723	511
	Av. per week	379	
1833.	JUPITER -	31,582	52
	AJAX - -	26,163	52
	FIREFLY -	24,879	39
	LIVER - -	23,134	52
	PLUTO - -	20,308	52
	VESTA - -	19,838	52
	LEEDS - -	19,364	48
	SATURN -	18,738	52
	VENUS - -	18,348	52
	ETNA - -	17,763	52
	Sum - -	220,117	503
	Av. per week	438	
1834.	FIREFLY -	8,542	12
	VULCAN -	8,526	12
	SATURN -	7,290	12
	LIVER - -	7,080	12
	SUN - - -	7,080	12
	ETNA - -	6,557	12
	LEEDS - -	5,712	12
	AJAX - -	4,890	12
	VENUS - -	4,632	12
	PLUTO - -	4,246	12
	Sum - -	64,555	120
	Av. per week	538	

Among those engines, the *Liver* had worked for 107 weeks, had travelled 52,865 miles, or, on an average 494 miles a-week during all that time; the *Firefly* had worked 57 weeks, had travelled a distance 33,421 miles, or 586 miles per week, and neither of these engines at the period in question, had yet required a fundamental repair.*

This statement shows what can be expected from locomotive engines, when constructed with care and of good materials; and there is no doubt that, in time, more work will still be obtained from them.

In order to give also an instance of the expense of repairs of locomotive engines, under other circumstances, and with another mode of construction of the engines, we shall set down here the work performed by the locomotive engines on the Darlington Railway, during the same year, that is to say, from June 30, 1833, to June 30, 1834, and the amount of expenses for repairing those engines for the same space of time.

On this Railway the number of trips of 20 miles, down hill, performed in the course of the year, was 5318½. In each of these journeys the engine had to draw, in coals, a load of 63.6 t., which puts the total work at 6,764,951 t. carried to the distance of one mile.

But as this tonnage does not include the tare of wagons, and as, independently of this descending trade, it is also necessary to bring the empty wagons *up* the line again, this point requires our entering into some particulars, in order to be able to deduce from it the work really executed by the engines.

We shall elucidate it before we go any farther.

When a weight of one ton is drawn on a level Railway, we have seen that it requires a traction of 8 lbs. But if the line is not all on a level, upon each *ascending* plane, the gravity of the mass drawn will be an additional resistance to be overcome, and must consequently be added to the 8 lbs. traction, already necessary in order to overcome the friction of the wagons. For the contrary reason, in the *descending* planes that gravity enters into deduction of the power to be exerted, and must consequently be substracted instead of added.

If, however, the same train, after having ascended an inclined plane, descends another equal one, the addition in one case being exactly equal to the substraction in the other, the consequence will be, that the definitive resistance of a ton will remain the same as if the way had been level.

Or, if the way has a known average inclination, from which it deviates, at times augmenting and at others diminishing, returning, however, always to that average inclination, the same principle of compensation will stand good still, and it will be sufficient to calculate the traction required on that average inclination.

But this principle which has its foundation in the supposition that the engine is just as much eased in one point as it is overcharged in another, ceases to be true on all such planes where the gravity surpasses the friction; that is to say, on all planes where the inclination is greater than $\frac{1}{280}$. In fact, beyond that point the overcharging in ascending continues to augment rapidly, while the load in going down, already reduced to nothing on a plane at $\frac{1}{280}$, cannot diminish any more. All compensation therefore ceases.

This remark proves that the consideration of the gravity, on the average inclination of a line, gives the real resistance on that line, only in case it contains no des-

* The first class carriages are glass coaches, containing each 18 persons; they weigh 3.65 t. Those of the second class are open, and have 24 places; their weight is 2.23 t. Lastly, the mail-coaches weigh 2.71 t., and carry 10 travellers. Each glass coach has besides one outside place.

* The greater part of these excellent engines were built by R. Stephenson, so well known for his important and numerous improvements in this branch of industry.

The *Liver* engine, the merit of which is sufficiently established by the above stated facts, is the work of Messrs. Edward Bury and Kennedie, of Liverpool.

cending planes of a greater inclination than $\frac{1}{286}$, or in case those that are in that predicament have been reckoned separately.

Applying that principle to the Darlington Railway we find, according to the section of that line*, that on its total length there are eight inclined planes on which the gravity surpasses the friction. The length of these eight planes being together 10.23 miles, which is a half of the whole distance, we see that, during one half of their journey in descending, the Darlington engines have no traction to exercise, and that the trains go down of themselves. The remaining half of way, being practically level ($22\frac{1}{2}$ feet in descent for $10\frac{1}{2}$ miles,) the engines have on that part the traction of a level line, that is to say, 8 lbs. per ton. So their average traction during the whole descent is 4 lbs. per ton, or in other words, their work is equal to the draft of their load to half the distance on a level. We see here how great a mistake we would have made if we had taken as a rule the *average* inclination of the whole line; for that inclination being $\frac{1}{286}$, we would naturally have concluded that for all the descending trade, the traction was almost reduced to nothing.

Coming back, therefore, to the tonnage on the line, we have seen that it amounts, for the *goods*, to

6,764,951 t.

This number does not include the weight of the wagons themselves. These wagons weighing 1.30 t., and their load being 2.65 t., the addition to be made on that account, will be found in multiplying the above number by the ratio $\frac{1.30}{2.65}$.

Thus the total weight carried in *going down* the line is

Weight of the coals	6,764,951 t.
Weight of the wagon	3,318,656.
Total wt. drawn to a distance of one mile descending	10,083,607 gr. tons.

We have seen that the draft of one ton to the distance of one mile, in going down the line, is equal to the draft of the same load to the distance of half-a-mile *on a level.* The above-mentioned tonnage referred to a level, represents consequently 5,041,803 gross tons carried to a distance of a mile.

In order to estimate the draft in *going up*, we may retain or not the division of the line in two parts, the result is the same; but the simplest way is to make use of the average inclination at $\frac{1}{286}$. The calculation we have to make regarding only the *ascending* line, which contains no descending plane, and *a fortiori*, no descending plane of a greater inclination than $\frac{1}{286}$, the division established above is no longer necessary.

Considering, then, that the ascending trains are composed of 24 empty wagons, weighing together 31.2 t.; that, besides, on the inclined planes, the gravity of the engine and its tenders offers an additional resistance which would not take place on a level; finally, that the weight of the engine is 10 to 11 t., and that two of the tenders, half empty, 4.5 t.; which makes in all, on the inclined plane, a mass of 46.2 t., to be moved; it will be seen that the total resistance opposed by the steam, is,

Friction of the wagons, 31.2 t. at 8 lbs. per ton - - -	249.6 lbs.
Gravity of the mass 46.2 t. on an inclined plane at $\frac{1}{286}$	362
Total resistance,	611.6 lbs.

This, being the resistance that results from a train composed of 31.2 t. makes per ton 19.60 lbs., or in round numbers, 20 lbs. As we know, on the other hand, that on a level one ton requires only 8 lbs. traction, we see that the necessary force is here twice and a-half as great; or in other words, we see that the draft of one ton to a distance of one mile, *going up* that line, is equal to that of the same load to 2.5 miles *on a level.*

This granted, we have found that the haulage of the wagons is equal to 3,318,656 tons conveyed to the distance of one mile in going up. Referring this to a level, it will be represented by the same number multiplied by 2.6, that is to say, it will be 8,296,640 gr. t.. carried to a distance of one mile on a level.

From which follows, finally, that the total work executed by these engines and referred to a level, is,

Draft in going down, in gross tons carried to a distance of one mile on a level . . .	5,041,803 t.
Draft in going up, measured in the same way	8,296,640
Sum . . .	13,338,443 t.

The number of tons of coals which produced this draft being, as we have seen, 6,764,951 t., we find that, on account of the weight of the necessary wagons and the difficulty of the draft in going up, the haulage of those six millions and a-half of *goods* produced really a draft equal to thirteen millions of tons on a level; that is to say, to be more accurate, that in comparing these two numbers, we see that the real work executed by the engines may be deduced from the weight of the goods by multiplying the latter number by 1.9718.

This first point established, we may now come to the amount of the expenses of repairs.

After having for a long while kept and repaired their engines themselves, the Directors of the Darlington Company decided, in order to avoid minute accounts, to enter into a contract for that; and, in consequence, in 1833, they put their engines in the hands of three persons.

By the contract entered into, and which is at present in force, the company pays $\frac{4}{16}$ of a penny per ton of *goods*, carried to a distance of one mile; and, for that price, the contractors have undertaken, not only to keep the engines in good repair, furnishing workmen and materials, but also to pay all the current expenses of haulage, such as salary of the engine men, fuel, oil, grease, &c. Besides this, they must also pay the company an interest of five per cent. on the capital representing the value of the engines, and of all the establishments placed at their disposal for working.

The total sum paid to the contractors by the company for that object during the year ending June 30, 1834, was

£11,347 1*s.* 9*d.*

And deducting the expenses for rent, interest of capital and haulage, the amount of which is known, the directors of the company reckon that the definitive sum remaining with the contractors for the repairs of the engines (bars of the fire-box included,) amount, with the general profit on the whole undertaking, to

£5,732 18*s.* 5*d.*

This sum has been expended for the carriage of 13,338,443 gross tons to a distance of one mile on a level; so that finally the expense, per gross ton carried to one mile on a level, including the profits on the undertaking amount to

0.103*d.*

As a complement to what we have said, and to show on this railway as well as upon the Liverpool one, the work the engines are able to perform, we shall give a table of the haulage executed, and repairs undergone by the engines during the last five last months of the year 1833.

* The part of that Railway travelled by the locomotive engines begins at the foot of Brusselton inclined plane, at an elevation of 383 ft. 1 in. above the quay at Stockton, where it terminates, after passing over the following inclinations:

Miles.		
0.46	descent.	at $\frac{1}{311}$
0.06	do.	$\frac{1}{325}$
0 92	do.	$\frac{1}{144}$
1.45	do.	$\frac{1}{124}$
2.25	do.	$\frac{1}{328}$
1.25	do.	$\frac{1}{135}$
1.01	do.	$\frac{1}{352}$
1.76	do.	$\frac{1}{135}$
0.20	do.	$\frac{1}{396}$
1.75	do.	$\frac{1}{1584}$
1.61	do.	$\frac{1}{1408}$
1.64	do.	$\frac{1}{204}$
0.23	do.	$\frac{1}{713}$
2.09	do.	$\frac{1}{2192}$
1.25	do.	$\frac{1}{253}$
0.03	level.	
0.81	descent.	$\frac{1}{226}$
0.05	do.	$\frac{1}{487}$
0.80	do.	$\frac{1}{1584}$
1.16	do.	$\frac{1}{104}$

Sum 20.78. Average inclination, 383 feet on 109,692 feet, or $\frac{1}{286}$.

Besides the principal line, there are lateral branches over which the locomotive engines also travel, but the level of which has not been taken. The aggregate space travelled over by the locomotive engines is 24 miles. The rest of the Railway consisting of 16 miles more, is worked by horses and by stationary steam-engines.

STATEMENT OF THE WORK DONE BY THE LOCOMOTIVE ENGINES ON THE DARLINGTON RAILWAY, FROM JULY 1, TO DECEMBER 1, 1833.

Number of the engine.	Name of the engine.	Total number of miles travelled by the engine.	Tons of coals carried to one mile going down by the engine.	Gross tons carried to one mile on a level including the wagons and return.	Number of days that the engine was In activity.	In repair.	Amount of the repairs made to the engine during that time.	Amountofthe repairs per gross ton carried to 1 mile on a level.	Observations.
		miles.	tons.	tons.	days.	days.	£ s. d.	d.	
1	Locomotion	5,300	146,041	287,896	80	52	41 19 7	0.035	Boiler with a flue and two returning tubes.
2	Hope	3,100	82,305	162,281	66	69	57 5 5	0.085	" with a single flue.
3	Black Diamond	1,000	26,920	53,078	27	105	14 0 5	0.063	" with a singlle flus.
4	Diligence	80	1,906	3,758	2	130	13 18 3	0.889	Engine taken to pieces.
5	Royal George	700	23,733	46,794	11	121	161 7 8	0.828	Boiler with a flue and one returning tube.
6	Experiment	4,400	122,442	241,420	70	62	53 1 2	0.053	ditto
7	Rocket	3,940	109,512	215,925	64	68	57 0 9	0.063	ditto
8	Victory	10,600	349,150	688,418	107	25	58 3 10	0.020	ditto
9	Globe	3,120	70,682	139,365	60	72	36 4 6	0.062	Boiler with 120 returning tubes.
10	Planet	1,200	20,429	40,280	27	105	53 7 5	0.318	" with 88 "
11	North Star	2,400	47,546	93,746	55	77	32 5 10	0.083	" with 88 "
12	Majestic	2,880	90,422	178,282	47	85	131 2 3	0.177	" with 104 "
13	Coronation	2,940	97,687	192,609	52	80	46 16 2	0.058	" with 104 "
14	William IV.	4,060	134,540	265,075	55	77	78 19 8	0.072	" with 104 "
15	Northumbrian	4,480	143,885	283,698	59	73	67 14 11	0.057	" with 104 "
16	Director	5,860	202,492	399,253	91	41	107 19 11	0.065	Boiler with tubes on the model of Napier's patent.
17	Lord Brougham	4,780	155,729	307,051	62	70	62 5 10	0.049	Boiler with 104 returning tubes.
18	Shildon	4,720	159,400	314,289	63	22	49 16 3	0.038	" with a flue and two returning tubes.
19	Darlington	6,180	200,110	394,559	88	44	45 0 6	0.027	" with a flue and two returning tubes.
20	Adelaide	3,700	126,390	249,202	71	61	90 11 7	0.087	" with 104 returning tubes.
21	Earl Grey	7,960	276,462	545,088	110	22	14 19 6	0.007	" with a flue and two returning tubes.
22	Lord Durham	6,480	213,737	421,424	84	48	67 13 8	0.039	" with 104 returning tubes.
23	Wilberforce	4,200	141,534	279,062	55	9	51 17 11	0.045	" with 104 "
	Sums	94,080	2,942,925	5,802,562	1403	1518	1393 13 0	0.058	

The greatest part of the machines were constructed by Mr. Timothy Hackworth, of Shildon, near Darlington, and bear testimony to his skill. Twelve of them were almost new at the time this statement was made.

§ 2. *Expense for Maintenance of Way.*

The expenses for keeping the Liverpool Railway in repair, during the year we are considering, are given in the reports that will be found below. From the sums put down must be deducted the articles *ballast* and *new rails*, the first being caused by the recent construction of the road, that is to say, by the gradual sinking of the embankments, which are not completely compact, and the second being an extraordinary replacing of the rails on a part of the line.

Putting, therefore, those two articles aside, the expenses for repairing the railway, during the year ending on the 1st of June, 1834, were

£11,053 2*s*. 6*d*.

During the same time, the loads that passed on the railway drawn either by the company's engines, or by engines belonging to other companies, were

Goods on the whole road	139,328 t.	
—— on the half of the road 24,934 t., making on the whole line . .	12,467	
—— between Bolton and Manchester or Liverpool 38,-341 t., or on the whole road . .	19,170	
Coals on the half of the line 86,173, or on the whole . .	43,086	
		214,051 t.
Correspoding wagons ($\frac{1.5}{3.5}$ of the weight of the goods) . . .		128,431
Wagons brought back empty (¼ of the whole)		32,108
Carriages, and passengers' luggage, as above		140,662
Sum . .		515,252 t.

Thus 515,252 gr. t. passed on each mile of the railway, having amounted to £11,-053 2*s*. 6*d*., or to £368 8*s*. 1*d*. per mile, the expense per mile for each ton carried was

0.171*d*.

In this calculation we have only taken the *useful* length of the railway; that is to say, that we have omitted the sidings, &c., they being only the necessary complement of the principal line.

On the Darlington line, during the same year, the expenses for repairs on the 24 miles run over by the locomotive engines, were

Workmen	£4,253 0 0
Materials	2,060 0 0
	£6,313 0 0*

The weight that passed during the same time, on that part of the railway, was:

Coals, 6,764,951 tons carried to distance of one mile, or upon the whole of the 24 miles	281,873 t.
Corresponding wagons ($\frac{1.30}{2.65}$ of the weight of the goods)	138,277
Wagons going up the line (same weight)	138,277
	558,427 t.†

The expenses for the whole of these 24 miles amounting to £263 0*s*. 10*d*. Thu the expenses for maintenance of way, per mile, and for each gross ton conveyed on the road, were

0.113*d*.

We have here also, as well as above, left out the crossings, sidings, &c.

* The total expense for repairs of the line, during the year we are considering, were

Workmen	For the 24 miles run over by the locomotive engines . .	£4,253 0 0
	For the 16 miles worked by horses or stationary engines	1,067 5 0
Materials for repairs	Space run over by the locomotive engines . .	2,060 0 0
	Parts worked by horses or stationary engines	518 3 8
Repairs to bridges . . .		69 17 7
Repairs to walls and fences .		280 7 11
Accidental expenses . .		467 3 7
Total expenses .		£8,715 17 9

N. B. The distinction between the expenses relating to the space run over by locomotive engines and by horses, could only be made by approximation; as the company does not keep separate accounts in that respect.

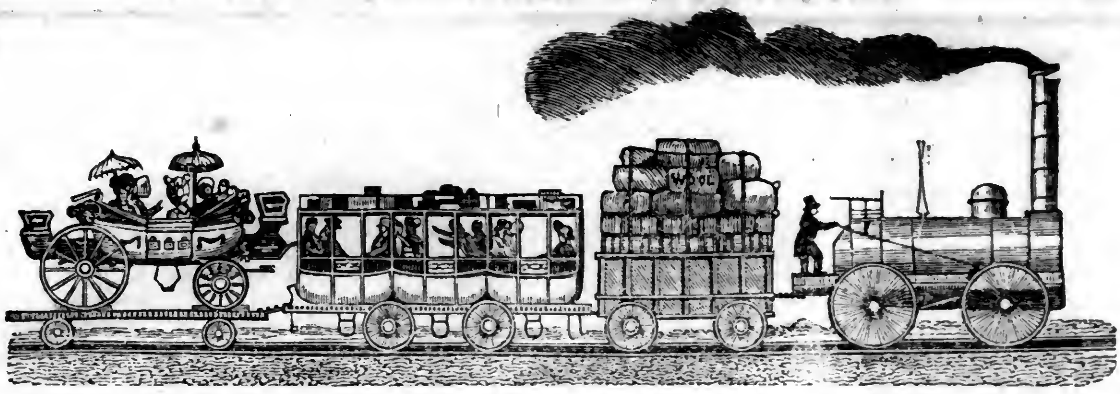
† Besides this weight, there passes on the line a small number of stage coaches, which for the last few months have been drawn by locomotive engines. But this haulage being inconsiderable, we did not wish to embarrass our calculation with it

This amount would undoubtedly be diminished if the Darlington wagons were on springs, like those of the Liverpool Railway.

These expenses, as we have seen, amount only to the two-thirds of those of the Liverpool Railway for the same object. The difference is owing to the rapid motion of the engines and carriages that pass on the latter railway. But it is chiefly in the expense for repairs of engines that this effect of velocity is felt.

It must not, however, be supposed that the considerable difference observed in that respect, between the engines of the two companies, is exclusively owing to the velocity of the motion. That velocity enters, indeed, for a great part in it, but the conditions attending each sort of business have a no less considerable influence on it. What we mean is, that passengers forming the chief business on the Liverpool line, their safety requires that a much greater care be taken of the engines than when the load is composed only of coals, as on the Darlington Railway. The consequence is, that the Liverpool engines are kept with a degree of care, we might even say of luxury, to which the Darlington ones can by no means be compared. In order to explain completely our idea, we shall say that the business of the Darlington Railway is a business of wagonage, and that of the Liverpool Railway a business of stage coaches.

(To be Continued.)



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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D. K MINOR, EDITOR.] SATURDAY, JUNE 25, 1836. [VOLUME V.—No. 25.

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 25, 1836.

STEAM-BOAT NOVELTY.

We have frequently desired to refer more particularly to the operations and experiments of DR. NOTT, than we have felt at liberty to do; inasmuch as we were aware of his desire to avoid newspaper or periodical notoriety; we cannot, however, refrain from embracing the present opportunity of expressing our admiration of the perseverence with which he has pursued his experiments on the use of anthracite coal for steam navigation.

We conceive that Dr. N., in perfecting his machinery, has laid society under the greatest obligations—we need only point to the destruction of our forests—where is our wood to come from if each of our immense boats consumes 30 to 40 cords per day? We have not been in the habit of considering our forests as other than inexhaustible, but such is the state of things no longer, and we hear complaints from every quarter. Indeed no one could witness the enthusiasm with which the success of the experiment was hailed in every place and at Albany in particular, without being convinced that the substitution of coal for wood has been made *not one day too soon.*

We had the pleasure of being of the party to Albany last week in this beautiful boat. Seldom has it fallen to our lot to make a more pleasant trip. The perfect feeling of security combined with the consciousness of the boat's great speed produced in us a sensation of pleasure as agreeable as unusual.

The Novelty is 252 feet long—certainly our longest boat and we think the largest in the world—her engines are horizontal—two large ones, and a small one for blowing the fire, pumping, &c.

The grates are on the principle of Dr. Nott's improvements in the use of Anthracite coal—the boilers are tubular.

The economy of the various parts of the machinery is beautiful, but we shall not attempt a description in detail. It is sufficient to say that the operation of the boat is most successful. We have never made a passage during which we have less felt the vibration of the machinery, and notwithstanding the boat's great length the motion at her extreme ends as well as beside her machinery was far less than usual.

The great object of the proprietors has been the saving in fuel, and this has been attained most ingeniously. The cost of fuel is less than one half of that in the wood boats. Nineteen to twenty tons will probably be used in a trip.

On Thursday last during the passage the boat had to contend with ebb tide—a freshet in the river—strong N. E. wind. Her time was as follows:

		h.	m.
Left	New-York	6	27
Passed	Teller's Point	9	27
	Verplanks's Point	9	57
	Caldwell's	10	5
	West Point	10	40
	Newburgh	11	28
	Poughkeepsie	12	32
	Hyde Park	1	4
	Rhinebeck	1	52
	Barrytown	2	52
	Bristol	2	57
	Catskill	3	43
	Hudson	3	57
	Coxsackie	4	29
	Baltimore	5	5
	Coeyman's	5	17
Arrived at	Albany	6	37

Making the whole passage in 12 hours 10 minutes.

An accident before leaving the dock, injured the iron attached to the rudder and prevented the more rapid alteration of the course of the boat, particularly in following the shore to avoid the tide and catch the eddy. This had considerable influence in coming down the river.

On the return of the boat on Saturday two flood tides were encountered, the one at Baltimore, the other at the Highlands. The times were as follows:—

Left	Albany	8	5	
Passed	Coeymans	9	6	
	Baltimore	9	15	
	Cocksackie	9	43	
	Hudson	10	15	
	Catskill	10	54	
	Tivoli	11	21	
	Barrytown	11	38	
	Rhinebeck	11	58	
	Hyde Park	12	36	
	Poughkeepsie	12	58	2¼ lost
Passed the Erie, coming up		1	2	
	Newburgh	1	52	
	West Point	2	20	
	Caldwell	2	54	
	Yonkers	4	35	
Arrived at	New-York	5	58	

Deducting the landing, making the passage in 9 hours 45 minutes.

Below Poughkeepsie, came in sight of the morning boat, the Champlain, she having left Albany at 7 o'clock, making her usual landings.

She came into the wharf about ½ a mile, or ¾, ahead of the Novelty. From Newburgh down to New York, dense volumes of smoke issued from all four pipes of the Champlain, proving the enormous consumption of fuel; while we feel it our duty to say, that no strain whatever was upon the Novelty—she going at such a rate as is entirely practicable every day.

No coal was put into the furnaces for the last thirty miles on either trip; and while the other boat was smoking furiously, the firemen of the Novelty were upon the front deck cooling themselves, and rejoicing in their light work. They, at least prefer coal to wood.

Speed is certainly desirable, and we were agreeably surprised to find this boat move with such rapidity on a first voyage, when every thing must be new to the hands, having never before used such fuel; whereas,

in the ordinary engines, the practice of many years is extended to their benefit. But safety is the all-important object, and never could we desire a more safe mode of conveyance. The terror of a rupture of the boiler is here unknown. Should a boiler burst, it would only result in the collapse of a small tube, and put out the fire.

We can add nothing more than to inform our readers, that this boat is commanded by Capt. Seymour, assisted by Capt. Lewis, so long and creditably known upon the North River; we can answer for the treatment his passengers will receive.

RAILROAD CONVENTION.

The period for the meeting of the Great Southern Railroad *Convention* at *Knoxville*, Tennessee, is at hand. The object of that meeting, viz.. the *connection of the southern seaboard at Charleston, S. C., with the Ohio at Cincinnati, and probably at Louisville, Ky.*, is worthy the attention of all the friends of Internal Improvement; and it will, we are sure, be ably advocated by those selected to attend the convention.

It was our *intention* to be at Knoxville during the Convention, but other engagements will prevent; we must therefore rely upon some friend to furnish the proceedings at an early day for the Journal.

RAILWAY IN ILLINOIS.

We give in this number of the Journal a map of Illinois with the principal rivers, towns, and chartered railroads delineated thereon. The object of this map is to give to the people of this eastern section of the country, a better idea of the State of Illinois, and its progressing, and contemplated improvements, than they now possess—and, although it is not as full as we could desire, yet, it will be found of much use to those who contemplate a visit, or removal to that fertile region. We have not the necessary documents before us, to go into a full, or general description of the various improvements laid down on this map, yet we cannot permit the opportunity to pass without calling attention to one or two of them, and we will commence by referring to No. 1, the National road which is now in progress as far as Vandalia. An Engineer is engaged in surveying the route from thence to Jefferson city, crossing the Mississippi river at Alton; there is no doubt but that it will be continued, at least to that point.

2, and 3. The road from Alton, on the Mississippi, to Springfield, in Sagamonn county. Alton is a very flouishing town—city we shall have soon to say—situated about 2½ miles above the mouth of the Missouri, and eighteen miles below the mouth of the Illinois rivers. Alton is said to have the best steam-boat landing on the east bank of the Mississippi, having a natural wharf of rock, of a convenient heighth and level surface. The Penitentiary is located there, and there are many who think it will yet become the capitol of the State. There is an abundance of good timber, bituminous coal, lime stone, free stone and hydraulic cement in its immediate vicinity. The town is laid out upon a liberal scale, having *five* squares reserved for public purposes, and streets of 150, 100, 80 and 60 feet in width according to their location. It has already several large wholesale stores and steam mills—and must eventually beyond all question become a very important place.

The railroad from Alton to Springfield has been surveyed, the company organized and measures adopted for an early and efficient prosecution of the work. It will be connected with other roads, particularly that leading from Springfield to Danville through Decatur—and another from Springfield through Jacksonville to Meredosia, on the Illinois, and Quincy on the Mississippi rivers, both of which are chartered and the stock of the latter we understand is taken.

4. Rail Road from Danville to Springfield by Decatur, 110 miles,—already chartered. This road, when completed, will connect Alton with Danville.

5. Rail Road from Springfield to Quincy by Jacksonville and Meredosia, 90 miles. Chartered. Will open a rail road communication between Alton and Quincy.

6. Rail Road from Alton to Galena via Carrolton, Jacksonville, Beardstown, &c. Chartered. Distance, 350 miles.

7. Rail Road from Grafton to Springfield iva Carrolton and Waverly. Connects with the Alton and Galena road at Carrolton.

8. Rail Road from a point on the Illinois river on the Jacksonville and Waverly, to intersect the Alton and Springfield Rail Road at Auburn.

9. Rail Road from Alton to Mount Carmel on the Wabash. Chartered. 150 miles.

10. Rail Road from Alton to Shawneetown. Chartered. Distance, 150 miles.

11. Rail Road from Galena to Ottawa (or the termination of the canal,) and thence to the mouth of the Ohio. Chartered. Intersects the Alton and Shawneetown Rail Road, and connects Alton with the mouth of the Ohio.

12. Canal from Chicago to Ottawa, 95 miles. Commenced this year.

This canal is to be 36 feet wide at bottom, 60 at its surface and 6 feet deep—It *should be eighty* feet wide and *eight* feet deep, with Locks of sufficient dimensions to admit the passage of *Steam Boats*; and it will have to be enlarged to those dimensions *within ten years*.

13. Rail Road from Danville to La Fayette, proposed by Indiana. At La Fayette the Wabash and Maumee terminates. From La Fayette Rail Roads are projected by Indiana to Evansville, and through Indianapolis to New Albany, Madison, and Lawrenceburg on the Ohio River, and from Lawrenceburg a Rail Road is to be made to Cincinnati, connecting Alton with all these places.

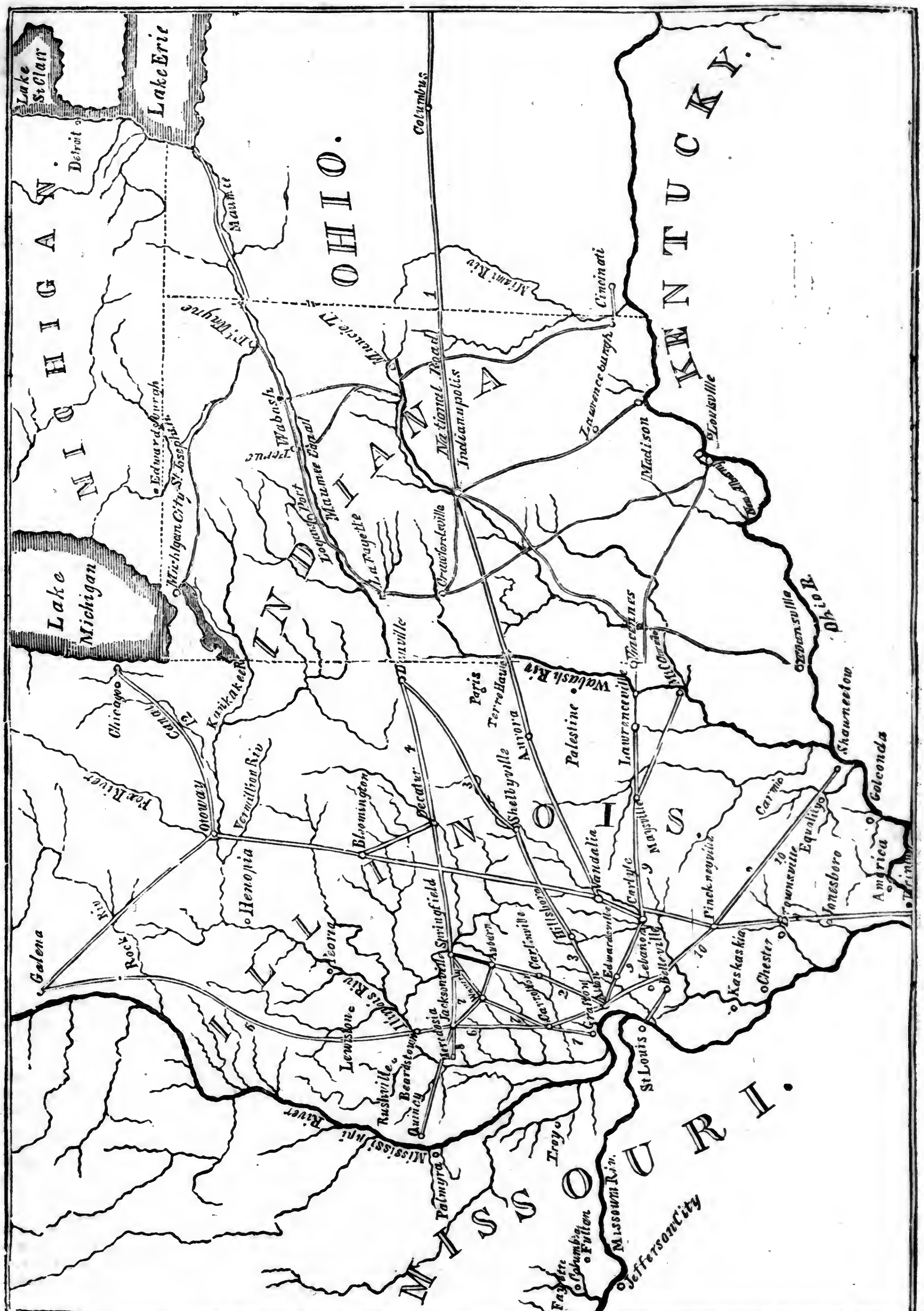
The preceding brief description of the several improvements which were authorized, and undertaken on the part of the State, by the law of last Session of the Legislature, and which are therefore properly included in what is termed the state system of internal improvement, will be found highly interesting to those who are in any way connected with the prosperity of Indiana. It is proper to remark, however, that in addition to these, a railroad from Indianapolis to Lawrenceburg has been commenced, and is now in progress by an enterprising company under a charter from the State; and numerous others will doubtless be undertaken by the inhabitants, by which the state works will be intersected, and connected in various other places, thereby giving to every part of the State those facilities which are essential to the proper developement of its immense resources; and at the same time give to the soil of an infant, and but recently, *wilderness* state, the value and advantages of an old and thickly settled country.

INDIANA.—INTERNAL IMPROVEMENTS, &c.

We have been furnished with documents which enable us to lay before our readers the following facts, referring to the map. They give the reader a better idea of those works than we have before been able to furnish.

The system of public works authorized by the act of the last Legislature, authorising the loan of ten millions of dollars, embraces the following described routes, which will be better understood by an examination of the map of the State, of which a copy may be seen at our office, or of the accompanying map of Illinois and Indiana together.

1st. The Wabash and Erie Canal.—This improvement is decidedly the most important one in the State. It commences at the head of steamboat navigation, on the Maume river, which empties into Lake Erie at its extreme western point, and follows up the valley of that river to Fort Wayne, and down the Wabash to La Fayette, thence to Terre Haut, and Evansville, on the Ohio river, and may indeed be called the basis or main trunk of the system, inasmuch as all the other lines are designed to connect with it, and will find their outlet to a northern market through this channel. Besides affording an outlet to market for half the State of Indiana, it will also form, when extended to the Ohio, one of the principal channels of trade between Lake Erie and the western and south western states. Additional importance is given to the work from the fact that a Railroad is about to be commepced at Alton, Illinois, near the mouth of the Missouri, which is designed to intersect the Wabash and Erie Canal at Covington, or La Fayette; passing across the entire state of Illinois, and thus open the most direct route from New York to St. Louis, and the whole south western country. This canal was authorized some years ago as far west as the mouth of the Tippacanoe, the point to which steamboats can ascend during high water; the work has been for some time in progress, and within the present season 65 miles will be navigable. But the navigation of the Wabash river, though highly important to the country, is believed to be entirely inadequate to the increasing commerce of this route, especially if the transit trade be taken into the account. The improvement of the river for steamboat navigation has been suggested, but owing to the very sandy


Lake St Clair
Lake Erie
Lake Michigan
MICHIGAN
OHIO.
INDIANA
ILLINOIS
KENTUCKY.
MISSOURI.
Detroit
Columbus
Maumee
Miami Riv
Cincinati
Ft Wayne
Wabash
Indianapolis
National Road
Lawrenceburgh
Madison
Louisville
New Albany
Michigan City
St Josephs
Edwardsburgh
La Fayette
Logans Port
Maumee Canal
Crawfordsville
Vincennes
Evansville
Ohio R.
Wabash Riv
Terre Haute
Paris
Palestine
Lawrenceville
Shawneetown
Golconda
Carmi
Equality
America
Jonesboro
Brownsville
Chester
Kaskaskia
Pinckneyville
Maysville
Carlyle
Vandalia
Lebanon
Belleville
Edwardsville
Alton
Grafton
St Louis
Hillsboro
Carlinville
Carrollton
Auburn
Springfield
Jacksonville
Meredosia
Beardstown
Rushville
Quincy
Lewistown
Illinois Riv
Peoria
Henopia
Rock Riv
Galena
Ottoway
Vermillion Riv
Fox River
Chicago
Canal
Kankakee
Bloomington
Decatur
Shelbyville
Aurora
Danville
Mississippi River
Palmyra
Troy
Missouri Riv.
Jefferson City
Fulton
Columbia
Fayette

character of its bed from the Tippacanoe to the rapids, any valuable improvement of the navigation is supposed to be impracticable. Under these circumstances it was considered highly interesting and important to the country, that when during the examinations of last year, it was ascertained to be entirely practicable to extend the canal down the Wabash river to Terre Haute, the point where the national road crosses, and thence across the country in a southeasterly direction, intersecting the Central Canal in Green County, through which canal it will be connected with the Ohio river at Evansville. The law contemplates this extension and connection. The whole length of the canal from the east line of the State to its junction with the Central Canal will be about 270 miles, from thence to the Ohio river about 110 miles, and the whole distance from Lake Erie to the Ohio river by this route is about 460 miles.

2d. The Central Canal.—This improvement is designed chiefly to open to the central region fo the State, an outlet both to a northern and southern market. It will diverge from the Wabash and Erie Canal at the most suitable point between Fort Wayne and Logansport; thence passing the fertile valleys of th Mississinewa and White rivers to the national road; thence down the west fork to the Ohio river at Evansville. The southern portion of this canal passes through a country abounding in coal and probably iron. The whole length of the canal will be about 290 miles.

It is proper to remark here that about 110 miles of this route, next to the Ohio, will be common both to the Central and the Wabash and Erie Canals, inasmuch as it will form the outlet for both. It will be perceived also, that these canals will form a perfect water communication between Lake Erie and the Ohio river at Evansville by two different routes, after it passes Fort Wayne, one passing down the valley of the Wabash, and the other through the valley of the Mississinewa and White river, passing the seat of government at Indianapolis These canals will open a *mine* of far more value to Indiana than mines of gold.

3d. The White water Canal.—The chief object of this improvement is to convey to market the surplus agricultural productions of a very fertile and well cultivatad district of country. It commences at the national road in Wayne county near the east line of the State, and passes down the White water valley to Lawrenceburgh on the Ohio river, a distance of 76 miles. It is however provided in the bill, that the north end of this canal shall at some future day be connected with the Central canal in Delaware county, thus making another connection between the Ohio river and Lake Erie, through the White water, the Central, and the Wabash and Erie canals. This connection is required to be canal if that mode be practicable, but if not, by a Railroad.

4. The Madison and Lafayette Railroad.—This work commences at the town of Madison, on the Ohio, and extends through the rich country drained by the east fork of White River to Indianapolis, and thence to Lafayette on the Wabash and Erie Canal; crossing, as it does at the seat of Government, both the central canal and the national road, it will receive the travellers which these works will concentrate at that point, and convey them in five hours to the Ohio. The constant intercourse which must ever be maintained by business men and others, in the interior, with the Ohio River, will, it is believed, cause sufficient travelling to sustain this road. Some of the products of the state will doubtless be conveyed to market on the road, though for those of a heavy and bulky nature, which may be raised near the centre of the state, it is supposed that the canal will afford the cheapest conveyance, and therefore be preferred. The merchandise designed for the interior, especially that which may be brought down the Ohio, will be conveyed on this road, and will form a source of considerable revenue. The length of the road will be about 160 miles.

5th. The Jeffersonville and Crawfordsville road.—This will connect the Ohio river at a point opposite Louisville, with the Wabash and Erie canal, by a route passing nearly parallel with the Madison and Lafayette Railway, though so far from that road as to depend for its trade and business upon a different district of country. This road will form the channel of trade and intercourse, both to the north and south, for a large district of the state, embracing several fertile and well-improved counties. The route of this road, crossing as it does the main vallies and ridges of the state, is so undulating as to render it questionable whether a railroad or Macadamized road would be most beneficial to the country. The law gives the preference to a railroad, and directs further examinations and surveys for this mode of improvement; but if, after full investigation, the Board of Intetnal Improvement should find the country too hilly for a railroad, they are, in that case, directed to construct a Macadamized road. The road will be about 158 miles in length.

6. The new Albany and Vincennes Macadamized Road. This improvement will connect the Ohio River at New Albany (near Louisville) with the Wabash River at Vincennes, crossing the central canal. The route being transverse to the main vallies which drain the country, and consequently very undulating, a Macadamized road was thought to be more beneficial to the country than a railroad with such extreme ascents and decents. The course of this road has long been the main route for travellers who pass by land from Kentucky, or the southern states, into Illinois or Missouri. It is believed, therefore, that besides subserving the interest and wants of the country through which it passes, it will also be important to the country as a general thoroughfare. The road will be about 104 miles in length.

7. The Michigan and Erie Canal or Railroad. This improvement is designed to complete the connection between the south end of Lake Michigan and the west end of Lake Erie. The work will unite with the Wabsah and Erie Canal, near Fort Wayne, and extend thence through the beautiful and fertile valies of the Elk hart and the Big St. Joseph to Michigan city. The law directs the connexion to be formed by canal, if found practicable, and if not, by railroad.

PAMBOUR ON LOCOMOTION.

Continued from page 380.

CHAPTER VI.

§ 3. *Experiments on the Effects of the Lead.*

The foregoing calculation gives us the loss of power produced in the engine in consequence of the lead.

However, no research having as yet been made on the subject, every thing is at present regulated by opinion alone. There are some engine builders that give no lead at all; others only $\frac{1}{16}$, or $\frac{1}{8}$ in. at most; others, on the contrary, give $\frac{5}{8}$ in. or more. Although the lead, if moderately used undoubtedly facilitates the working of the engine, it is also evident, that if carried too far, it must at last stop its effect. For that reason, we resolved to undertake some experiments on the subject.

In our research, we first made use of the Leeds engine, and we made the three experiments of the 15th of August, related above (Chap. V. Art. VII. § 1); the first with a lead of $\frac{1}{8}$ in.; the second with no lead; and the third, with a lead of $\frac{3}{8}$ in. But as the change in the load, in the pressure, and in the inclination of the road, caused naturally much complication in the results, we soon gave up that engine, and took in its place the Vesta. An ingenious apparatus, invented by Mr. J. Gray, of Liverpool, and fixed to this engine, made it easy to change the lead without interrupting the journey; so that, with the same load, and on the same spot, the engine could be tried successively with different leads. This effect was produced by means of three notches, placed more or less backward on the eccentric, and on which the driver might be brought at will, by means of the common catching lever. The first of these notches gave a lead of $\frac{1}{8}$ in., the second of $\frac{3}{8}$ in., and the last corresponded with a lead oi $\frac{5}{8}$ in. To make the difference more remarkable, we endeavored to obtain a comparrison between the first and the third of these positions of the slide.

The reader will recollect that the Vesta engine has the following proportions:—

Cylinders - - - - - -	$11\frac{1}{4}$ in.
Stroke of the piston - - -	16 in.
Wheel - - - - - - - -	5 ft.

I. On the 16th of August 1834, arriving with the engine and a train of 20 wagons at the foot of the inclined plane of Whiston, the inclination of which is $\frac{1}{96}$, all the train was taken off except the seven first wagons, weighing together 34.43 t., and with the tender, 39.93 t.; and the engine endeavored to ascend the plane with that load.

The lead was first regulated at $\frac{5}{8}$ in. Arrived at the foot of the plane with an acquired velocity of 10 miles an hour, the engine continued its motion for some time, but slackened visibly; and, after baving travel-

led ¾ mile, it stopped; the pressure being 23½ lbs. by the balance.

The lead was reduced to ⅛ in. The engine set off again, and reached the top of the plane with a velocity of 14 complete strokes of the piston per minute, the pressure by the balance being reduced to 23¼ lbs.

II. In the evening of the same day, the engine having taken to the same place a train of eight loaded wagons, and 12 empty ones, the eight wagons alone were left attached, their aggregate weight being 27.05 t., and with the tender, 32.05 t. With that load it began the ascent of the plane with an acquired speed of 10 miles an hour.

Lead, ⅝ in. The engine arrived at the top without stopping. Pressure at the balance, 23 lbs. Velocity, 46 complete strokes of the piston per minute.

III. The engine having returned to the bottom with the same eight wagons, six empty ones were attached behind them, making with the loaded wagons a total weight of 43.18 t., and tender included, 48.18 t.

This load was too much for the engine, even with its smallest lead. Pressure, 23 lbs. Two of the empty wagons were taken off.

IV. The engine then drew a train of eight loaded wagons and four empty ones, making together a weight of 34.05 t., and tender included, 39.05 t.

A lead of ⅝ in. was given; the engine was unable to start on the plane.

The lead was reduced to ⅛ in.; the engine started, and augmented gradually its velocity, giving successively 11 strokes of the piston per minute; then 11 again, then 14, and then 17.

The lead was once more tried at ⅝ in.; the engine stopped again.

The lead of ⅛ in. was resumed; the train started again. Pressure during the whole experiment, 23 lbs. by the balance.

V. The train continuing to ascend, two more empty wagons were taken off; there remained then, in all, eight loaded and two empty ones, weighing together 30.38 t., and with the tender, 35.38t.

Lead, ⅝ in. The engine stops; pressure, 23 lbs. by the balance.

Lead, ⅛ in. It starts again; same pressure.

VI. At last one more empty wagon is taken off, and the weight of the train is reduced to 28.55 t., and tender included, to 33.55 t.

Lead, ⅝ in. The engine stops; pressure, 23 lbs. by the balance.

Lead, ⅛ in. It starts again, and reaches the top, although, in consequence of the length of the experiment, the pressure diminishes by degrees from 23 to 21½ lbs. by the balance.

The engine executed thus, at 21½ lbs. pressure, what, with a lead of ⅝ in., it could not execute with a pressure of 23 lbs.

This series of experiments gives us very nearly the exact measure of the power of the engine in both cases, or the loss of power resulting from the difference in the lead.

§ 4. *Table of the results obtained in these Experiments.*

In order to place these experiments together before the eyes of the reader, we unite them in the following table:—

EXPERIMENTS ON THE EFFECTS ON THE LEAD.

Name and designation of the Engine.	Number of the Experiment.	Load of the Engin tender included.	Lead ⅝ inch. State of the motion.	Lead ⅝ inch. Effective pressure in pounds per square inch, by the balance.	Lead ⅛ inch. State of the motion.	Lead ⅛ inch. Effective pressure in pounds per square inch, by the balance.
		tons.		lbs.		lbs.
VESTA, Cylinders. 11⅛ in.	III.	48.18	stopped	20..23 = 56.5	stopped	20..23 = 56.5
Stroke .. 16 in.	I.	39.93	stopped	20..23.5 = 58	star.agn.	20..23.5 = 57.25
Wheel .. 5 ft.	IV.	39.05	stopped	20..23 = 56.5	star.agn.	20..23 = 56.5
Weight .. 8.71 t.	V.	35.38	stopped	20..23 = 56.5	star.agn.	20..23 = 56.5
Friction .. 187lbs.	VI.	33.55	stopped	20..23 = 56.5	star.agn.	20..21.5 = 52
	II.	32.05	continued its motion	20..23 = 56.5		

According to those experiments, all that an engine can do with a lead of ⅝ in., is to draw a load weighing, without the tender, 27.05 t.

And with a lead of ⅛ in., it will be able to draw a load weighing, without the tender, 34.05 t.

Thus comparing the *useful effects* of the engine in the two cases, we see that they are in the proportion of 4 to 5, which constitutes in practice a considerable advantage in favor of the smallest lead.

In order, however, to obtain an *absolute* measure of the power an engine is able to display in the two circumstances, we must calculate the total resistance that was opposed to the motion of the piston in each case.

In the first, the engine drew a load, tender included, of 32.05 t. on an inclination of $\frac{1}{86}$. On account of the gravity of the mass on the plane, including 8.71 t. for the weight of the engine, the train was equal, on a level, to a load of 160 t.

In the second case the engine drew on the same inclination a train of 39.05 t., equal to a load of 189 t. on a level.

We see that these numbers agree very nealry with those deduced from calulation. If those given by the experiment seem to be a little larger, the reason is because we reckon the tender at an invariable weight of five tons,—whereas, during this long experiment, the consumption of water and coke must have made it descend considerably below that weight, though we had no possibility of weighing the tender, and consequently we could not take the difference into account. We have said, that when the tender is quite empty, its weight is no more than three tons, which upon a level is two tons less than we reckon here, and makes on the inclined plane at $\frac{1}{86}$, a reduction of eight tons in the load.

We may consequently conclude from experience, as well as from theory, that *the decrease of power occasioned by the lead is in proportion to the resulting decrease in the useful length of the stroke of the piston.*

§. 5. *A Practical Table of the Effects of the Lead.*

In order to facilitate practical researches, we shall calculate here, according to the formulæ laid down above, § 2, a table of the effects of the lead, for different engines of the most usual proportions on railways.

By these formulæ, the velocity of the motion with no lead at all being known, that which will result from a certain lead represented by a, will be to the first in the ratio of

$$\frac{2}{1+\cos\gamma};$$

but, at the same time, the *maximum* load of the engine will be reduced as if the stroke of the piston were reduced to the length

$$\frac{l}{2}(\cos\gamma+\cos\gamma');$$

The arcs γ and γ' being determined by the equations,

$$\operatorname{Sin}\gamma=\frac{2a+4r}{l'},\ \text{and}\ \operatorname{Sin}\gamma'=\frac{2a}{l'}.$$

The reader will recollect that in these formulæ the signs have the following significations:

l, length of the stroke of the piston expressed in feet.

a, lead of the slide.

l' length of the range of the slide.

r, lap of the slide over the apertures of the cylinder.

These three last quantities may be indifferently expressed in feet or in inches, the equations containing only their ratio.

Applying, then, these formulæ to a series of different cases, we form the following table, which will show, at a glance, how the velocity increases when the lead is augmented. As, on the other hand, in the second column, we could not go beyond the load the engine is capable of drawing with its supposed lead, the same table also shows what diminution in the maximum load corresponds to that increase in velocity. It is with a view to make the comparison between these two effects more conspicuous, that we have extended the table further than the importance of the subject seems otherwise to require.

A PRACTICAL TABLE OF THE EFFECTS OF THE LEAD:

DESCRIPTION OF THE ENGINE.		Load in gross tons, tender included	Velocity in miles per hour, the lead being			
			0.	⅛ in.	¼ in.	⅜ in.
		tons.	miles.	miles.	miles.	miles.
Engine with cylinders 11 in. or	0.917 ft.	50	31.02	31.52	32.51	34.23
Stroke 16 in. or - - -	1.33 ft.	100	21.68	22.02	22.72	23.92
Wheel - - - - -	5 ft.	141	17.39	17.66	18.22	19.18
Friction - - - -	120 lbs.	155	16.28	16.54	17.06	0.
Heating surface - - -	140 sq. ft.	163	15.72	15.96	0.	0.
Effective pressure in boiler -	50 lbs.	165	15.58	0.	0.	0.
Range of the slide - -	3 in.					
Lap over the appertures -	⅛ in.					
Engine with cylinders 12 in. or	1 ft.	50	27.80	28.24	29.13	30.68
Stroke 16 in. or - - -	1.33 ft.	100	20.05	20.37	21.01	22.12
Wheel - - - -	5 ft.	150	15.68	15.93	16.43	17.30
Friction - - - -	150 lbs.	168	14.56	14.79	15.25	16.06
Heating surface - - -	140 sq. ft.	183	13.72	13.94	14.38	0.
Effective pressure in boiler -	50 lbs.	193	13.22	13.43	0.	0.
Range of the slide - -	3 in.	196	13.11	0.	0.	0.
Lap over the apertures -	⅛ in.					
Engine with cylinders 13 in. or	1.083 ft.	50	29.03	29.49	30.42	32.03
Stroke 16 in. or - - -	1.33 ft.	100	21.46	21.80	22.48	23.68
Wheel - - - -	5 ft.	150	17.02	17.29	17.83	18.78
Friction - - - -	165 lbs.	197	14.25	14.47	14.93	15.72
Heating surface - - -	160 sq. ft.	216	13.37	13.58	14.01	0.
Effective pressure in boiler -	50 lbs.	227	12.91	13.11	0.	0.
Range of the slide - -	3 in.	231	12.75	0.	0.	
Lap over the apertures -	⅛ in.					
Engine with cylinders 14 in. or	1.116 ft.	50	29.83	30.30	31.26	32.91
Stroke 16 in. or - - -	1.33 ft.	100	22.56	22 92	23.64	24.89
Wheel - - - - -	5 ft.	150	18.14	12.43	19.00	20.01
Friction - - - -	180 lbs.	200	15.17	15.41	15.89	16.73
Heating surface - -	180 sq. ft.	229	13.85	14.07	14.51	15.28
Effective pressure in boiler -	50 lbs.	252	12.96	13.16	13.58	0.
Range of the slide - -	3 in.	265	12.50	12.70	0.	0.
Lap over the apprtures -	⅛ in.	269	12.37	0.	0.	0.
Engine with cylinders 12 in. or	1 ft.	50	26.16	26.57	27.41	28.86
Stoke 18 in. or - - -	1.50 ft.	100	19.85	20.16	20.80	21.90
Wheel - - - - -	5 ft.	150	15.99	16.24	16.75	17.64
Friction - - - -	165 lbs.	188	13.93	14.15	14.60	15.37
Heating surface - - -	160 sq. ft.	207	13.09	13.30	13.72	0.
Effective presssure in boiler -	50 lbs.	217	12.69	12.89	0.	0.
Range of the slide - -	3 in.	221	12.53	0.	0.	0.
Lap over the apertures -	⅛ in.					

From these results we see that too great a lead detracts a considerable portion from the power of the engine. It is therefore necessary not to exceed, in that respect, certain limits.

It is, besides, easy to know the lead, or to regulate it at any degree.

After having opened the chamber situated under the chimney, and taken off the top of the slide-box, in order to see the slides work, the engine must be pushed gently forward on the rails, until the crank of the axle be perfectly horizontal.

Then the piston is at the bottom of the cylinder. If at that moment the passages which the slide opens to the steam be measured, it will give exactly the lead.

If we wish to alter the lead, we keep the crank in the same position, and loosening the driver which is fastened to the axle only with a screw, we turn the excentric, until the slide, which moves at the same time, opens the passage as much as is wanted. Then we replace the driver so as to fix the excentric in that position. This operation concluded, it is clear that whenever the crank is horizontal, or the piston ready to begin its stroke, the slide will open the passage to the degree required.

There are some ways of altering the lead without opening each time the chimney chamber; but they are not quite exact, and some of them are injurious to the engine.

In the experiments we have related above on the velocity of the load of the engines, the *Vesta* engine was the only one in which the lead was considerable enough to have a remarkable effect on the speed.

CHAPTER VII.

OF THE CURVES AND INCLINED PLANES.

ARTICLE I.

OF THE CURVES.

§ 1. *Of the conical form of the Wheels and surplus of elevation of the Rails, calculated to annul the effect of the Curves.*

We have considered the dispositions proper to the engine, that may either favor or impede its effect. We have still to examine two external circumstances that may have a similar influence on the motions.

The curves offer on the railways an additional resistance, which is so much the greater according as the degree of their incurvation is more considerable.

The wagons being of a square form, tend to continue their motion in a straight line. If, therefore, they are obliged to follow a curve, the flange of the wheel does no longer pass in a tangent along the rail without touching it, as it does in a direct motion. The rail, on the contrary, presents itself partially crosswise before the wheel, and opposes thus its progress, by forcing it to deviate constantly from its direction.

Moreover, the wheel that follows the exterior rail of the curve has naturally more way to travel than that which follows the interior rail. Now in the wagons at present in use, the two wheels of the same pair are not independent of one another. They are fixed on the axletree that turns with them. If therefore the road travelled by one of the two wheels be less than that of the other, the latter one must necessarily be dragged along without turning on the difference of the two roads.

Finally, on passing the curves, the wagons are thrown by the centrifugal force of the motion against the outward rail, the result of which is a lateral friction of the flange of the wheel against the rail, which does not exist in the direct motion.

It is impossible to construct the wheels of the wagons and the railway itself in such a manner that these three additional causes of resistance may be destroyed. The mode we are going to describe, in order to obtain that effect, is that which is already known; viz., the conicalness of the tire of the wheel, and a greater elevation of the outward rail at the place of the curve. But those means have until now been employed only by approximation, and fulfil more or less imperfectly the intended purpose. By sumitting them to calculation, we trust we shall be able to deduce general rules, which will make us certain that the required effect will be obtained.

The particular resistance owing to the passage of the curves, is composed of two distinct parts, as to their causes and their effects.

The first, according to what we have seen above, is occasioned by the waggons being obliged to turn along the curve, which produces an opposition of the rail to the motion, and a dragging of the wheel.

The second is owing to the centrifugal force, and produces the friction of the flange of the wheel against the rail.

The first of these two resistances will evidently be corrected, if we succeed in constructing the wheels of the wagon in such a manner that the wagon may follow of itself the curve of the railway. For that, it will be sufficient to make the wheel slightly conical with its greatest diameter inside; that is to say, towards the body of the wagon, as appears on the engine in fig. 2.

By that disposition, when the centrifugal force throws the wagon on the outside of

the curve, the wheel on that same side will then rest on a tire of a larger diameter. Two effects will result from this. The wagon will no longer tend to follow a straight line. One of its wheels growing larger than the other, will, on the contrary, have a tendency to turn in the direction of the curve. Besides which, the two coupled wheels will naturally travel different lengths of road without any dragging on the rail.

This form of the wheel and its effects being very well understood, we have first to determine what difference of diameter must be created between the two wheels, in order that the wagon may turn of itself with the curve, and how much the wagon must deviate on one side in order to produce that differe ce of diameter. Then we shall see how the railway must be constructed, in order that the centrifugal force of the motion produce of itself that lateral deviation. It will thus be clear, that, those different conditions being fulfilled, the first species of resistance of the curve will be destroyed by the motion itself. Coming to the friction of the flange of the wheel against the rail, we shall determine what degree of conicalness the wheel must have, in order that, even in passing over the most abrupt curve of the railway, the lateral deviation of the wagon may never go so far as to put the flange in contact with the side of the rail. In this way, both by the disposition of the rails and by the form of the wheels, the two species of resistance will be destroyed.

Let us suppose that mm' and nn' (fig. 28) be the two lines of rails of the way. In order that the wagon may follow without effort the curve of the way, it is necessary that, while the outside wheels describes the arc mm', the inside wheel describes of itself the arc nn', which terminates at the same radius as the first. If, therefore, the length mm' represent a circumference of the outside wheel, nn' must also be a circumference of the inside wheel, and the diameters of the two wheels must be in a certain proportion for that effect to be produced.

Let D be the diameter of the first wheel, and D′ that of the second, π being the ratio of the circumference to the diameter, we shall have—

$$mm' = \pi D, \text{ and } nn' = \pi D'.$$

Now the two arcs being both terminated by the same radius, we have—

$$\frac{mm'}{nn'} = \frac{mo}{no}.$$

If we express the radius of curvation oo by r, and the half breadth of the road by e, this proportion may be expressed thus:—

$$\frac{mm'}{nn'} = \frac{r+e}{r-e};$$

then,

$$\frac{D}{D'} = \frac{r+e}{r-e}$$

and, finally,

$$D - D' = D\left(1 - \frac{r-e}{r+e}\right) = \frac{2\,e\,D}{r+e}.$$

This equation shows the difference that must exist between the diameters of the wheels, that the required effect may be obtained.

Our intention being to produce that effect, by pushing the wagon aside on the road, the question is, how much the wagon must be laterally displaced.

This point depends evidently on the degree of conicalness of the wheel.

At Liverpool, the wheels of the wagons have 3 ft. diameter at the interior part or near the flange, and 2 ft. 11 in. at the exterior part. The wheel is originally cylindrical, but the conical form is produced by the addition of a second tire, the breadth of which, not including the flange, is ½ in. less on one side than on the other. Fig. 29, represents the section of that tire on a scale of ¼. Its breadth being 3½ in., we see that its conical inclination is ½ in. on 3½ in. or $\frac{1}{7}$

Let us suppose in general the inclination of the tire expressed by $\frac{1}{a}$. The two wheels running originally upon equal tires, in order that the difference D—D′ be produced in their diameters, by the displacing of the tire on the rail, this lateral displacing of the wheel must evidently be

$$\tfrac{1}{4}\,a\,(D - D');$$

for the inclination of the tire being $\frac{1}{a}$, this displacing will produce on the thickness of the tire, or on the radius of the wheel, a difference of

$$\tfrac{1}{4}(D - D'),$$

which will make on the diameter

$$\tfrac{1}{2}(D - D').$$

This difference on the diameter will be produced in plus on the outside wheel, and as an equal difference, but in a contrary sense, that is to say, in minus, will be produced on the inside wheel; the result will be a total difference of D — D′ between the actual diameter of the two wheels, as we have said.

Thus the lateral motion to be produced is

$$\tfrac{1}{4}\,a\,(D - D) = \frac{a\,e\,D}{2\,(r+e)}.$$

We know at present what must be the lateral displacing of the wagon, in order to destroy the first species of resistance. The question now is, to make use of the centrifugal force to produce that effect. It is its natural tendency; but it is evident that that force must produce exactly the necessary displacing, else the defect would by no means be corrected.

If we represent by r the radius of curvation, by V the velocity of the motion, and by m the mass of the body moved, the centrifugal force produced on the curve will be, as is known, expressed by

$$f = m\frac{V^2}{r}.$$

But P being the weight of that same body, and g the accelerating force of gravitation, we have

$$P = gm, \text{ from whence } m = \frac{P}{g};$$

thus

$$f = \frac{P}{g}\,\frac{V^2}{r},$$

which is the expression of the centrifugal force of a body of a given weight P, moving with a velocity V, on a curve the radius of curvation of which is r.

In this expression, g is the accelerating force of gravitation, or the double of the space passed over in the unit of time by a body falling in a vacuum. Taking a second for the unit of time, and a foot for the unit of space, we have $g = 32$. Referring to the same units the velocity V, and the radius of curvation r, we shall have the measure of the centrifugal force expressed by its proportion to the weight P, or represented by a weight.

Let us suppose, for instance, that the velocity of the motion be 20 miles an hour, or 29.3 ft. per second, and the radius of the curve 500 ft.; we shall have

$$f = P \times \frac{\overline{29.3}^2}{32 \times 500} = \tfrac{1}{19}P.$$

So in that case the centrifugal force will be the nineteenth part of the weight of the body in motion.

The sense of the signs being now well understood, we return to the general expression of the centrifugal force.

$$f = P \times \frac{V^2}{gr}.$$

The effort of this force exerting itself in the direction of the radius, its effect will be to push all the wagons out of the curve. If the two sides of the railway are of equal elevation, the wagons will be stopped in the lateral motion only by the friction of the flange of the wheel against the rail. But if we give to the outward rail a surplus of elevation above the inward one, it is clear that, in increasing sufficiently that elevation, we shall be able to master at last the centrifugal force, in such a manner as to permit it only to produce just the displacing we want. In fact, by raising in that manner the outward side, we change the railway in an inclined plane. The wagons placed on that plane ought, by virtue of their gravity, to slip towards the lower rail. On the other hand, the centrifugal force pushes them against the outward rail, which is the highest. We create, then, by that means, a counterpoise to the centrifugal force.

Let us call y the surplus of elevation given to the outward rail (fig. 30); $2e$ being the breadth of the way, the inclination of the plane on which the wagons are placed, is $\frac{y}{2e}$. On this plane, the gravity of a body, the weight of which is P, is expressed by

$$P \times \frac{y}{2e}.$$

This gravity, as we have seen, tends to make the wagons fall within the curve, while the centrifugal force pushes it without. If, therefore, we select the height y, such as may give

$$P \times \frac{y}{2e} = P \times \frac{V^2}{gr},$$

the train, in passing over the curve, will experience no derangement from its original position, because the gravity and the centrifugal force will equilibrate.

But, as for motives already explained, we require the wagon to be pushed aside, a certain quantity expressed by

$$\frac{aeD}{2(r+e)} = \mu,$$

we must endeavor to find out what is the necessary inclination.

Let us then suppose the train already displaced as much as required. Let us imagine, for instance, that the train has been pushed from the position *ab* to the piston *cd* (fig. 30;) that is to say, that the point of the inside wheel that was at *a* become to *c*, at the distance μ from the first point, and that at the same time, the point of the outward wheel that was at *b*, become to *d*. In this situation, the inclination of the plane on which the train is, will be $\frac{y}{2e-\mu}$.

Moreover, the conical inclination of the wheels shows that on the outward side of the curve the wheel will have increased its diameter by a certain quantity, in consequence of the lateral deviation; while on the interior side, it will on the contrary, have diminished of an equal quantity. The tire of the wheel having a supposed inclination of $\frac{1}{a}$, a lateral motion represented by μ, must have produced on each wheel a difference in height represented by $\frac{\mu}{a}$. The effect of that variation of the wheels being to incline the wagon on one side, so that it is raised on one side of the quantity $\frac{\mu}{a}$, and lowered on the other of the same quantity $\frac{\mu}{a}$; the result is a total inclination of $\frac{2\mu}{a}$, which must thus be added to the inclination already produced by the difference of level between the rails.

Consequently the outward side of the wagon will be raised above the interior side of a quantity equal to $y+\frac{2\mu}{a}$; and as the base which separates the two bearing points is measured by $2e-\mu$, the final result is that the wagon will be in the same case as if it were placed on a plane, the inclination of which should be

$$\frac{y+\frac{2\mu}{a}}{2e-\mu}.$$

In order that the centrifugal force may maintain the wagon in that position without throwing it out or letting it fall in, that is to say, so that there may be an equilibrium between the gravity on the plane and the centrifugal force, we must have

$$P\times\frac{y+\frac{2\mu}{a}}{2e-\mu}=\frac{PV^2}{gr},$$

or

$$y=\frac{V^2}{gr}(2e-\mu)-\frac{2\mu}{a}.$$

Substituting for μ its value, this equation becomes

$$y=\frac{eV^2}{gr}\left\{2-\frac{aD}{2(r+e)}\right\}\frac{eD}{r+e}.$$

Knowing, then, the conical form and the diameter of the wheels, as well as the average velocity of the motion and the breadth of the way, this expression will give the surplus of elevation y that suits the radius of curvation r.

Let us suppose that we have to employ the dimensions of the railway and wagons of Liverpool; that is to say, that we have:

V, average velocity, 20 miles an hour, or 29.3ft. per. second.

$\frac{1}{a}$, inclination of the tire of the wheel, $\frac{1}{7}$.

e, half breadth of the way, 2.35 ft.

D, diameter of the wheel at its right place on the rail, 3 ft.

If we wish to construct on that railway a curve of 500 ft. radius, on which the wagons may experience no additional resistance the equation will give

$y = 0.236$ ft. or in inches, $y = 2.83$ in.

We must, therefore, for that curve, with that wheel and that average velocity, give a surplus of elevation of 2.83 in. to the outward rail.

Adopting the surplus of elevation of the rail deduced from that equation, we render it impossible, the first species of resistance, which the passage of the curves tend to produce. However, as we only destroy that resistance by a certain lateral deviation of the wagon, it might be feared that that deviation might go so far as to make the flange of the wheel rub against the rail, in which case we would only have substituted one resistance for another. This is, therefore, the point we have still to consider.

We have, until now, supposed the inclination $\frac{1}{a}$ of the tire of the wheel to be given *a priori*. But as it is on that inclination that depends the degree of deviation the wagon must undergo on the rails, it must evidently be such that, even on the most abrupt curve of the line, the lateral deviation of the wagon may never be considerable enough to bring the flange of the wheel in contact with the rail.

Now we have seen above, that the necessary lateral deviation is expressed by

$$\mu=\frac{aeD}{2(r+e)};$$

If, therefore, the wagons have, for instance, a play of 2 in. on the way altogether; that is to say, if, in their regular position, the flanges of the wheels keep on each side at a distance of 1 in. from the rail, the greatest value of the deviation μ, must always be less than 1 in. By that greatest value of μ, we mean the deviation on the most abrupt curve of the line. Consequently, putting for r the radius of that curve, and for μ its maximum, 1 in. or $\frac{1}{12}$ of a foot, the equation will give the greatest value that can be given to the quantity a, or the least value of the inclination $\frac{1}{a}$.

For instance, on a line, the most abrupt curve of which has 500 ft. radius, with wagons having wheels of 3 ft. diameter, and a play of 1 in. on each side of the way. the equation shows that the least inclination one ought to give to the tire of wheel is $\frac{1}{12}$; but a more considerable inclination will answer, *a fortiori*.

On the Liverpool and Manchester Railway, the most abrupt curve, which is the one at the entrance of Manchester, has a radius of 858 ft. This results a conical inclination of $\frac{1}{12}$, and this would answer in all cases; but having said that a greater inclination will fulfil the same object, we are free to adopt a greater inclination, if it suits other purposes better.

It is customary to give an inclination of $\frac{1}{7}$. The motive for making it so considerable, is to prevent all possibility of the flange rubbing against the rail, either in case of a strong side-wind, or in case of some fortuitous defect in the level of the rails, by which the wagons would be thrown on the lower rail. Having seen above that, with an inclination of $\frac{1}{12}$, there would be no danger of the flange rubbing in the curves, that danger will be still more impossible with an inclination of $\frac{1}{7}$.

We conclude that, with wheels having that inclination, the surplus of elevation of the rail which we have determined above, will correct the first species of resistance of the curves without creating the second, and that, consequently, the train will pass over the curves without any diminution of speed.

§ 2. *A Practical Table of the Surplus of Elevation of the outward Rail in Curves, in order to annul the effects of those Curves.*

From what has been said, the surplus of elevation that must be given to the outward rail in the curves, is determined by the following formulæ:

$$y=\frac{eV^2}{gr}\left\{2-\frac{aD}{2(r+e)}\right\}\frac{eD}{r+e}.$$

In this equation the signs have the following value:

D, diameter of the wheel expressed in feet.

r, radius of the curve expressed in the same manner.

e, half of the width of the way expressed in the same.

V, average velocity that is to be given to the motion, expressed in feet per second.

g, accelerating force of gravitation, expressed in feet per second, or $g = 32$ feet.

$\frac{1}{a}=\frac{1}{7}$; consequently, $a = 7$.

y, surplus of elevation to be given to the outward rail of the curve, over the inward rail, expressed in feet and decimals of feet.

Solving these formulæ in the most usual cases on railways, we make out the following table which dispenses with all calculations in that respect.

A PRACTICAL TABLE OF THE SURPLUS OF ELEVATION TO BE GIVEN TO THE OUTWARD RAIL IN THE CURVES, IN ORDER TO ANNUL THE RETARDING EFFECT OF THE CURVES.

Designation of the Wagons and the Way.	Radius of the curve, in feet.	Surplus of elevation to be given to the rail, in inches, the velocity of the motion in miles, per hour, being 10 miles.	20 miles.	30 miles.
	ft.	in.	in.	in.
Wagon with wheel . . . 3 ft.	250	1.14	5.60	12.99
Way . . . . 4.70 ft.	500	0.57	2.83	6.56
Play of the wagon on the way, 1 in., or . . 0.083 ft.	1000	0.29	1.43	3.30
Inclination of the tire of the wheel $\frac{1}{7}$	2000	0.15	0.71	1.65
	3000	0.10	0.47	1.10
	4000	0.07	0.36	0.83
	5000	0.06	0.28	0.66

ARTICLE II.

OF THE INCLINED PLANES.

§ 1. *Of the Resistance of the Trains on Inclined Planes.*

Inclined planes are a great obstacle to the motion on railways.

As soon as the trains reach these inclined planes, they offer a considerable surplus of resistance, on account of the gravity of the total mass that must be drawn up the plane.

Let us suppose a train of 100 t. drawn by an engine. Having seen that on a level the friction of the wagons produces a resistance of 8 lbs. per ton, the power required of the engine will be 800 lbs., when travelling on a level. But let us suppose the same train ascending an inclined plane at $\frac{1}{100}$. On that plain, besides the resistance owing to the friction of the wagons, a fresh resistance occurs, which is the gravity of the total mass in motion on the plane. That gravity is the force by virtue of which the train would roll back if it were not retained; and it is equal to the weight of the mass divided by the number that indicates the inclination of the plane. If, therefore, in this case, the load of 100 t. is drawn by an engine weighing 10 t., the total mass placed on the inclined plane will be 110 t. or 246,400 lbs.; and thus its gravity on the inclined plane, at $\frac{1}{100}$, will be $\frac{246,400}{100}$ lbs. = 2,464 lbs. The surplus of traction required of the engine, on account of that circumstance, is, therefore, 2,464 lbs., and, as we have seen that on a level 1 t. load is represented by 8 lbs. traction, we also see that those 2,464 lbs. represent the resistance that would be offered by a load of 308 t. on a level. Consequently the engine which, before, drew 100 t. must now draw 408 t., or at least must exert the same effort as if it drew 408 t. on a level.

This is the manner in which the calculation of the resistance on inclined planes must be established; and we have entered into those particulars, because it frequently happens that, in making the calculation, the gravity of the load is alone considered, without taking into account the gravity of the engine, which ought also to enter for its share.

In speaking of the fuel, we shall see that the inclined planes of the Liverpool Railway, which at first sight appear quite insignificant, oblige, however, the engines to a surplus of work, which amounts to a sixth part of what they would have to do on a level. By this we see how important it is, in establishing a railway, to keep it on as perfect a level as possible. It frequently happens that, by avoiding to level a part of the road, that is to say, to cut through a hill, or to form an embankment through a valley, a great economy is expected. This is, however, a great mistake, for, in most instances, the only economy is that of the first outlay, whereas, the annual augmentation of expense surpasses by far the interest of the capital saved; so that, instead of an economy, we have in reality a greater expense. This additional expense may even, in some cases, go so far as to paralyze completely all the advantages of the undertaking.

In suffering inclined planes to subsist on a line of railway, it not only becomes impossible to lower sufficiently the freight of the goods; but, what is much more important, frequent accidents occur while descending those steep acclivities, the least inconvenience of which is to destroy public confidence in the safety of the conveyance. It is, therefore, necessary to lay down as a principle, that the end to be aimed at in the construction of a railway, is not only to make a smooth road, but likewise a level one. It is, besides, the only way to apply with efficacy the use of locomotive engines.

When, however, it has been impossible to avoid the inclined planes, and when the use of stationary engines has been rejected on account of the interruption they unavoidably cause in the service, there are only two ways that can be resorted to. The loads must either be regulated so that they may not exceed the power of the engine in going up the plane, or it is necessary to give the engines the help of one or more others, according to what is required.

On the Liverpool Railway, the trains of coaches never being very heavy, are seldom above the power of the engines on the most inclined parts of the line, viz. in the two acclivities of $\frac{1}{96}$ and $\frac{1}{89}$. In general, therefore, the engines ascend these inclined planes without help; and during the rest of the trip, on the level or descending parts of the line, their speed is regulated by partially shutting the regulator.

The trains that are too heavy for a single engine, as are commonly those of wagons, are helped in passing the plane by an engine stationed at the foot of the acclivity, and especially intended for that use. This engine is, consequently, constructed for a slow motion and a considerable power. The cylinders have 12 or 14 in. diameter, with the usual stroke of 16 in., and the wheels have only 4 ft. 6 in. Besides, in order to have more adhesion, the weight of the engine is 12 t. and the four wheels are coupled. These additional engines, working less than the others, require also, in general, much less repairs.

On the Darlington Railway, the acclivities are much too numerous for an additional engine to be placed at each of them. The load of the engine must therefore be limited so that it may ascend with that load the most inclined of the planes.

The locomotive engines acquire, however, a considerable augmentation of power, at the moment of their passage on an inclined plane, because their speed being suddenly considerably reduced, the cylinders consume a smaller quantity of steam. The fire, strongly excited by the preceding rapidity of the engine, continuing to furnish the same quantity of steam, a great part of it must escape through the valve. But the passage of the valve is too narrow to emit freely all that steam. Besides, the spring that presses on the valve opposes more and more resistance, in proportion as the steam tends to raise it higher, in order to get a wider passage for itself. The consequence is that the steam, not being able to escape as quickly as it is generated, suffers an increase of pressure in the boiler.

This increase of pressure evidently depends on several circumstances: the size of the valve, the evaporating power of the boiler, the previous excitation of the fire, and finally the length of the lever at the extremity of which the spring-balance acts. In some engines this increase may amount to 10 lbs. per square inch, as we have remarked in speaking of the pressure.

In that case, if the usual effective pressure of the engine be 50 lbs. per square inch, it may, on ascending the inclined plane, increase to 60 lbs., that is to say, in the proportion of $\frac{1}{5}$, which is considerable. This must, therefore, be taken into account when it is required to calculate the load the engines are able to draw on these planes. But it is necessary to observe that this is effectual only when the inclined planes are not of too considerable an extent, because, in that case, the fire ceasing to be excited in the same proportion, the surplus of effect will be reduced. The weight of the engine must, besides, always give sufficient adhesion of the wheel to the rail, as we shall explain in the following Chapter.

There is also another circumstance in which the engines are obliged to exert an additional effort. That is at the moment of starting. We have seen, in fact, that the power which, when the motion is once created, need only to be constantly equal to the resistance, must, on the contrary, surpass it at the instant that it is to put the mass in motion. The reason is plain: in the first place, it is only necessary to maintain the speed; in the other it must be

created and maintained. It is this additional effort on the part of the moving power which is improperly called *vis inertiæ*, because it is attributed to a particular resistance residing in the mass.

The starting is, therefore, a difficult task for a locomotive engine heavily loaded. However, at that moment the engine acquires, as well as on the inclined planes, a considerable increase of power. Here again the slowness of the motion produces two effects. The pressure in the cylinder grows equal to the pressure in the boiler, which is itself augmented by the effect of the spring-balance. But, notwithstanding this twofold advantage, the difficulty of starting still remains so great for considerable loads, that we should always advise giving in that point a slight declivity to the way. By that means the trains would be set in motion with more ease at the departure, and it would not be necessary at their arrival to make use, in order to stop them, of the powerful brakes, the effect of which is certainly as destructive to the wheels of the wagons as to the rails.

§ 2. *Practical Table of the Resistance of the Trains on Inclined Planes.*

In the preceding paragraph, we have seen in what manner the resistance of the trains on the inclined planes must be calculated. The following table presents the result of that calculation in the cases which occur the most frequently on the railways.

It is clear that, by the weights inscribed in the following table, it is only intended to show the resistance offered by the train, and not the weights the engines are able to draw, those weights being limited either by the power of the engine, as we have explained elsewhere, or by its adhesion, as shall be mentioned in the following Chapter.

A PRACTICAL TABLE OF THE RESISTANCE OF THE TRAINS ON INCLINED PLAINS.

Designation of the Engine.	Weight of the trains in gross tons, tender included	Load in gross tons which on a level would offer the same resistance the inclination of the plane being					
		1/[illegible]	1/[illegible]	1/[illegible]	1/[illegible]	1/[illegible]	1/[illegible]
Engine weighing 8 t. - - -	25	44	48	56	7	87	117
	50	83	91	105	131	158	212
	75	122	138	153	191	230	307
	100	161	176	201	251	302	402
	125	200	218	249	311	373	497
	150	239	251	298	371	445	592
Engine weighing 10 t. - -	25	45	50	5[illegible]	74	91	125
	50	84	93	107	134	162	218
	75	123	135	155	184	234	313
	100	162	178	203	254	306	408
	125	201	220	251	314	377	503
	150	240	263	300	374	449	598
	175	279	305	345	434	521	695
	200	318	348	396	494	592	785
Engine weighing 12 t. - -	25	46	51	60	77	95	129
	50	85	94	109	137	166	224
	75	124	136	157	197	238	319
	100	162	179	205	257	310	414
	125	202	221	253	317	381	509
	150	241	264	302	377	453	604
	175	280	306	350	437	525	699
	200	319	349	398	497	596	794
	225	358	392	446	557	668	889
	250	397	434	494	617	740	984

This table, assimilating the trains drawn on inclined planes, to trains drawn on a level, gives the means to learn by the former tables, either the loads the engines will be able to draw on given inclinations, or, *vice versa*, the inclined planes the engines will be able to ascend with given loads.

CHAPTER VIII.

OF THE ADHESION.

§ 1. *Measure of that Force.*

The series of experiments we have described above on the velocity and load of the engines, solves also another question in regard to the motion of locomotive engines of which we have not yet spoken. That is the adhesion of the wheel to the rails.

We have remarked in describing the engine, that the power of the steam being applied to the wheel, the engine is in the same situation as a carriage which is made to advance by pushing at the spokes. Thus, as in that action, the only fulcrum of the moving power exists in the adhesion of the wheel to the rail, if that adhesion is not sufficient, the force of the steam will indeed make the wheels turn, but the wheels, but the wheels slipping on the rails instead of adhering to them, will revolve, and the engine will remain in the same place.

The more considerable the train the engine draws, the more power it must employ, and the more resistance it must consequently find in the point on which it rests, for executing the motion. It was therefore to be feared, that with considerable trains, the engines would be unable to advance ; not that the force would be wanting in the moving power itself, but in the fulcrum of the motion.

The experiments related above, establish the measure of that adhesion in the fine season of the year. Among all these experiments, not one is to be found where the motion has been stopped or even slackened for want of adhesion, and nevertheless we see loads that amount to more than 200 t.

If we take, for instance, the first experiment made with the Fury, on July 24 ; during a part of the journey, that engine drew 244 t. The engine advancing with that load, the adhesion must necessarily have been sufficient. Now the weight of the Fury is 8.20 t,, and that weight is divided in such a manner, that 5.5 t. are supported on the two hind wheels, which are the only working wheels, the others not serving to push the engine forward, but only to carry it. We have thus a weight of 5.5 t. drawing 244 t., or a load $44\frac{1}{2}$ times as considerable as itself. The result of this is, that an engine having its four wheels coupled, and which consequently adheres by its whole weight, is able to draw a load $44\frac{1}{2}$ times its own mass.

We have said that the Fury engine adhered only by two of its wheels. On the Liverpool Railway that disposition is generally adopted for all trip engines, because the adhesion of two wheels is sufficient for the loads they have to draw. As for the helping engines, the work by the adhesion of their four wheels, as has been said elsewhere. The Atlas is the only one of the former class that differs from the others in that respect. This engine has six wheels, four of which are of equal size, and worked by the piston. The two others, which are smaller, and have no flange, can be raised out of contact with the rails, by the action of the steam on a moveable piston. That ingenious arrangement, which may have more than one useful application, in permitting the weight of an engine to be distributed upon six wheels, without making the engine more embarrassing than if it had only four, is due to Mr. J. Melling, of Liverpool, who, in this instance, made use of it in order to give the engine a much larger firebox, and consequently the power of generating a greater quantity of steam.

We have now expressed the adhesion, by giving the measure of its effects ; but the power itself may be expressed in a direct manner. The load of 244 t. produced a resistance, or required a traction of 1,952 lbs. ; the adhesion was thus equal at least to 1,952 lbs., else the wheel would have turned without advancing. Now the adhering weight was 5.5 t. or expressed in pounds 12,320 lbs. ; we see then that the force of adhesion was equal to about $\frac{1}{6}$ of the adhering weight. Considering that every 8 lbs. force corresponds with the traction of a ton on a level, this expression is exactly similar to the first.

In winter when the rails are greasy and dirty, in consequence of damp weather, the adhesion diminishes considerably.—However, except in very extraordinary circumstances, the engines are always able to draw a load of 15 wagons, or 75 t., tender included, that is to say, 14 times their adhering weight. In other words, the resistance of 75 t. being 600 lbs., the force of adhesion is always at least $\frac{1}{20}$ of the adhering weight.

Adhesion being indispensable to the creation of a progressive motion, two conditions are necessary in order that an engine may draw a given load. 1st. That the dimensions and proportions of the engine and its boiler enable it to produce on the piston, by means of the steam, the necessary pressure, which constitutes what is properly termed the power of the engine: and, 2nd, that the weight of the engine be such as to give a sufficient adhesion to the wheel on the rail. These two conditions of power and weight must be in concordance with each other ; for, if there is a great power of steam and little adhesion, the latter will limit the effect of the engine, and there will be steam lost ; if, on the other hand, there is too much weight for the steam, that weight will be an useless burthen, the limit of load being in that case marked by the steam.

§ 2. *Of the Engines employed on Common Roads.*

The considerable loads that have been drawn by the engines in the experiments described above, ought to remove the fears of such persons as suppose that the wheels of locomotive engines on railways are con-

stantly apt to slip, and who endeavor to remedy that imaginary defect by employing the engines on common roads, without having ascertained whether the adhesion will be more considerable.

We see here a locomotive engine on a railway, drawing 244 t. by the force of its steam, and not less than 75 t. by its adhesion. Its loads are thus always comprised between those two limits.

On a common road, where the resistance of traction is very considerable, not one of the above-mentioned engines would be able, by the force of its steam, to draw a weight of 75 t., much less ever to attain 244 t. The loads will therefore always, and in every circumstance, remain below what they would be on a railway. Of what importance is it, in fact, whether the moter gains in regard to adhesion, which is only an inert force, if the power of the steam do not enable it to profit of that advantage?

We say that an engine that draws on a railway a load of 75 t. *at least*, will never be able, on a common road, to draw that same load *at most*.

Let us in fact examine the same engine, with the same weight and same pressure, placed in those two different circumstances.

The experiments made by Mr. Telford, on the draft of carriages on different sorts of roads, prove that on the road from Liverpool to Holyhead, *the best in England*, the force of traction necessary to draw a weight of one ton is as follows:—*

	lbs.
1st. On a well-made pavement - -	33
2nd. On a broken stone surface on old flint road - - - - - - - - -	65
3rd. On a gravel road - - - -	147
4th. On a broken stone road, upon a rough pavement foundation - - -	46
5th. On a broken stone surface upon a bottoming of concrete, formed of Parker's cement and gravel - -	46
Mean - - - -	67

On a railway, a ton requires only 8 lbs. traction. Thus, on the Holyhead road, the traction of a ton requires eight times as much force as on a railway.

The consequence is, that the FURY engine, for instance, which by the effect of its 65 lbs. effective pressure, was able to draw on a level 244 t., would in no circumstance, even on the excellent Holyhead road, be able at the same pressure to draw more than $\frac{1}{8}$ of that load, or 30 t.

Thus its *maximum* load on a common road would only be the $\frac{2}{5}$ of its *minimum* load on the railway.

To which must still be added, that the resistance of the engine in the case of its progress on a common road, will be, like the resistance of the wagons, considerably augmented. It will therefore be obliged, in order to move itself, to consume a much greater portion of its own power, which will diminish in the same proportion the 30 t. it might else have drawn.

We see that on a common road, the resistance of the carriages puts much quicker a stop to the useful effect than the adhesion does on a railway; and that, under all circumstances, the advantage in regard to the load is in favor of the engines on railways.

But there is another consideration that appears to militate in favor of what is called steam-carriages, that is to say, locomotive engines employed on common roads; that consideration is the expense of constructing a railway which is thus avoided. A considerable economy is expected to be made by that means. The construction and keeping in repair of the railway, is in fact a very heavy expense. The capital laid out for that will be entirely avoided. But, at the same time, the chief advantage of the undertaking will be lost.

Why demur to lay out capital, if a considerable profit is to be derived from it? Why save the first expense, if the consequence is the necessity of spending more annually than the interest of the capital saved?

This is exactly the present case. The construction of a railway is undoubtedly expensive; but it is the principal element of success. It is money employed to level the road, in order not to have any difficulty afterwards in conveying the goods, and to begin from that moment to reap the profits. What would be said to a man who should propose to cross the fields, in order to avoid the constructing of roads? The answer would be, that the loss in freight would be greater than the expense of construction.

The same is true in regard to railways. If there be an advantage in constructing them for horses, as an experience of sixty years' prosperity has sufficiently demonstrated, how is it possible that there should be none for the use of locomotive engines or any other moter? Whatever advantage those engines may offer on common roads, they must necessarily present a much greater one on railways.

It may appear surprising to see a steam-engine on a common road draw two or three stage coaches with 12 or 15 passengers in each. But the Liverpool engines at the time of the races have drawn as much as 800 persons in a single train, at a speed of 15 miles an hour.

It will perhaps be said that steam-carriages are able to draw more than three stage-coaches. As yet, however, none have been fouud that have done more. The greatest part of them do not even carry more than 18 or 20 passengers. It is easy to see the cause that puts so soon a limit to their load. There exists no common road without considerable acclivities. As they must be overcome, it is necessary to give to the engine only the load which it can take over the steepest of those ascents. Now, on an acclivity of $\frac{1}{12}$, the weight of three stage-coaches, or 9 t., increased by the weight of the engine, presents, on account of the gravity, a resistance equal to that which 45 t. or 15 stage-coaches would offer on a level. A steam-engine that is to draw three stage-coaches during a journey of some length, must therefore be able to draw 15 loaded stage-coaches on a level common road. This is all that can be supposed, even admitting improvemen s, for that force corresponds with 120 stage-coaches on a railway. We must take therefore two or three stage-coaches at most, as the regular load of these engines.

But the levelling, which is the result of the expense attending the construction of a railway, renders those same engines capable of drawing 40 loaded stage-coaches or wagons. This is thus 12 or even 20 times as much. To do the same work on a common road, 12 times as many engines will consequently be required at once, with 12 times as many engine-men and fire-men. Considering also the disadvantage there is for the engines, in respect to fuel, in drawing small loads, we may confidently calculate that the expense for fuel will be doubled. Of this we will be the more convinced, if we take into account the surplus of power necessary to move the engine itself on a road full of asperities.

Besides the repairs of the engines are, even on railways, a considerable expense. At Liverpool, of the 30 engines belonging to the company, ten only are in *activity* on the line for the conveyance of goods and passengers. The effective work is eight or ten hours a day, and the expense for maintaining in activity those ten engines, amounts to more than £18,000, or £1,800 a year for each of them. These expenses are paid and become a source of profit, because on a railway the engines draw considerable trains; but it would not be the same thing if the trains were reduced, or, in other words, if a greater number of engines were required to do the same work. Moreover, if the engines, instead of sliding without jolts on the smooth surface of a railway, were obliged to run on the rough soil of our roads, how great would not be the expense of repairs. And we have 12 times as many engines to repair.

Outlay and interest of capital for engines, salary of engine-men and assistants, fuel, repairs, all these articles will soon have absorbed the expected economy.

Besides, the chief advantage of such undertakings, consists in the speed with which the haulage is executed. When the 29½ miles between Liverpool and Manchester were travelled in four hours, there were about 450 passengers going daily from one of those towns to the other. At present when, thanks to locomotive engines, the journey is completed in an hour or an hour and a half, there are 1,200 passengers a day. The speed has the greatest share in the creation of that profit. It must be given up if the engines are only to run eight or ten miles an hour.

Now, the 8 or 9 t. that the locomotive engines weigh on railways, allow us to give them a sufficient extent of boiler to generate a certain quantity of steam per minute, and consequently a certain speed. If the nature of the road obliges us to reduce the weight of the engine to 3 t. only, with the necessity of making all its different parts stronger, on account of the jolts on a rough surface, there will naturally be less heating surface in the boiler, and consequently less possible speed. And, in

* Report of the Holyhead Road Commissioners.

fact, the steam coaches scarcely do more than eight or ten miles an hour.

As a last reflection we shall add, that until the present moment the success of locomotive engines on common roads, continues, as a speculation, to be very uncertain, whilst the prosperity of railways, whatever be the moving power, is demonstrated by their continued extension. Steam-coaches may be improved, but, we repeat, whatever be the advantages they may offer on a common road, it is not to be contested that, by employing them on a railway, those advantages will be infinitely greater.

CHAPTER IX.

OF THE FUEL.

§ 1. *Of the Consumption of Fuel in Proportion with the Load.*

We have still an important article to discuss. That is the fuel.

From what we have said above, the steam generated in the boiler at whatever pressure it may be, takes, in passing into the cylinder, a pressure exactly determined by the resistance on the piston. The mode of action of the engine, is thus limited to the transformation of a certain quantity of steam, drawn from the boiler, and consequently at the pressure of the boiler, into steam at a lower pressure and of a proportionally greater volume.

Let us suppose the same engine, with the same pressure in the boiler, and travelling the same distance with two different loads. The distance travelled being the same, the number of turns of the wheel, and consequently of strokes of the piston or cylinders of steam expended during the journey, will be the same in the two cases. If the load had been the same, there would also have been identity in the nature of the steam expended. But as the loads differed, the same number of cylinders will indeed have been expended, but the degree of the steam in the cylinders will be different in the two cases.

Then the expense of moving power will be in one case a certain volume of steam at the pressure R, for instance, and in the other case the same volume at the pressure R'.

The pressure of the steam in the boiler being supposed the same in the two experiments, its temperature will also be the same. As the temperature experiences no reduction during its passage to the cylinders, the pipes and the cylinders themselves being immersed in the boiler, or surrounded by the flame of the fire-place, the temperature of the steam in the cylinders will be the same in the two cases.

Thus the volume and temperature of the steam expended during the journey will be the same in both circumstances. The pressure of the steam in the cylinder will alone have undergone a change. Consequently the mass or weight of steam expended, will be in each case in the ratio of the pressure in the cylinder.

The weight of the steam being equal to that of the water that generated it, the weights of water evaporated will then be to each other as the pressures in the cylinder, or, in other words, as the resistances on the piston. Besides as the water is first transformed into steam at the pressure of the boiler, that is to say, in both cases into steam at the same degree of pressure, it follows also that the quantities of fuel necessary for the evaporation, will be to each other as the pressures or total resistances on the piston.

This shows that the consumption of fuel is independent of the speed, and that it depends only on the resistance on the piston.

If in the two journeys we consider, the pressure happens not to be identically the same in the boiler, there will be a little more fuel consumed in that case where the pressure has been the greatest, because the pressure could only increase in consequence of an increase of temperature. But as degrees of pressure very distant from each other are produced by very similar temperatures, the difference of consumption occasioned by that circumstance will be of little importance, and will not be perceived in practice.

This principle gives the proportions of the consumption of fuel for the same engine with different loads, and may thus serve to determine its consumption in all circumstances, as soon as it is known in one determined case.

If for instance Q and Q' are the quantities of fuel expended with two given loads, the resistance on the piston with the first of these loads being expressed by R, and with the second by R', we shall have

$$\frac{Q}{Q'}=\frac{R}{R'}$$

But we have already calculated the resistance R on the piston of an engine. We have seen (Chap. V. Art. II.) that M being the load expressed in tons, tender included; F the friction of the engine without load; d the diameter of the cylinder; D the diameter of the wheel; l the length of the stroke; ρ being the atmospheric pressure per unit of surface, n the resistance of the load per ton, and δ the additional friction of the engine per ton of load, that resistance is

$$R=[F+(\delta+n)M]\frac{D}{d^2l}\times\rho.$$

Thus, for a different load drawn by the same engine, we shall have

$$R'=[F+(\delta+n)M']\frac{D}{d^2l}+\rho\,;$$

consequently,

$$\frac{Q}{Q'}=\frac{[F+(\ +\delta n)\ M']\frac{D}{d^2l}+\rho}{[F+(\delta+n)\ M']\frac{D}{d^2l}+\rho}.$$

This equation can be written in the following form:

$$\frac{Q}{Q'}=\frac{M+\left[\frac{\rho d^2l}{(\delta+n)D}+\frac{F}{\delta+n}\right]}{M'+\left[\frac{\delta d^2l}{(\delta+n)D}+\frac{F}{\delta+n}\right]}$$

So that the expression

$$\left\{\frac{\rho d^2l}{(\delta+n)D}+\frac{F}{\rho+n}\right\}$$

being calculated once for all the given dimensions of the engine, nothing more will be necessary than to add that quantity to M and M', in order to have the required proportion of Q to Q'.

Let us suppose, for instance, that we have an engine similar to the 11-inch cylinder engine of Liverpool, viz.:

F, friction of the engine without load - - - = 110 lbs.
d, diameter of the cylinder 11 in., or in feet - - - = 0.917 ft.
D, diameter of the wheel = 5 ft.
l, length of the stroke 16 in., or in feet - - - = 1.33 ft.
As besides we have
ρ, atmospheric pressure per square foot - - - =23.117 lbs.
n, resistance of the load per ton - - - - - - - = 8 lbs.
δ, additional friction of the engine per ton of load = 1 lb.

For this case we shall have

$$\frac{\rho d^2l}{(\delta+n)D}+\frac{F}{\delta+n}=65.$$

In the case of a 12-inch cylinder engine, with 152 lbs. friction, like the ATLAS, the value of this quantity would be 80.

And, finally, for the VESTA, with 11⅛ inch cylinders and 187 lbs. friction, the same quantity is 75.

Thus, in the case of those different sorts of engines, we shall have for the quantity of fuel expended with two different loads M and M',

$$\frac{Q}{Q}=\frac{M+65}{M'+65},$$

or

$$\frac{Q}{Q}=\frac{M+80}{M'+80}.$$

or finally

$$\frac{Q}{Q}=\frac{M+75}{M'+75}.$$

In these expressions M stands for the load, tender included; the weight of the tender is meant, therefore, to be added to the load, if it was not included in it from the first.

We easily perceive that the quantity $\frac{F}{\delta+n}+\frac{\rho d^2l}{(\delta+n)D}$ is nothing but the friction of the engine and the atmospheric pressure referred to the velocity of the engine, and represented by the number of tons that would offer an equivalent resistance. Thus the number M of tons, added to that quantity represents the total resistance overcome by the engine. Consequently the principle established above amounts to this: that the power applied is in proportion to the *total* resistance to be overcome, as was naturally to be expected.

This invariable quantity, which must be added to the load, expresses, as we have said, the aggregate inert resistance of the engine, or, if we may be permitted to use that expression, the *constant vis inertiæ* of the engine. As this quantity differs for each engine, and as it must be calculated separately for each of them, we shall join here a table which will show its value, superseding thus the necessity of calculating it, for the engines most commonly used on railways.

A TABLE OF THE CONSTANT VIS INERTIÆ OF THE ENGINES, NECESSARY TO DETERMINE THE CONSUMPTION OF FUEL WITH DIFFERENT LOADS.

Designation of the Engine.	*Constant vis inertiæ*, expressed in tons.
Engine with cylinders 11 in., or in feet . . 0.917 ft.; stroke 16 in., or 1.33 ft.; wheel . . . 5 ft.; friction . . . 120 lbs.	66 t.
Engine with cylinders 12 in., or . . . . . . 1 ft.; stroke 16 in., or 1.33 ft.; wheel . . . 5 ft.; friction . . . 150 lbs.	80 t.
Engine with cylinders 13 in., or . . . . . 1.083 ft.; stroke 16 in., or 1.33 ft.; wheel . . . 5 ft.; friction . . . 165 lbs.	92 t.
Engine with cylinders 14 in., or . . . . . 1.166 ft.; stroke 16 in., or 1.33 ft.; wheel . . . 5 ft.; friction . . . 180 lbs.	105 t.
Engine with cylinders 12 in., or . . . . . . 1 ft.; stroke 18 in., or 1.50 ft.; wheel . . . 5 ft.; friction . . . 165 lbs.	107 t.

§ 2. *Experiments on the Quantity of Fuel consumed by the Engines.*

The above formula, which is of easy application, gives the absolute quantity of fuel required by an engine in all circumstances, provided the consumption of the engine in a given case be known.

The only thing necessary, will therefore be, to make one experiment on the fuel consumed by the engine with a given load, which will be the data of the problem.

Evidently between two different engines, this first data will differ according to the particular construction of each engine, and chiefly according to the extent of heating surface of its boiler. The following experiments were therefore undertaken on the Liverpool and Manchester Railway, in order to obtain a knowledge of this data, and likewise to verify the theoretical principle exposed above.

In these experiments the tender was first carefully emptied, then the coke was accurately weighed and put into the tender. The fire-place of the engine was besides filled with fuel, up to the lower part of the door. At the end of the experiment, the fire-place was again filled to the same height, and the coke remaining in the tender was weighed with the same care as at setting off.

As an engine that ascends alone, with its train, an inclined plane exerts necessarily a greater effort than if at that moment it were helped by an additional engine, we have put down whether the engine was helped or not in going up the plane. We have also inscribed the state of the weather and the temperature of the water in the tender, in order that those circumstances might be taken into consideration.

In these experiments, the co-operation of the persons attached to the establishment was often necessary. We must particularly mention Mr. J. Dizon, the resident engineer, to whom we are indebted also for his accurate levelling of the road, and many other pieces of information obligingly communicated to us.

EXPERIMENTS ON THE QUANTITY OF FUEL CONSUMED BY THE LOCOMOTIVE ENGINES, WITH GIVEN LOADS.

Name of the Engine.	Date of the experiment.	Nature and Weight of the load, not including the tender.		Time of the trip of 29½ miles.	Delays on the road, not included in the above time.	Average effective pressure, in lbs. per square inch.	Coke of prime quality consumed during the journey.	Coke per ton per mile on a level, help deducted on incl. plane.	Accessory Circumstances. Help on the inclined plane.	Temperature of the water in the boiler.	State of the weather.
	1834.		tons.	h. m.	m.	lbs.	lbs.	lbs.			
Atlas, from L. to M.	23 July	40 wagons	190.00	3. 2	15	53.7	1596	0.28	Help.	Cold in the tender.	Calm.
Do. do.	9 July	25 do.	123.13	1.48	12	53	1102	0.34	Help.	Lukewarm in the tender.	”
Do. do.	4 Aug	25 do.	122.64	1.58	0	53	1224	0.34	Help.	Cold in the tender.	Fair and calm.
									The connecting rods of the wheels too tight.		
Do. do.	14 July	25 do.	118.90	1.31	19	61.5	1118	0.32	Help.	Cold in the tender.	Fair and calm.
Do. do.	11 July	25 do.	117.61	1.41	5	53	1136	0.33	Help.	Lukewarm in the tender.	”
										One piston too slack.	
Do. do.	28 June	25 do.	113.90	1.50	5	53	1104	0.33	Help.	Rather hot in the tender.	”
Do. do.	16 July	20 do.	94.66	1.25	23	53.5	1081	0.39	Help.	Little lukewarm in tender.	Calm.
Do. do.	17 July	15 do.	65.40	1.27	3	54	1012	0.52	Help.	Very hot in the tender.	Fair and calm.
									The axle-box of one of the wagons too tight.		
Do. from M. to L.	31 July	8 loaded wagons and 4 empty	35.15	1.54	0	30	881	0.73	No help.	”	”
Do. do.	17 July	3 loaded wagons and 8 empty, and 2 wagons on a part of the road.	25.30	1.26	3	54.5	720	0.82	No help.	Very hot in the tender.	Fair and calm
Vesta, from L. to M.	5 July	20 wagons	92.75	1.42	5	53	916	0.33	Help.	Hot in the tender.	Calm.
Do. from M. to L.	1 Aug	5 loaded wagons and 5 empty	28.15	1. 5	0	51	774	0.80	No help.	Very hot in the tender.	Fair, moderate wind in favor of the motion.
									Engine a little stiff.	*It comes out of the repair-yard.*	

EXPERIMENTS ON THE QUANTITY OF FUEL CONSUMED BY THE LOCOMOTIVE ENGINES, WITH GIVEN LOADS.

Name of the Engine.	Date of the experiment.	Nature and Weight of the load, not including the tender.		Time of the trip of 29½ miles.	Delays on the road not included in the above time.	Average effective pressure, in lbs. per square inch.	Coke of prime quality consumed during the journey.	Coke per ton per mile on a level, help deducted on incl. plane.	Accessory Circumstances. Help on the inclined plane.	Temperature of the water in the boiler.	State of the weather.
	1834.		tons.	h. m.	m.	lbs.	lbs.	lbs.			
Vulcan, from L. to M.	1 July	20 wagons . .	97.70	1.37	3	54.5	1071	0.37	Help.	Lukewarm in the tender.	Calm.
Do. from M. to L.	22 July	9 1st cl. carriages	34.97	1.17	3	54.5	664	0.56	Nohelp.	Cold in the tender.	Fair, very light wind against the motion.
Leeds, from L. to M.	15 Aug	20 wagons . .	83.44	1.35	0	54	897	0.36	Help.	Rather lukewarm in tender.	Fair and calm.
Do. from M. to L.	15 Aug	8 do of which 1 at half way	32.01	1.17½	3	49	690	0.62	No help.	Very hot in the tender.	Fair and calm.
Fury, from L. to M.	24 July	10 do . . .	51.16	1.30	0	60	806	0.46	Nohelp.	Cold in the tender.	Fair and calm.
Do. from M. to L.	24 July	10 do . . .	63.80	1.35	0	59	746	0.49	Nohelp,	Cold in the tender.	Fair, side wind tolerably strong by intervals.
Jupiter, from L. to M.	16 July	8 1st cl. carriages	33.09	1.12	3	53	742	0.76	Help.	Almost cold in the tender.	Fair and calm.
Do. from M. to L.	16 July	7 do do	30.09	1.12	4	53	836	0.94	Help.	”	Fair, moderate wind contrary to the motion.
Firefly, from L. to M.	26 July	8 do do	36.40	1.35	5	44	879	0.82	Help.	Almost cold in the tender.	Fair.
									The engine is not in a good condition.		
Do. from M. to L.	26 July	8 do do	36.40	1.18	5	49	870	0.81	Help.	”	Rainy, wind tolerably strong against motion.
		Sum - -	1605.65	”	”	”	20865	”	*The engine is not in a good condition.*		

In examining these experiments, we find that neither the pressure in the boiler, nor the velocity of the motion, have any remarkable influence on the result. This fact was already indicated by theory.

We also remark the advantage that is found in respect to fuel, in making the engines, whenever it is possible, draw the greatest loads their power will permit. For instance, the Atlas, drawing a load of 25 t., consumed 720 lbs. coke, whereas, in drawing 190 t., or a load eight time as great, it only consumed double the quantity of coke. This difference must evidently, as we have explained above, be attributed to the expense of power necessary in each case, in order to overcome the resistance of the atmosphere, the engine, and its tender.

We must add, that in those experiments the coke employed was of prime quality, or *Worsley coke*, which is prepared on purpose for iron-founderies. When gas-coke is used the engines consume about 12 per cent. more without reckoning the loss resulting from the friability of that combustible. It has moreover been ascertained, that the sulphurous parts it contains are highly destructive of metals. For that reason its use has been completely given up on the Liverpool Railway, notwithstanding its low price.

In making use of coals of good quality, the quantity required is nearly the same as that of good coke; but this combustible has in regard to the preservation of the engines, the same defects as gas-coke.

Respecting the distance travelled by the engines in these experiments, the railway from Liverpool to Manchester is generally reckoned 30 miles long, and considered a level; but as a greater degree of accuracy is required in the calculation, and as we wish to deduce from these experiments the really corresponding consumption of coke on a level railway, we must reckon as follows.

One part of the line travelled by the locomotive engines is 29½ miles long. If we divide it in three parts, we see that 1 t. drawn from one end of the railway to the other, opposes the following resistances. (See the section of the railway, Chap. V. Art. VII. § 1.)

	ton.	miles.
1 t. at 26½ miles, on nearly a level - - - - - - -	1 at	26½
1 t. at 1½ mile, ascending $\frac{1}{96}$ or $\frac{1}{89}$, equal (friction and gravity) to 4 t. drawn to the same distance on a level, or 1 t. at 6 miles - - - -	1 at	6
1 t. at 1½ mile, descending by the sole force of the gravity	0	0
Sum - - -	1 at	32.5

Thus when the engines ascend the plane without help, the work they actually do is equal to the traction of a similar load to a distance of 32.5 miles on a level.

If they ascend the plane with the help of one or more other engines, their share of the load in ascending is on an average only ⅓ of the whole on the plane, and thus the work they do is equal to the traction of their load to 26.5 × 2 = 28.5 miles.

This does not include the surplus of resistance owing to the gravity of the engine and its tender in going up the plane. Their average weight being together from 13 to 14 t., the gravity of which on the plane is equal to the resistance of about 40 t. on a level, we see that this fresh effort required of the engine, equals the traction of 40 t. to a mile and a half, which is the length of the acclivity. If, therefore, the train itself weighs 30 t. without the tender, as is the case with engines that are not helped by additional ones, the work is equal to the traction of that train two miles more than the length of the line. If, on the contrary, the load weighs 60 or 80 t., as is in general the case with engines that are helped on the inclined planes, the additional traction of 40 t. for 1½ mile, is equal to the traction of the whole load to a mile.

Then for trains that receive no help at the passage of the inclined planes, we must reckon the distance for which the draft has taken place, as equal to 34½ miles *on a level;* and for the engines that are helped on the acclivity, we must reckon the work they have done as equal to the traction of their load to a distance of 29½ miles *on a level.* The difference which exists in these two cases, is of ⅙ in plus for the unassisted engines. This is the work done by the helping engines, when they

are employed, and the surplus of work produced by the passage of the planes.

It is from those distances of 29.5 miles and 34.5 miles, that the numbers placed in the eighth column of the preceding table have been deduced in each experiment.

In examining the results contained in that table, we find that they agree with the rule deduced above from the theory of the engine.

For the ATLAS, the average of the experiments made with 25 wagons, gives 119 t. conveyed by 1136 lbs. of coke. Calculating upon this data, and adding $\frac{1}{6}$ for the cases where there has been no help, we find

	tons.	lbs.	Calculation.	Experiment.
ATLAS	119 and tender	1136.		
	190 and tender		1531	1596
	95 and tender		1002	1081
	65 and tender		835	10 12
	35 and tender		779	881
	25 and tender		719	720
VESTA	93 and tender	916.		
	34 and tender		668	774
VULCAN	98 and tender	1071.		
	34 and tender		773	664
LEEDS	83 and tender	897		
	32 and tender		697	690
FURY	51 and tender	806.		
	44 and tender		759	746

If we take into account the accessory circumstances, we shall find between the calculation and the experiment, as complete a coincidence as the nature of the experiments themselves could allow; for, besides the above-mentioned circumstances, the greasing of the carriages, the quality of the coke, and, above all, the manner in which the fire-place is filled after the experiment, are subject to produce considerable differences, notwithstanding the most scrupulous attention.

The experiments we have related, give the quantity of coke consumed during the trip.

It is however clear, that in the interval between one trip and another, the engine, although at rest, continues to consume a certain quantity of fuel, because its fire must be kept up for the following journey. It is true, that several of those engines, such as the ATLAS, VESTA, and some others, have a particular sort of apparatus, by means of which, while the engine is at rest, the steam that continues to be generated in the boiler may be led to the tender. That steam is then not completely lost, being condensed in the boiler, and serving to heat the water it contains. But all the engines are not disposed in that manner.

Besides, there is in all cases consumed, every morning, a certain quantity of fuel for heating all the parts of the engine and the water of the boiler.

A surplus of consumption must therefore be calculated for those two objects. This is a practical piece of information which will find its place hereafter.

The researches contained in the work, give the solution of all such questions as are most important for the application of locomotive engines to the draft of loads on railways. They give the means of measuring the pressure of the steam; of calculating the load, the velocity, and the proportions of the engines; of valuing the different sorts of resistance they have to overcome; of taking into account the influence of additional circumstances on their motion; and, finally, of knowing their consumption of fuel.

Here naturally our work terminates. However, as a knowledge of these engines cannot be complete, unless we are able to calculate also the expenses they will require for a given draft, we add in an Appendix the necessary information, by means of which that important point may be established.

THE POTATO SQUASH.—We have received some *Squash Seeds*, together with the following note.

MR. FESSENDEN,

Sir—I send you for distribution, though perhaps, rather late a few squash seeds, which I obtained in Illinois last season. They are known there by the name of the "Potato Squash," resembling very much the sweet potato, being very dry and sweet to the taste. If they can be raised here as well as there, they will surpass all others. I ate of them mashed as we mash our common potato, and their flavor was exceedingly fine. They grow about the size of the common short necked squash, and weigh about six pounds; their color nearly white.

Respectfully,
JACOB N. BANG.

We are much obliged to the donor of the above mentioned seeds, and will distribute them among careful cultivators, in small parcels for the benefit of the commonweal. [New-England Farmer.]

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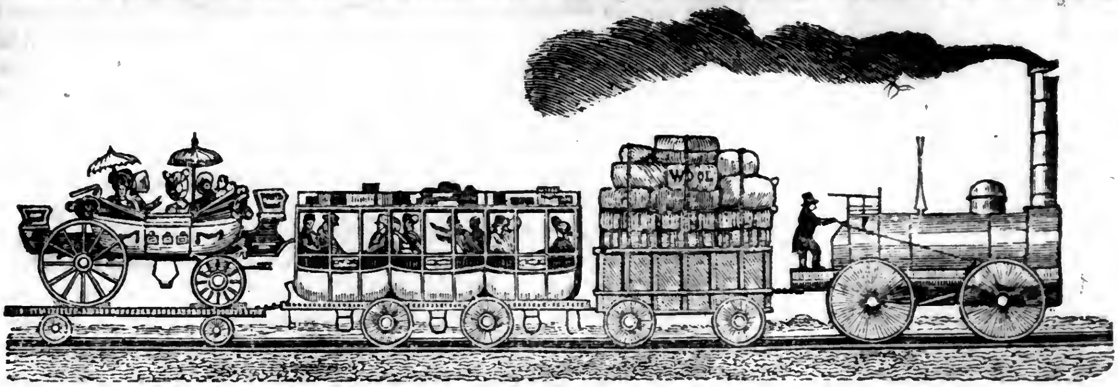

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, EDITOR.] SATURDAY, JULY 2, 1836. [VOLUME V.—No. 26.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 2, 1836.

TO CONTRACTORS.

ENGINEER DEPARTMENT, Lawrenceburgh and Indianapolis Railroad Company, June 20, 1836.

PROPOSALS will be received at this office until the 5th of August for the graduation and masonry on the first division of the Road.

This division commences near the Ohio River at Lawrenceburgh, Indiana, and follows the Valley of Tanners Creek a distance of ten miles.

Plans and Profiles of the Route and proposed works can be examined at the Engineers Office, Lawrenceburgh, Dearborn County, Indiana.

25—tau15 JULIUS W. ADAMS, Engineer.

SYRACUSE AND UTICA RAILROAD.

BOOKS of Subscription to the above Stock will be opened on the 19th, 20th, and 21st days of July next, as follows, to wit: at the

"Syracuse House," in Syracuse.

Joseph C. Spencers's "Coffee House," Canastota.

J. H. Pratt's "Canal Coffee House," Utica.

"Mansion House," Albany.

Office of the "Farmers' Loan and Trust Company," New-York.

In Syracuse, Canastota and Utica the Books will be kept open from 9 to 12, and from 2 till 5, P. M., on the two first days, and on the last day till sunset.

In Albany and New-York from 10 till 3, P. M.

Capital Stock $500,000. Shares $50. $5 to be paid on each share on subscription. Payments to be made in specie or Bank bills of this State. Dated 10th June, 1836. I. S. SPENCEE, Secretary.

25—2t*

FOR SALE—At this office, a good LEVEL, made by Pike. It has a 20 inch telescope a sensitive bubble with a scale, stout level plates with clamp aud tangent screws complete. It is a new instrument, has only had two weeks use; the owner having no further use for it, offers it for $118.

NEW ARRANGEMENT.—I take pleasure in announcing to the readers of my periodicals that I have taken as a partner, in the business pertaining to them, Mr. GEORGE C. SCHAEFFER, a gentleman of education and a practical engineer.

Mr. Schaeffer will hereafter have the principal charge of the editorial department of the Journal and Mechanics' Magazine—in the discharge of which duties he has for several months past taken an active part—and, as we have reason to believe, much to the satisfaction of our readers and patrons.

With our united efforts we hope to render the periodicals worthy of a more extensive circulation.

This number it will be observed completes part *one* of Volume *five*.

D. K. MINOR.

New-York, July 2nd, 1836.

SERIOUS ACCIDENT ON THE RAILROAD.

We learn from the papers that a very serious accident occurred on Wednesday last, on the Boston and Providence Railroad. It is *said* to have occurred through the *carelessness* of the conductor of the Boston train, whose duty it was to wait until the Dedham train had passed. Whether it be so or not, there can be no doubt but that a fearful responsibility rests *somewhere*. It is the duty of the directors of every railroad company to employ sober, careful and prudent men. This however is not *all* they are bound to provide. They are also under the strongest obligations to establish *proper* regulations, and when they are established, to see that they are observed. The conductor of a locomotive engine who neglects to attend to his instructions, is equally culpable, if injury occur to any one, with the omnibus driver who disregards our city regulations, and drives furiously round a corner, to the destruction of life or limb; or with the engineer of a steamboat, who through strife or carelessness, destroys or injures the passengers; and we deem it a proper subject for investigation by the Grand Jury, who should inquire into the cause of not only the present, but also of previous accidents on Railroads; and in every case where injury has resulted to individuals through the carelessness of the managers, or conductors, they should be subjected to such penalties and punishments as will at least cause others to be more careful.

It is the duty of the directors to discharge, and publish the name of, every individual who shall, through *carelessness*, *negligence* or *intemperance*, cause injury to individuals or property. Nothing short of the most rigid scrutiny on the part of stockholders, directors, or engineers, will produce that confidence in the public mind towards railroads to which they are entitled: and it is the duty of every friend of the system to unite their efforts to prevent unavoidable accidents, and to punish the inividuals who cause those resulting from carelessness.

We desire not, as every reader of this Journal will bear us witness, to traduce, injure, or *prejudice* railroads, or the railroad system—nor can it be imagined that we desire to cast odium on the directors, engineers, or subordinate agents of *any*, and especially of this particular railroad; but as the early, steadfast, and unyielding friends of the system, who desire, and expect, to see them—if judiciously managed—pervading the whole country, deem it our duty to call the early and earnest attention of ENGINEERS and DIRECTORS to the importance of preventing accidents, which have been so frequent and oftentimes so disastrous, on our railroads. Let every accident be properly looked to, the circumstances published, and then let a just and merited censure fall upon those who trifle with the safety and lives of passengers.

LITTLE FALLS.—This picturesque and thriving little village is situated on both sides of the Mohawk river, 72 miles west of Albany, and 22 miles east of Utica. The great western canal passes through it, on the south side of the river, and is connected with the main part of the village by a beautiful stone aqueduct over the river, which serves as a feeder, receiving the water from the old canal on the north side, and affording to the village every convenience desired for business.

This beautiful village was, until within a few years, owned by an English gentleman,) Mr. Ellis, we believe,) and its *immense* water power was for many years, indeed almost since the revolutionary war, nearly useless, as the proprietor declined to sell, or even to give permanent leases, and the village of course made but slow progress in the march of improvement which has marked the course of many less favored plaues farther west.

Fortunately, however, here, as in many other places, a change has come over the aspect of things—a forign proprietorship give way to one of true American spirit. The title was about two years since transferred to a gentleman of this city, who viewed things as an AMERICAN. He caused the property to be surveyed, streets and public squares to be laid out, and has contributed largely to the erection of churches, and has sold freely and at fair prices to those who desired to improve its advantages. Those who, like ourselves, recollect its appearance *twenty* years ago, and have witnessed its progress under the fostering care of its present proprietor, need no description of its present condition, or its delightful surrounding scenery—but to those who have not witnessed its beauties, a brief description may not be uninteresting.

The village of Little Falls is situated in a narrow defile, which appears to have been formed by the waters of the river in its passage from the lakes to the Hudson, on the west, and also on the east are the beautiful and fertile flats of the Mohawk; but on the north the village is hemmed in by hills, covered with forest, approaching in some places nearly to the water, with abrupt and almost precipitous acclivities; whilst in other places the village extends for half a mile or more from the main street. It is on the south side, however, that we behold the mountains in their majesty. The canal, which hugs the side of the precipice, and winds its way amongst the rocks, is about 30 feet above the river; and the summit of the hills are more than *three hundred feet*, and in some places almost perpendicular, above the canal. This was indeed a herculean task; and to others than Americans, an attempt to construct such a work would have been deemed almost chimerical. It was however, accomplished, and is now the admiration of the hundreds of thousands who annually pass on its waters.

The improvements of the place are progressing with spirit—its water power is esmated equal to 750,000 spindles and several sites with power have recently been sold.—There are now in operation three furnaces, one turning shop, three paper mills, one machine shop, two saw mills, one flouring mill, one grist mill, one plaster mill, three tanneries, one distillery, two malting houses, three blacksmith shops, one axe and seyth factory and one carriage manufactory. A woollen factory, and two flouring mills with four runs of stones are to be erected the present season. This place being the centre of a rich agricultural country carries on a considerable trade with Albany and New-York. The item of cheese alone produced in Herkimer county, and shipped by its merchants, on the canal during the last season amounted to upwards of $350,000.

It is surprising to us who know and appreciate its advantrges, that a situation so eligible, so healthly and with such immense water power should have been until this period overlooked by this shrewd money making and speculating community. They will not longer be disregarded as proper attention is now directed to it; and the period is not distant when LITTE FALLS will boast of its numerous manufactories its rapidly increasing, intelligent, and wealthy population and its flourisng hischools. May it long continue to flourish, and its worthy proprietors, as well as its enterprizing population, reap rich reward for their labor.

ERIE CANAL ENLARGEMENT.

We notice the Canal Board are to meet Tuesday the 21st, and trust it is further to consider their resolutions to enlarge the Erie Canal, and that at all events they will place before the public the *modus operandi* of executing this important work, without *interrupting the trade upon*, which even for a day, or a week, cannot be permitted. The breach at Utica, of 3 or 4 days this spring, caused weeks of derangement to the business of forwarders—much distress to the acceptors of drafts in this city, and an accumulation of boats in contact with each other, from Oriskany to Frankford, 16 miles. The Engineers in the employ of the State stand uncommitted as to the enlargement, as far as has come to the public eye, except Mr. J. B. Jervis, who has raised the curtain as to the mode he proposes to get along with the *mason work* necessary to be done in the winter, to wit: See Assembly Documents, 1836, No. 99, pages 8 and 10; as to the summer, we are left in the dark by all the Engineers. "*This work must be done in the winter; and to protect the cement from frost, a house must be erected over the site, and a proper temperature maintained by stoves.*"

Before this work is further progressed in, the pnblic require that there shall be a responsibility rest somewhere, in the event of failure; and that we have a right to expect one, is evident, or there is a gross neglect of duty on the part of the superintendents, which we do not charge them with, when the fact is stated, and notorious to all forwarders, *that the Erie Canal has been gradually filling up by deposits, since its construction*, and so little time has there been to clear it out, during the time of suspended navigation, (let alone enlarging it,) that boats drawing over 2½ feet of water cannot now navigate our *nominal* 4 feet canal, *without touching the bottom!!* and such is its present state, and the constant *contact of boats*, from its narrowness and their increasing numbers, that boats last only 4 years, upon an average, instead of 6 years, as was the case after the first construction of the Erie Canal. Boats, with even 35 to 38 tons, rubbing on the bottom to their serious injury, even with the water in many parts being raised 12 to 18 inches above the 4 foot line as first constructed, and this too, from the necessity of the case on the part of the superintendents, to keep up and open early our trade, at the risk of constant breaches, in the canal, and to its great and constant injury.

That the Canal Board wish to meet the public expectation, in opening the Erie Canal as early as possible, there can be no doubt,—nor do they desire to run the risk of interrupting the trade upon it; but when it is gravely stated, by one of their engineers, [who has not, so far, risked his reputation, by presenting his plan in his report that this work—*more difficult and expensive than building an entire new canal, 8 feet by 80 or 90 feet wide,*] that the enlargement can be accomplished, *by excavating on the basin or heel-path bank, in the summer,* "*leaving a cone or cove in the middle, to be removed during the time of suspended navigation,*" when a large part of the mason work, locks, culverts, aqueducts, &c., is to be executed, "under the cover of houses, kept to the proper temperature by stoves!!!" It may

be the case, that the Engineers in the employ of the State have not been called on by the Canal Board or commissioners to express their opinions as to cost and facility of construction of a *new canal* with *larger locks*, along side of the present important work, at a much less expense than to attempt to patch on to an old and *imperfect work*. The public call for opinions on this subject from the Canal Board. As it is to be an expenditure of 12 to 20 millions of dollars, the best engineering talents in and and out of the State, should be *personally* examined before the Canal Board, at the expense of the State, instead of getting delphic and *gratuitous* replies from Engineers to written queries on the subject of the enlargement, as we understand was the course adopted prior to proposing the plan to the Legislature. Even these queries and replies are in none of the State documents, and a fearful responsibility rests somewhere, in the anticipated event of the enlargement plan being a failure. OSWEGO.

From the N. Y. Times.

ERIE CANAL ENLAEGEMENT.

In the Times of the 21st inst. (June) an article appeared under the above head, over the signature of Oswego. After alluding to the meeting of the Canal Board, and calling for information in relation to the manner they intended to proceed with the proposed work, the writer observes—"Up to this time, the Engineers in the employ of the state, stand uncommitted, except so far as Mr. J. B. Jervis has raised the curtain, as to the manner he proposes to execute the necessary mason work to be done in the winter, to locks, culverts, aqueducts, &c, in speaking of it. See Assembly Doc. No. 99 of 1836, pages 8 and 10.—This work must be done in the winter, and houses built over the same, with stoves to keep up a proper temperature."

The idea that would be taken by most readers, would no doubt be, that Mr. Jervis had recommended that all the mason work for "locks, culverts, aqueducts, &c." should be done in the winter and protected from frost as above stated. This construction, however, is more favorable than some we have seen, for we recollect seeing an article in some newspaper a few months since, in which he is made to recommend that not only masoury, but the *entire* canal should be covered to protect the work of enlargement from frost. To guard the public from an entire misapprehension of the doings of the Canal Board and their Engineers, we have thought it worth while to examine the report alluded to. The document is reports of engineers accompanying the report of the Canal Board, presented to the legislature 26th January, 1836, of near 300 pages, which is at least some evidence of the *publicity of the doings* of the Board on this subject. Your correspondence refers to pages 8 and 10. At page 8, in speaking of the propased improvement at Schoharie Creek, in reference to the *Guard* lock, Mr. Jervis says "This work must be done in the winter, and, to protect the cement from frost, a house must be erected over the site, and a proper temperature maintained by stoves." Here, it will be observed, the proposition is expressly for a *Guard Lock*, in a peculiar situation which is explained in the report referred to, and no intimation is given that this method is proposed for every ordinary or *lift* lock; and even in the case of this particular *Guard* lock, Mr. Jervis goes into a course of reasoning to show that the old line at this place should be abandoned, and the Creek crossed by an aqueduct, instead of the present mode, by a dam and *Guard* lock.

In this general estimate he leaves the present line at this place, and gives the estimate on the new line which he recommends. It therefore appears he does not recommend the plan of erecting a house over any lock whatever.

In relation to aqueducts, page 10 of said document Mr. Jarvis observes, "When the abutments are sound, they may be extended in the summer season, and the trunks put on during the suspension of navigation. But in cases where it is necessary to *rebuild the old part of the abutment*, it is proposed (*unless the line can be changed*) to do the work in the winter; and to guard against the influence of frost, &c." It is not then for the purpose of enlarging the canal, but to *renew* the work *indispensable* to the maintenance of the *present* navigation that this plan is proposed; and even this, ouly in cases where a change of line is not practicable.

In relation to culverts on the page above quoted, Mr. J. observes, "The culvers that are sound will only require to be lengthened, and new wings and parapets put on one end which *may be done during the ssason of navigation*. Some new culverts will be required, and when the levels are lowered, they will generally require to be rebuilt This work can only be done in the season of suspended navigation. and when it is necessary to make them of *stone and cement*, a house must be erected," &c.

The cases, it appears, in which culverts will require to be built in the winter, will mainly depend on the imperfection of those now in operation; and whether they will require protection from frost, will depend on the necessity of using *cement*. The part under bottom of canal in some cases may be made of *timber*, or of *cast iron*, or of stone so well cut and secured as not to require cement; and the question is presented by Mr. J. in a manner that shows that very little of this kind of protection will be required.

If any further evidence is wanted to show the unimportant character of this item, it is found in the estimate of Mr. Jarvis, where it amounts to *eight thousand and four hundred dollars*. But the *total* estimate of Mr. J. is near *three millions*. Now, we would ask, can any candid man suppose that your correspondent viewed this small item of so much importance as to call public attention to it? If so, then he was in honor bound to have given it only the importance it had in the report referred to. But as before quoted, it will be perceived that "locks, culverts, aqueducts, &c." are to be built in the winter and protected from frost, &c. We have seen that there is *no* proposition to build the locks in this way; and that your correspondent had no occasion to be alarmed for the culverts and aqueducts. But where are his et cetera? They imply that there is something else—but nothing of the kind is found in the report of Mr. J. except what we have quoted.

From the examination we have given to this subject we are brought to the conclusion that your correspondent was disposed to find fault, and considering the proposition alluded to as novel, and probably to him incomprehensible, he has thought it worthy of presentation to the notice of your readers. In regard to the novelty, however, he is mistaken. It has been adopted to build locks on even American canals; and where circumstances require it, it is no very fearful undertaking.

The doings of the Canal Board are charged by your correspondent as hidden from public view. Now as we are not at liberty to say who your correspondent is, we will put on the broad mantle of charity, and presume he has but partially read the public documents that contain the proceedings of this board, and which are easily found on the printed journrls of the several Legislatures to whom they have been presented.

We are led to the further conclusion, that if in a document of near three hundred pages, this is the only item on which "the curtain has been raised," there must have been extraordinary stupidity, or wonderful ingenuity. The document is before the public, and any one may examine it, and we believe any candid man will find on examination, that it proposes to enlarge the Erie Canal from Albany to Buffalo, and gives, in as much detail as is usual, an estimate of the expense; and much remark in relation to the matter of doing the work, communicated in a candid and unreserved manner.

It would be drawing out this communication to too great a length to go into an exposition of their doings. But as several communications have been made besides that of your correspondent, tending to give the impression, that the Canal Board contemplated stopping, or interrupting the navigation of the Erie Canal, and that the work of enlargement could only be done in the winter, we will merely mention, that their official reports, and those of the Canal

Commissioners, with accompanying documents, unequivocally take the ground, that the *suspensim* or *interruption* of the *navigation* is admissible, and that the great majority of the work, is to be done in the usual season of performing such work; and even the manner of doing work in the season of navigation in several cases, supposed to be attended with most difficulty, have been referred to or pointed out. There is nothing that can be considered proof against misrepresentation, but we are confident that any candid man will be satisfied on reading the printed proceeding of the Canal officers, that there has been a plain practical and uneqvivocal mode of proceeding, not only in relation to the enlargement of the Erie Canal, but of all their duties as public officers in a most important branch of the affairs of the State Government.

We hope, therefore, that your correspondent, before he presents any further account of their doings, will examine their published proceedings, and give the public a correct account. Such a course will do the Canal Road no harm, be honorble to your correspondent, and promote TRUTH.

We are gratified to be able to publish the following correspondence between a committee of the Common Council of New Brunswick and a committee of the Railroad Company. We trust the day will be as fair and pleasant for the celebration, as the advantages of the work will surely be great to New Jersey.

From the Newark Daily Advertiser, June 29.

NEW JERSEY RAILROAD OPENED TO NEW BRUNSWICK.

The following invitation of the Common Council of New Brunswick, to the President and Directors of the New Jersey Railroad and Transportation Company, and the correspondence on the subject we insert with plasure, as an annunciation to the public that their Railrord will be complete to New Brunswick by the 1st of July, and also as an evidence of the friendly feelings and deep interests manifested by our sister city towards this important enterprise.

New Brunswick, June 6, 1836.

At a meeting of the Board of Common Council, held this evening, the following preamble and resolution were adopted; viz:

"Whereas it is understood that the New Jersey Railroad will be completed in a short time—and whereas the citizens of New Brunswick feel a deep interest in the completion of said work, Therefore,

Resolved, That a Committee be appointed to make arrangements for the proper reception of the President and Directors of the New Jersey Railroad Company upon their arrival in this city, when said road is first opened."

PETER CONOVER, Clerk.

(A true copy.)

The Committee appointed consists of—the Recorder, Alderman Zabriskie, and Mr. Vail.

New Brunswick, June 11th, 1836.

To the President and Directors of the New Jersey Railroad and Transportation Company—

Gentlemen:—The undersigned having been appointed a Committee by the Common Council of this city, "to make arrangements for the proper reception of the President and Directors of the New Jersey Railroad and Transportation Company, upon their arrival in this city when said road is first opened," will proceed with alacrity in the performance of that duty, actuated by emotions of no ordinary character, believing as the Committee do, that the work, about being completed, is emphatically a *New Jersey improvement*, and that it will eventually tend more to the developement of the resources of our State, and add more to the convenience of our citizens, than any other work that can be constructed within its limits.

The Committee would respectfully suggest whether if the road be completed by that time, it would not be proper to connect that event, (so important to the interests of our State,) with the anniversary of our National Independence.

The Committee would be pleased to learn the day that may be selected for the celebration of the event above referred to at your earliest convenience.

Respectfully, your obedient servants,

JAMES C. ZABRISKIE,
STAATS VAN DUERSON,
D. W. VAIL.
Committee &c.

Newark, June 25th, 1836.

To J. C. Zabriskie, S. Van Duerson, and D. W. Vail, Esquires, Committee of the Common Council of New Brunswick:

Gentlemen: The New Jersey Railroad and Transportation Company have assigned to us the agreeable duty of accepting the polite invitation of the Common Council of New Brunswick, and of making the arrangements appropriate to the occasion. In behalf of those we represent, we tender you our acknowledgments for the very kind terms with which you have been pleased to characterize our work, and we fondly trust that time will confirm all your favorable anticipations. Its progress has not been unattended with the difficulties and toil incident to undertaking of this character and magnitude; but the unwavering confidence and steady perseverance of the capitalists* with whom we are assaciated, have enabled us to prosecute thns far with gratifying success, this "*New Jersey improvement*," and we feel entirely assured from the fidelity and devotion already manifested, that the same spirit will coutinue to its final consummation.

We deem that tribute justly due to those to whom this state is chiefly indebted, for the construction of a work which it is the highest aim and desire of its projectors should prove a powerful means of "*developing the resources of New Jersey, and of promoting the convenience of its citizens*," and we rejoice that we have been the humble instruments of awakening an enlarged spirit of enterprise in a section of the State, which, though rich in resources, had long been neglected, and in furnishing facilities of communication, which cannot fail greatly to advance its wealth and prosperity. It is to us a source of sincere gratulation, that whatever may be the prospects of revenue to our work, its beneficial influence to others in promoting the value of property, in facilitating and fostering social intercourse, and in advancing the business operations of the community at large will be immeasurably greater.

Our road will be completed to your city by the first of July, and it is highly complimentary to our company, that you should propose to connect the celebration of its opening with the anniversary of our National Independence; but as this day is consecrated to commemmorate by general jubilee the most important event in our country's history, we hope you will permit us to postpone our excursion, until after that period; we accordingly have designatnd Thursday, the 7th of July, as the day on which our company will be happy to receive the hospitable civilities of your city.

We have the honor, Gentlemen to be, very respectfully, your obedient servants,

GEORGE L. SCHUYLER,
JOHN P. JACKSON,
Committee, &c.

[*We presume the allusion is to the enterprising house of Nevins, Townsend & Company, of New York City, whose names are honorably connected with a number of the most important public works in this country.—Ed.]

From the Cortland Advocate.

☞ The Syracuse, Cortland, and Binghampton Railroad Central Committee, it will be seen by the following notice, have called a meeting of the Commissioners named in the bill incorporating the above named work, and although the proceeding may not be strictly regular, it will be excused, as it cannot result prejudicially to any one, and as it secures great despatch, and is more convenient than any other method. The step was taken by the Central Committee, at the request of the resident Commissioners.

The Commissioners to open the books, etc. of the "Syracuse, Cortland and Binghamton Railroad," are requested to meet at the Eagle Tavern, in Cortland Village, on Tuesday the 12th day of July next, at 12 o'clock M:—

The Commissioners are as follows:—Henry Stephens, Eleazer W. Edgcomb, Augustus Donnelly, Samuel G. Hathaway, Edward C. Reed, Roswell Randall, William Randall, Samuel S. Foreman, Elam Lynds, Myrom S Mills, Henry F. King, Deniel Dickinson, Joseph S. Bosworth, and Thomas G. Waterman.

William Rarlitt,
Adin Webb,
Henry S. Randall,
Central Committee.

June 23, 1836.

APPENDIX

TO

PAMBOUR ON LOCOMOTION.

Continued from page 334.

The data laid down above must therefore be taken each in their speciality, that is to say, the one as suitable to a slow motion, with engines of a certain construction and intended for the draft of goods, and the other to a rapid motion with engines of a different construction, and intended for the draft of passengers.

Before we close this article, we must remark that the repairs of the railway consist principally in replacing the blocks, chairs, keys, and pins. The rails themselves, being in malleable iron, seldom break. As for their gradual decrease of weight, by wear, this is a very inconsiderable effect.

On May 10th, 1831, on the Liverpool line, a malleable iron rail, 15 feet long, carefully cleaned, weighed 177 lbs. 10½ oz. On February 10th, 1833, the same rail, taken up by Mr. J. Locke, then resident engineer on the line, and well cleaned as before, weighed 176 lbs. 8 oz. It had consequently lost in 21 months a weight of 18½ oz. The number of gross tons that had passed on the rail during that time was estimated at 600,000. Thus we see that with so considerable a tonnage, and with the velocity of the motion on that railway, the annual loss of the rail was only $\frac{1}{268}$ of its primitive weight. So that it would require more than a hundred years to reduce it to the half of its present strength.

§ 3. Expense of Fuel.

In regard to fuel, we have already, in Chapter IX. of this work, related experiments from which may be deduced the consumption of fuel according to the load the engines have to draw.

However, as in the intervals of the trips the fire must be kept up, and as, besides, there are always unavoidable losses during working, an increase of expense in that respect must naturally be expected in practice. This we also learn in a positive manner by the examination of facts.

According to the half-yearly reports of the Liverpool Railway Company, for the year ending June 30, 1834, the expense for fuel for the locomotive engines was

£6,079 15*s.* 8*d.*

The number of trips performed was 11,656; consequently the expense for fuel for each journey amounted to 10.432*s.*, and as the average price of coke employed during that year on the railway was 23.5*s.*, the consumption of fuel, measured in weight, amounted to 994.37 lbs. per trip.

We have seen (Appendix, § 1.) that the total number of gross tons conveyed by the locomotive engines of the company from one end of the railway to the other, in the same number of journeys was

373,776 t.

The average load of the engines was consequently about 32 tons.

A load of 32 tons, not including the tender, has consequently required, by the fact, a consumption of coke of 994 lbs. So, considering that the load has been really carried to a distance of 34½ miles, this makes 0.90 lbs. per gross ton drawn to a distance of one mile on a level. Our special Experiments (Chap. IX. § 2.) only give an average consumption of 784 lbs. of coke for a load of 32 t. By this it will be seen that, in practice, and with the nature of the business on that line, the different losses amount to one-fourth of the expense of the active work.

This increase is owing not only to the necessary expense for lighting the fire every morning, but also to the necessity, on that line, of keeping, for the passage of the inclined planes, helping engines, the fire of which must remain lit the whole day, although they only serve at distant intervals, and to the long delays between one journey and another. These circumstances, that of the helping engines alone excepted, are inevitable in a business of the nature of that of Liverpool.

On the Darlington Railway the same causes of loss do not exist, at least not to the same degree.

According to the notes, carefully kept by the directors of that company to serve as a foundation to the contracts they sign, the quantity of coals consumed on an average, during one journey of an engine, that is to say, to convey 24 wagons to a distance of 30 miles down hill, and bring them back again empty to the same distance up hill, costs the engine men 4*s.* 9¾*d.*, when the coals are at 5*s.* per ton. So the weight of coals consumed is 2157 lbs.

The *useful* load drawn by the engine is composed of 63.60 t. of coals in going down, and there is no *useful* load at all in going up; making an average of 31.80 tons of goods drawn to a distance of 40 miles in all.

This weight, from what we have seen (Appendix, § 1.,) corresponds with a *gross* weight, drawn on a level to the same distance, of

$$31.80 \text{ t.} \times 1.9717 = 62.70 \text{ t.};$$

the consumption of coals per gross ton carried to a distance of one mile on a level is, consequently, 0.86 lb.

This is nearly the same consumption as on the Liverpool Railway, especially if we consider that a ton of coals, of a good quality, produces a little more evaporation than the same weight of good coke.*

This result may appear surprising, the boilers of the Darlington engines being generally constructed on a less economical principle, as to the application of heat, than the Liverpool ones; but considering the way of working on each line, this circumstance will easily be accounted for. On the Darlington Railway the engines never go off but with a full load; that is to say, that they draw, as we have mentioned, an average weight of 62.7 t. per trip, and we know that this circumstance is favorable to the consumption of fuel. If these engines were to draw only an aveage load of 32 t., like the Liverpool ones, their comparative consumption would certainly be greater. To this must also be added that, on the Darlington Railway, the engines undergo no delay between their journeys, and that the invariability in the load and in the speed makes it unnecessary to give them more evaporating power than is strictly wanted for their motion. The consequence is that one never sees at the valve that enormous blowing which takes away from the Liverpool locomotive engines a fourth part of their produce.

It is to these combined circumstances that the practical result appearing in this case, must be attributed.

* The proportion of the quantity of coke prepared in a closed vessel, and of Newcastle coals, necessary to transform the same quantity of water into steam at the same pressure, is nearly as 14 to 13.

§ 4. *Total Expense of Haulage.*

The remaining expenses of the haulage require, on our part, no separate discussion. The particulars will be found in the following statements relating to the Liverpool Company. But their aggregate amount acquaints us with the total expense of haulage by means of locomotive engines, and this is a point which requires some consideration as well as the former ones.

According to the statements concerning the year in question, we see that the total expenses of the Liverpool Company amounted to the following sums:

	£	s.	d.
1st half-year . . .	56,350	1	9
2nd half-year . . .	60,092	15	11
	£116,442	17	8

But our purpose being to know the expenses relating to the use of the locomotive engines taken separately, in order to compare the amount with the total haulage they executed, we must deduct from that sum the following articles:

		£	s.	d.
1st. Interest on loans	1st hlaf-year	5,140	6	4
	2nd half-year	5,546	4	0
2nd. Stationary engine and tunnel disbursements	1st half-year	1,307	16	5
	2nd half-year	986	10	3
3rd. New rails, this being an extraordinary expense	1st half-year	150	16	0
	2nd half-year	3,153	14	0
4th. From the amount for maintenance of way, new rails not included, must be deducted $\frac{1}{18}$ for expenses concerning the tunnels, that are not worked by the locomotive engines and the length of which is 1¼ mile on the 31 miles of the whole line	1st half-year	627	10	0
	2nd half-year	619	14	0
5th. On the rest of the expense for maintenance of way must also be deducted $\frac{2}{5}$, being expenses occasioned by the passage, with their trains, of locomotive engines not belonging to the company. The haulage effected by the engines of the company being 373,776 tons, carried on the whole line. We have seen (Appendix, § 2) that the work of the engines not belonging to the company, raises the tonnage to 515,252 tons; consequently the work of the latter engines is 141,476 tons, or $\frac{2}{5}$ of the haulage of the company's engines. This article makes	1st half-year	2,258	18	0
	2nd half-year	2,231	0	0
Total sum to be deducted		£22,022	9	
Remains for expenses concerning the work of the company's locomotive engines		94,420	8	0

The haulage executed by the same engines being

12,895,272 gross tons carried to a distance of one mile,

the consequence is that, on the Liverpool Railway, at an average velocity of 16.73 miles per hour, the total expense of haul-

age by locomotive engines amounts to 1.75 d. *per gross ton carried to a distance of one mile on a level.*

This includes all sorts of expenses, carriages, rent, offices, &c.

On the Darlington Railway the expenses of haulage are much lower. The company estimates them at 1.00 d. *per ton of coals* carried to one mile *in going down* the line; which, after our calculation (Appendix, § 1.,) would make 0.51 d. per *gross* ton carried to one mile *on a level.*

The cause of that difference between the two railways has already been mentioned, being the velocity of the motion and the nature of the goods conveyed. To this must also be added the considerable difference in the price of fuel, the Darlington Company employing coals which cost only 5s. per ton, instead of 23s. 6d., the price of the coke used by the Liverpool Company. But the use on that line of several ways of working either by locomotive or stationary engines, or by horses, does not permit us to class and verify the expenses with the same precision as in the case of Liverpool. This is the reason why we shall not enter into any particulars in that respect.

§ 5. *Profits.*

After having examined the expenses, it is also necessary to cast a look on the receipts. Before we go over to the specified statements of the expenses of all sorts of the Liverpool Company, we shall therefore take down here, from those same statements the amount of the profits made by the company from the opening of the railway. This sketch will show that, if the mode of haulage in question necessitates considerable expenses for its establishment, the profits it produces are fully adequate to indemnify speedily the shareholders.

The road was opened to trade on September 16th, 1830, and from that period the dividends per share of £100 sterling amounted to the following sums:

	£	s.	d.
December 31, 1830 - - -	£2	0	0
June 30, 1831 - - - - -	4	10	0
December 31, 1831 - - -	4	17	8
June 30, 1832 - - - - -	4	4	8
December 31, 1832 - - -	4	8	0
June 30, 1833 - - - - -	4	7	6
December, 31, 1833 (besides a reserved fund of 4,088 8s. 10d.) - - - - - -	4	15	3
June 30, 1834 - - - - -	4	15	2
Total Sum from Sep. 16, 1830, to June 30, 1834, that is to say, in three years, nine months and a-half - -	£33	18	3

This sum makes 9 per cent. a-year, besides the reserved fund laid aside by the company, and notwithstanding the extraordinary expenses inevitable at the beginning of an undertaking, which being the first of its kind, was necessarily obliged to pay dearly for its own experience, whilst future railways will profit by that acquired by their predecessors.

Besides this high interest for the capital invested, we repeat that the shares of this railway, from the original price of £100 sterling, have risen, and sell at present, after four years establishment only, at £210; and that those of the Darlington Railroad, which boasts only nine years' existence, give 8 per cent. interest, and have risen in that short interval from £100 to £300, which is their present price.

This plain recital of facts speaks volumes. It is, therefore, unnecessary for us to add any reflection.

We shall be happy if the elucidations we have already given and those we intend to subjoin be of use to persons who may feel inclined to engage in these speculations, which, in regard to expenses, cannot fail to be as advantageous to their private fortune as to the prosperity of the country at large.

We shall conclude this Appendix by giving the specified statements of the receipts and expenditure of the Liverpool Company, from its origin to the present moment.

EXTRACTS

FROM THE REPORTS OF THE DIRECTORS OF THE LIVERPOOL AND MANCHESTER RAILWAY, FROM THE OPENING OF THE RAILWAY, ON THE 16TH SEPTEMBER, TO THE 30TH JUNE, 1834.

STATEMENT OF EXPENDITURE ON CAPITAL ACCOUNT.

	£	s.	d.
Amount of expenditure on the construction of the way and the works, from the commencement of the undertaking to 31st December, 1833 - - -	£1,089,818	17	7

ANNUAL OR WORKING ACCOUNT.

FROM 16TH SEPTEMBER TO 31ST DECEMBER, 1830.

	£	s.	d.
Nett profits of the Company	£14,432	19	5
Dividend per share of £100	2	0	0

HALF-YEAR ENDING 30TH JUNE, 1831.

	£	s.	d.
Nett profits of the Company	£30,314	9	10
Dividend per share of £100	4	10	0

HALF-YEAR ENDING 31ST DECEMBER, 1831.

	Tons.
Merchandise between Liverpool and Manchester	52,224
Road traffic - - - - -	2,347
Between Liverpool and the Bolton junction	10,917
Coal from Huyton, Eltonhead, and Haydock collieries brought by the Company's engines - -	7,198
Coal from Hulton brought by the Bolton engines - - - -	1,198
Number of passengers booked at the Company's offices - - -	256,321
Number of trips of 30 miles performed by the locomotive engines with passengers - - - -	2,944
Do. with goods - - - - -	2,298
Do. with coal - - - - -	150

Receipts.

	£	s.	d.
Coach department -	£58,348	10	0
General merchandise -	30,764	17	8
Coal department - -	605	14	5
	£89,809	2	0

Expenses.

	£	s.	d.
Office establishment -	£902	3	10
Coal disbursements -	60	15	5
Petty ditto - - - -	110	0	5
Cart ditto - - - -	60	17	8
Maintenance of way -	6,599	12	6
Charge for direction -	297	19	0
Coach office establishment	589	5	9
Locomotive power -	12,203	5	6
Advertising - - -	59	3	4
Interest - - - -	2,737	7	3
Rent - - - - -	900	5	3
Compensation (coaching department) - - -	156	7	5
Engineering department	625	0	0
Carrying disbursements	10,450	12	3
Taxes and rates - -	2,763	5	1
Stationary engine disbursements - - - - -	269	4	7
Coach disbursements -	6,709	7	11
Wagon ditto - - - -	979	19	8
Compensation (carrying department) - - -	786	8	2
Police establishment -	1,490	14	1
Law disbursements -	98	9	10
Bad debts - - -	175	13	6
	£49,025	18	5
Nett profit from 1st July to 31st Dec. 1831 - -	£40.783	3	7
Dividend per share of £100	4	10	0
Nett profit on Sunday travelling per share of £100	0	7	8

HALF-YEAR ENDING 30TH JUNE, 1832.

	Tons.
Merchandise between Liverpool and Manchester - - -	54,174
Traffic to and from different parts of the road - - -	3,707
Between Liverpool and the Bolton junction - - -	14,720
Coals from different parts of the road brought by the Company's engines - - -	22,045
Coals brought by the Bolton engines . . .	7,411
Number of passengers booked at the Company's offices .	174,122
Number of trips of 30 miles performed by locomotive engines with passengers . .	2,636
Ditto with merchandise .	2,248
Ditto with coals . .	234

Receipts.

	£	s.	d.
Coaching department .	£40,044	14	7
General merchandise department . . .	32,477	14	0
Coal do	2,184	7	6
	£74,706	16	1

Expenses.

	£	s.	d.
Bad debt account .	394	5	7
Coach disbursements. Guards' and porters wages, £1104 4 6—Parcel carts and drivers' wages, £254 10 5—Omnibuses and duty, £1082 0 7—Repairs and materials, £1777 9 4—Gas, oil, tallow, &c. £228 14 6—Stationery and sundry disbursements, £441 1 7	4888	0	11
Carrying disbursem'ts. Salaries £1749 5 10—Porters' wages £3362 0 8—Brakesmen's wages £461 5 9—Oil, tallow, cordage &c. £561 12 6—Carting £808 16 5—Repairs to jiggers, trucks, &c. £163 14 11—Stationery and sundry expenses, £563 10 8	8010	6	9
Coal ditto . . .	26	8	10
Cartage (Manchester) .	1420	4	9
Charge for direction .	308	14	0
Compensation (coaching) .	101	10	9
Compensation (carrying) .	288	10	3
Coach office establishment (salaries, £573 13 1—Rent and taxes, £106 10 0.)	680	3	1
Engineering department .	520	9	0
Interest	5966	14	11
Locomotive Power. Fuel and watering £2907 8 0—Oil, tallow, hemp, &c. £507 3 1—Repairs and materials £5947 6 5—Enginemen's wages £1170 18 8	10,582	16	2
Maintenance of way (wages, £3929 8 0—Blocks, sleepers, chairs, &c. £2668 12 3—Ballast, £733 0 3) . .	7,3331	0	6

Office establishment (salaries, £662 8 6—Rent and taxes, £77 9 2—Stationery, &c. £81 10 5) . . .	811 8 1
Police and gatekeepers .	1356 9 11
Petty disbursements .	75 1 0
Rent	1840 1 10
Stationary engine and tunnel disbursement, new tunnel rope, £330 10 8—Coal £265 7 0—Wages £290 9 9—Repairs, oil, tallow, hemp, &c. £165 8 9 . . .	1051 16 2
Taxes and rates . .	1109 14 9
Wagon disbursements. Smiths' and joiners' wages, £586 6 7—Iron, timber, &c. £265 0 9—Canvass, paint, &c. for sheets, £155 10 10	1006 18 2
	£47,770 15 5
Deduct credits	1,112 4 1
	£46,658 11 4
Nett profits for six months	£28,048 4 9
Dividend per share of £100	4 0 0
Nett profit on Sunday travelling per share of £100 .	0 4 8

HALF-YEAR ENDING 31ST DECEMBER, 1832.

	Tons.
Merchandise between Liverpool and Manchester . .	61,995
Ditto, to different parts of the road, including the Warrington and Wigan trade . .	6,011
Ditto, between Liverpool and Bolton . . .	18,836
Coals from various parts of the road to Liverpool or Manchester	39,940
Number of passengers booked in the Company's offices .	182,823
Number of trips of 30 miles performed by the locomotive engines with passengers .	3,363
Do. with goods . . .	1,679
Do. with coals . . .	211

Receipts.

Coaching department .	£43,120 6 11
General merchandise .	34,977 12 7
Coal department . .	2,804 3 4
	£80,902 2 10

Expenses.

Bad debt account . .	£81 6 0
Coach disbursements. Guards' and porters' wages £1173 19 6—Parcel carts and drivers' wages, £375 14 4—Materials for repairs, £464 1 9—Mens' wages, repairing £613 18 1—Gas, oil, tallow, &c. £232 11 7—Duty on passengers £985 19 1—Stationery and petty expenses £414 19 7	4261 3 11
Carrying disbursements. Salaries £1822 13 2.—Porters', &c. wages, £3925 7 4.—Gas, oil, tallow, cordage, &c. £296 11 7.—Repairs to jiggers, trucks, stations, &c. £398 3 11.—Stationery and petty expenses £540 13 5.	6983 9 5
Coal ditto	27 2 10
Cartage (Manchester) . .	2744 18 7
Charge for direction . .	295 1 0
Compensation (coaching) .	209 15 11
Ditto (carrying) . . .	150 19 11
Coach office establishment (Salaries £556 3 10—Rent and taxes, £75 16 2) . .	631 19 0
Engineering department .	450 0 0
Interest	4555 15 7
Locomotive power. Fuel and watering, £3848 10 8.—Oil, tallow, hemp, &c. £661 1 9.—Materials for repairs, £3723 9 7.—Men's wages, repairing, £3352 16 2.—Engine and firemen's wages, £1060 11 6.	12,646 9 8
Law disbursements	118 3 8
Maintenance of way (wages £3675 16 5—Block, sleepers, chairs, &c. £2355 17 1—Ballast, &c. £846 10 9)	6878 4 3
Petty disbursements . .	66 2 0
Rent	1246 5 0
Stationary, engine and tunnel disbursements (Coal, £209 15 3—Engine and brakemen's wages, £316 7 5—Repairs, gas, oil, tallow, &c. £326 14 7) . .	852 17 3
Taxes and rates . . .	3483 18 12
Wagon disbursements. Smiths' and joiners' wages, £583 0 5—Iron, timber, &c. £350 12 10. — Canvass, paint, &c. for sheets, £31 0 0.	946 13 1
Office establishment (Salaries, £623 18 0—Rent £85 0 0—Stationery £18 9 0) .	727 7 0
Police ditto	902 16 5
	£48,278 8 10
Nett profit for six months	£32,623 14 0
Dividend per share of £100 .	4 4 0
Nett profit on Sunday travelling per share of £100 .	0 4 0

HALF-YEAR ENDING 30TH JUNE, 1833.

	Tons.
Merchandise between Liverpool and Manchester . . .	68,281
Ditto, to different parts of the line, including Warrington and Wigan	8,712
Ditto, between Liverpool, Manchester and Bolton . . .	19,461
Coals from various parts, to Liverpool and Manchester .	41,375
Total number of passengers booked in the company's offices	171,421
Number of trips of 30 miles performed by the locomotive engines, with passengers	3,262
Ditto with merchandise . .	2,244

Receipts.

Coaching department .	£44,130 17 2
Merchandize ditto .	39,301 17 3
Coal ditto .	2,638 15 9
	£86,071 10 2

Expenses.

Advertising account . .	£50 8 7
Bad debt account . . .	176 18 6
Coach disbursements. Guards and porters' wages, £1150 4 0—Parcel carts, horse keep and drivers' wages, £401 18 6—Materials for repairs, £383 15 11—Men's wages, repairing, £758 10 6—Gas, oil, tallow, cordage, &c. £324 4 0—Duty on passengers, £2466 15 4—Stationery and petty expenses, £236 15 6—Taxes on offices, stations, &c. £112 18 4	5,835 2 1
Carrying disbursements. Agents' and clerks' salaries, £1703 17 6—Porters' and brakesmen's wages, horse keep, &c. £4687 9 7—Gas, oil, tallow, cordage, &c. £648 4 11—Repairs to jiggers, trucks, stations, &c. £405 13 1—Stationery and petty expenses, £336 9 0—Taxes, insurance, &c. on offices and stations, £798 1 8.	8,579 15 9
Coal disbursements . .	120 16 1
Cartage (Manchester) . .	2460 16 1
Charge for direction . .	252 0 0
Compensation (coaching) .	38 1 2
Compensation (carrying)	1033 18 3
Coach office establishment (Agents' and clerks' salaries, £577 19 6—Rent and taxes, £102 17 1) . .	680 16 7
Engineering department .	441 17 4
Interest	5,367 11 9
Locomotive power. Coke and carting, £2795 4 5—Wages to coke fillers, and watering engines, £338 16 10—Gas, oil, tallow, hemp, &c. £760 15 2—Copper and brass tubes, iron, timber, &c. for repairs, £3290 8 8—Men's wages, repairing, £1115 0 8—Enginemen and firemen's wages, £892 4 4—Out-door repairs to engines, £943 6 8—Two new engines, "Leeds" and "Firefly," £1580 0 0	14,715 16 9
Maintenance of way (wages, £3648 18 5—Blocks, sleepers, chairs, &c. £2052 5 11 Ballast and draining, £1013 5 11)	6,714 9 8
Office establishment (Salaries, £624 19 0—Rent and taxes, £62 18 6—Stationery, &c. £56 19 5) . . .	744 16 11
Police	950 4 7
Petty disbursements . .	70 0 0
Rent	601 15 8
Repairs to walls and fences .	296 4 0
Stationary engine and tunnel disbursements (Coal £155 8 1—Engine and brakemen's wages, £363 8 10—Repairs, gas, oil, tallow, &c. £340 15 11 . . .	859 12 10
Tax and rate . . .	1,891 0 7

Waggon disbursements (Smiths' and joiners' wages, £598 3 1—Iron, timber, &c. £320 1 4—Cordage, paint, &c. for sheets £82 7 3) 1,000 11 8
Cartage (Liverpool) . . 18 4 0

£52,900 9 1

Nett profit for six months £33,171 1 1
Dividend per share of £100 . 4 4 0
Nett profit on Sunday travelling per share of £100 0 3 6

HALF-YEAR ENDING 31ST DECEMBER, 1833.

	Tons.
Merchandise between Liverpool and Manchester . .	69,806
Ditto, to and from different parts of the line, including Warrington and Wigan .	9,733
Ditto, between Liverpool, Manchester, and Bolton . .	18,708
Coal from various parts to Liverpool and Manchester .	40,134
Total number of passengers booked at the company's offices	215,071
Number of trips of 30 miles performed by the locomotive engines with passengers	3,253
Ditto, with merchandise .	2,587

Receipts.

Coaching department . £54,685 6 11
Merchandise ditto . . 39,957 16 8
Coal ditto 2,591 6 6

£97,234 10 1

Expenses.

Advertising account . . 6 10 0
Bad debt account . . . 374 10 1

Coach disbursements. {Guards and porters' wages, £1168 4 6—Parcel carts, horse keep, and drivers' wages, £361 1 7—Materials for repairs, £689 12 6—Men's wages, repairing, £1041 1 3—Gas, oil, tallow, cordage, &c. £196 4 11—Duty on passengers, £3224 11 11—Stationery and petty expenses, £277 4 5—Taxes on offices, stations, &c. £116 0 8—Guards' clothes, £54 15 0.} 7,138 16 9

Carrying disbursements. {Agents' and clerks' salaries, £1728 16 9—Porters' and brakesmen's wages, horse keep,&c. £5006 6 10—Gas, oil, tallow, cordage, &c. £529 17 0—Repairs to jiggers, trucks, stations, &c. £366 9 11—Stationery and petty expenses, £429 5 1—Taxes and insurance on offices, &c. £456 17 7—Sacks for grain, £110 3 10.} 8,627 17 0

Coal disbursements . . 82 0 9
Cartage (Manchester) . 3,173 18 0
Charge for direction . 812 18 0
Compensation (coaching) . 142 4 8
Compensation (carrying) . 1,223 10 11

Coach office establishment (Agents' and clerks' salaries, £602 6 8—Rent, £30) 632 6 8
Engineering department 319 3 4
Interest 5,140 6 4

Locomotive power. {Coke and carting, £3197 4 4—Wages to coke fillers and waterers, £348 8 5—Gas, oil, tallow, hemp, cordage, &c. £865 14 9—Brass and copper, iron, timber, &c. for repairs, £3755 3 7—Men's wages, repairing, £4401 4 10—Engine and firemen's wages, £784 8 5—Out-door repairs to engines, £613 3 9.} 13,965 8 1

Maintenance of way. {Wages to plate layers, joiners,&c. £2937 19 2—Stone, blocks, sleepers, keys, chairs, &c. £2411 2 4—Ballasting and draining, £925 16 11—New rails, £150 16 3.} 6,425 14 8

Office establishment (Salaries, £607 2 0—Rent and taxes, £75 14 3—Stationery and printing, £22 7 8—Stamps, £17 2 3) 722 6 2
Police 1,022 7 6
Petty disbursements . . 61 19 6
Rent 603 10 8
Repairs to walls and fences . 665 3 4
Stationary engine and tunnel disbursements, (Coal, £302 6 5—Engine and brakesmen's wages, £319 11 2—Repairs, gas, oil, tallow, &c £419 15 5—New rope for tunnel, £266 3 6) . . 1,307 16 6
Tax and rate 3,409 11 0

Wagon disbursements. {Smiths' and joiners' wages, £718 19 7—Iron,timber,castings, &c. £700 7 1—Cordage, paint, &c. £28 5 2—Canvass for sheets £163 6 5} 1,611 0 3

Cartage (Liverpool) . . 80 17 10
Law disbursement . . 300 3 9

£56,350 1 9

Nett profit for six months £40,884 8 4
Dividend per share of £100 4 10 0
Nett profit on Sunday travelling per share of £100 . 0 5 3
Reserved fund formed in the six months . . . 4,088 8 10

HALF YEAR ENDING 30TH JUNE, 1834.

	Tons.
Merchandise between Liverpool and Manchester . .	69,522
To and from different parts of the road, including Warrington and Wigan . .	15,201
Between Liverpool, Manchester and Bolton . .	19,633
Coal to Liverpool and Manchester	46,069
Number of passengers booked at the Company's offices .	200,676
Number of trips of 30 miles performed by the locomotive engines with passengers .	3,317
Ditto with merchandise .	2,499

Receipts.

Coaching department £50,770 16 11
Merchandise ditto . . 41,087 19 5
Coal ditto . . 2,925 15 11

£94,784 12 3

Expenses.

Advertising account . . £16 15 0
Bad debt ditto . . . 75 12 3

Coach disbursements. {Guards' and porters' wages, £1167 11 10—Parcel carts, horse keep and drivers' wages, £359 13 0—Materials for repairs, £1007 9 7—Men's wages, repairing, £1221 15 5—Gas, oil, tallow, cordage, &c. £358 15 6—Duty on passengers, £3008 1 11—Stationery and petty expenses, £165 2 5—Taxes, insurance, &c. on offices and stations, £65 8 11} 7,353 18 7

Carrying disbursements. {Agents' and clerks' salaries, £1740 14 2—Porters' and brakesmen's wages, horse keep, &c. £5397 8 5—Gas, oil, tallow, cordage, &c. £708 17 4—Repairs to jiggers, trucks, stations, &c. £716 2 8—Stationery and petty expenses, £290 3 2—Taxes, insurance, &c. on offices and stations, £469 6 2} 9,322 11 3

Coal disbursements . . 45 1 0
Cartage (Manchester) . . 2,988 6 2
Charge for direction . . 289 16 0
Compensation (coaching) . 26 3 10
Compensation (carrying) . 645 6 0
Coach office establishment (Agents' and clerk's salaries, £615 1 11—Rent and taxes £63 1 1) . . . 678 3 0
Engineering department . 352 10 0
Interest 5,546 4 0

Locomotive power. {Coke and carting. £2882 11 4—Wages to coke fillers and watering engines, £386 19 5—Gas, oil, tallow, hemp, &c. 881 18 4—Copper and brass tubes, iron, timber, &c. for repairs, £4140 19 6—Men's wages for repairing, £5432 8 8—Enginemen and firemen's wages, £836 14 3—A new engine, £700—Lathe engine, boiler and fixing for repairing sheds and watering stations, £380 6 4.} 15,641 17 10

Law disbursements . . 100 0 0

Maintenance of way. {Wages and small materials, £4221 2 5—Stone,blocks,sleepers, &c. £1482 18 7—New rails and chairs, points, crossings, &c. £3153 14 5—Ballast and leading, £493 2 0} 9,350 17 5

Office establishment (salaries, £818 14 4—Rent and taxes, &58 8 0) . . . 877 2 4
Police 1,016 18 1
Petty disbursements . . 60 0 0
Rent 363 11 11
Stationary engine and tunnel disbursements, (Coal, £327

12 1—Engine and brakesmen's wages, £385 7 0—Repairs, gas, oil, tallow, &c. £273 11 1) . .	986 10 2
Tax and rate . . .	1,778 16 10
Wagon disbursements. {Smiths' and joiners' wages, £773 3 8—Iron, timber, &c. £728 12 4—Cordage. paint, &c. £109 19 2—Canvass for sheets, £240 0 0 . }	1,851 15 2
Repairs to walls and fences .	664 0 11
Cartage (Liverpool) . .	80 17 6
	£60,092 15 11
Net profit for six months	£34,691 16 4
Dividend per share of £100	4 10 0
Nett profit on Sunday travelling per share of £100 .	0 5 2

From the immense mass of testimony, collected by the Select Committee of the House of Commons on Accidents in Mines, we have selected the following article in relation to a novel and ingenious method of lighting, not only mines, but all places where actual exposure of flame to the atmosphere, might be productive of dangerous explosions or conflagrations.

We recollect a domestic application of this method, that was ingenious enough in its operation.

A gentleman had lost a knife of some value, at the bottom of a very deep well. By means of a large mirror, he reflected the sun's rays to the bottom of the well, and immediately discovered the position of the knife. A magnet, attached to a line, was let down upon it, and brought up the knife with it. We have not unfrequently used this method of illumination, when in search of some small article in an obscure corner of a dark closet.

MR. GOLDSWORTHY GURNEY'S SAFETY METHOD OF LIGHTING MINES.

(From the Minutes of Evidence taken before the Select Committee of the House of Commons on Accidents in Mines.)

Has it ever occurred to you to consider whether mines might be lit under such circumstances as to do away with the necessity of the moveable lamp?—The subject has been one which I have lately considered a good deal, in conseqence of being engaged again in experiments of a similar kind to those of 1822; I have recently made a series of experiments for the Trinity House on artificial light; and the results of these experiments, and observations connected with them, induce me to believe it possible to light coal mines without taking flame at all into mines: In a few words, I will state, that I think it capable of being done by reflected light. In these experiments I found artificial light may be produced, so intense that when placed in the focus of a parabolical reflector, it will throw a distinct shadow at the distance of eleven miles. Now, as light is capable of being concentrated, reflected, and refracted in any angles, or in any direction, or in any quantities, I think it possible that such light may be reflected into mines, subdivided, and passed through the galleries, in sufficient quantities and intensity as to enable miners to work far better than by lamps of any description. The light itself, and the combustion to produce it, could be placed above the shaft, in the open air. If, however, from mechanical difficulties, such as obstructing parts in the way of its passage down the shaft, it is possible that the light might be placed in some safe part of the mine itself, where fire-damp is never found, and from thence be reflected and refracted through the various parts of the mine. I have made experiments with this view, and have found light capable of being reflected, in various directions, with simple and inexpensive reflectors; the first reflection requires a true parabolic reflector, but afterwards plain and simple surfaces will do. Possibly, the whole mine and galleries may be all lit by a single light, if not very extensive; but if seven lights of the first order be placed in the focus of seven true 12 inch parabolas, and arranged within a circle of 3 feet diameter, which they may be, I firmly believe one of the longest mines might be most effectually lighted in every gallery. No one can judge of the power and management of this light who has not seen it, or possibly conceive its practicability to the subject before us. I need not go into explanation of the manner of doing it. The Committee will remember that, as the angle of reflection is always equal to the angle of incidence, we may throw the light in whatever direction we please; by this means we may turn it round a corner at right angles, or in any angles suited to the drifts the mine happens to be cut into. The practical difficulties connected with this plan chiefly, I conceive, are those arising from obstructions in the galleries: one, for instance, is the air-doors, which are necessarily used for ventilation; there is no difficulty, however, in such case in placing a piece of plate-glass in some particular part of the door, so as to admit the passage of the light through it, or a second light may be brought in an opposite direction; again, if the galleries are so low that there is not room for the light, coal wagons or miners, to pass together, it is possible so to widen them, or enlarge them, that there would be a sufficient space for a sufficient quantity of light to pass; it may be passed through very small openings by strong concentration, and afterwards diverged as may be necessary.

Would it not be attended with great expense?—No.

Less than the ordinary mode?—I am not prepared to say exactly, but I think it would not be more expensive than the present mode. In case the light is not required to be very great, I think a light of less intensity might be used, with advantage, that would be less expensive than the present oil-lamps. A very simple but powerful light, is about to be adopted by the Trinity Board for light-houses, which, by way of distinction, and in reference to the place where it was discovered, has been called the "Bude Light." This light produces an intensity 140 times that of the present Argand burner; this light, therefore, may be used where the ramifications of the mine, or greater extent, does not require the first order, namely, the lime light. In some cases, the light from the common Argand burner, placed in a parabolic reflector, may be sufficient, and in that case it certainly would be cheaper. I am of opinion, from the experiments and investigations made at the Trinity House, that the light from lime, and also the Bude Light, is less expensive than that of the ordinary light, taking quantity and intensity into account, which may be sub-divided to equal intensity with the first; the intensity of the one is 290 times greater than the other, and the intensity of the second 140; thus one is capable of giving the same quantity as 290 Argand burners, and the other as much as 140.

The term Bude Light has no application to the peculiar manner in which it is produced?—It is a term simply used to distinguish it.

From what is it derived?—It is produced by striking nacent carbon, evolved in the combustion of oil, resin, or similar bodies, with oxygen gas.

You have spoken of difficulties in the introduction of this new system of lighting in the mines of this country; apply your mind for a moment to the difficulties which might arise in the mines not having above two or three feet depth of seam?—I think such difficulties are to be overcome by inexpensive boring or widening to admit the light to pass; in such a drift a stream of light, highly concentrated, of six inches diameter, would be ample, and whether it passed by the side or the top of the gallery, it matters not. A large quantity of light, by simple means, might be concentrated in such case, and passed along such an opening, and afterwards diverged in larger galleries, if such was indispensable. These are points upon which I think the Committee will find other persons more capable of giving information on than myself.

Supposing a light is required to be in a straight line for a mile, there would be on difficulty in obtaining a sufficient light at the terminus?—The light at the distance of a mile would enable you to read the smallest print. If it is reflected two or three times in that distance through a circuitous passage, you would lose very little, if you use good reflectors made of speculum metal. The quantity of light lost by such reflection is very trifling.

The question related to the casting of light upon one object at the distance named?—So I have answered it; it is of little consequence whether it be straight a-head, or at the end of a curved or angular gallery.

In case that light is then to be divided into fifty different directions, so as to suit different galleries, what would be the consequence as regards the terminus?—The result would be, that the light would simply be reduced fifty times in quantity; it would be divided into fifty portions; it would then be still stronger than the strongest Argand burners; and I beg to be understood as meaning the Argand burner used on the tables of private families, not the little oil burner of the safety-lamp. I will make an observation here which may be important, namely, the stream of light may be sent through the various galleries, and when it arrives at the situation where the men are working, every man, with a little reflector or refractor, as may be determined on, may take that portion of light which may be intended for him, and no more, from the great stream, and thus limit him the quantity of light that he may abstract from the stream; which portion he may at pleasure direct wherever he pleases on the work before him; so that instead of a lamp, he would work with a little diverging reflector, or refractor, which he would carry in his pocket, perhaps of the size of half-a-crown.

Do you not think that the experiments of scientific men might be better made in the mines themselves, than they could be in their own laboratory?—Certainly; if a principle is established, it rests as a matter of mechanical detail, or of mechanical situation and position, to know whether it can or cannot be applied, practically, with advantage. Sir George Cayley informs me that he used the principle of reflection to throw daylight to some men who were

working a deep well. It had a beautiful effect, and answered the purpose perfectly. His reflector was nothing more than a piece of tin plate. The daylight is not sufficiently intense; we cannot focus it so as to be passed through the galleries of mines.

In your opinion, would the experiment be better conducted by placing the light above the shaft, or at the bottom of the shaft?—It would depend on the depth and size of the shaft.

Assume 200 yards in depth?—In such case above; you get at the materials and apparatus for forming the light better; the distance of 200 yards has very little effect in diminishing the light; reflected light does not obey the same laws as radiated light; radiated light diminishes as the squares of the distances, but reflected light does not; this is contrary to received opinions, but I am satisfied it is corect, from the observations I have lately made.

You have not supposed any difficulties in the application of this light, beyond those already stated, which the Committee understand to be the interruptions occasioned by stoppings or trap-doors in the mines, or the extreme sub-division of the reflected light?—I have: there are others, but I think of minor importance, which can only be justly appreciated in practice.

The shafts of the mines are placed at right angles, that is, they are driven along, and they begin at the further end, and then work upwards; is there any difficulty in transmitting the light at right angles?—Not any difficulty whatever; you may transmit the light in any angle you please; it may first be thrown down a shaft, and then sent into any angle, upwards or downwards, or on one side or on another.

Suppose there be a space of two or three feet left on one side, or both sides, of the carriages conveying the minerals along the galleries, the light might be transmitted independently of the space occupied by the carriages?—Certainly.

Or through a similar space above the carriages?—Yes.

And you propose, to obviate the difficulty of passing through the trap-doors, that means in the mines, by the insertion of glass in those doors; what is the smallest size you would consider sufficient for that purpose?—It would depend upon the situation in which the door was placed in the mine; if in the first gallery, where you wanted the full stream or supply of light to pass, you would require twenty inches diameter; when doors occur further on, in the division of light, perhaps three or four inches in diameter would be sufficient.

Would that be sufficient to light a gallery at the distance beyond the door many hundred yards, if twelve feet wide?—Certainly. There is another valuable natural fact that I would mention here: the stream of light, as it passes through the air, is refracted by the atmosphere, and thrown in all directions several yards, with an intensity sufficient for practical purposes. My house at Bude has a long gallery in it; I passed a stream of reflected light through that gallery; every bed-room entering into the gallery was sufficiently illuminated in every part for a person to pick up a pin. The light in the bed-rooms was refracted light, from the reflected light passing through the gallery. I conceive that unless men are working at some distance from the stream of light through a gallery, a reflector would be scarcely necessary for them. Dust, floating in the atmosphere, reflects a good deal of light sideways.

Would the accumulation of dust upon glass so inserted in one of the trap-doors, be a serious impediment to the light?—Not practically, because it could be easily wiped away.

Are you aware that a boy is generally stationed to take charge of those doors?—Yes.

And of course, he might have instructions to keep the glass perfectly clean?—Certainly.

From the Baltimore Farmer and Gardener.

VIRTUES OF LIME AS A MANURE.

We mentioned last week the republication of the excellent essay on this subject, by M. Puvis, in pamphlet form, and promised to give the very able *introduction*, with which the edition is prefaced,—from the pen of Professor Renwick, of Columbia College, New-York. It will be found below and will more than repay the reader for the time devoted to its perusal; for it is in truth a most luminious paper, replete with intelligence which every farmer should be in possession of. His explanations of the constituents of soils and the mode of action of lime, upon peculiar soils, are both so plain that none who wish to comprehend them can mistake their import. For ourself we are gratified to find gentlemen of Professor *Renwick's* distinction putting their shoulders to the wheel in support of the cause of agriculture, as, besides the brilliant lights which are thrown out by them, the influence of their names is of incalculable value. We should not omit mentioning that the public are indebted chiefly to *James Wadsworth*, Esq. of New-York for the edition of this excellent work.

"The chemical facts and principles which are applicable to agriculture, are neither numerous nor complete. They are, however, to be found only in works on general chemistry, in which they are intimately associated with laws and phenomena of a more abstruse description, and in connection with which they constitute a science of which the most learned are still students, and to attain which in its existing form may require years of close and attentive study. The language, too, of chemistry, which, to those who study it in a regular course, serves as an artificial memory. and single words of which call up long trains of thoughts and experiment, presents the uninitiated all the difficulties of a foreign tongue.

Yet it cannot be doubted, that the practical farmer may derive important benefit from acquiring so much of this language as will enable him to understand the chemical explanation of the numerous changes which are continually taking place in the natural actions which it is his high privilege to call into his service, to direct in part, and modify in degree. So also certain chemical elements and compounds, with the properties of which he ought to be acquainted if he wish to be able to direct his practical skill with more effect, even in circumstances familiar to him, but which may be absolutely necessary, or will at any rate save waste of labor and loss of time, when the knowledge acquired by practice in one place is to be employed in a new situation, and under a change of circumstances.

It is the object of this introduction to exhibit, in such a form as may be intelligible to those who have not made general chemistry an object of study, a concise view of such of the laws and facts of that science, as are absolutely necessary for the agriculturist who may wish to improve his practice, and which are more particularly required by those who wish to avail themselves of the knowledge contained in the subjoined essay. To do this has been found no easy task. It would be in itself difficult, but to the author of this introduction has been more particularly so, as he has for years been in the habit of imparting instruction to those whose habits of life and thoughts are as remote as possible from those of the practical farmer; persons to whom the peculiar language of chemistry is an aid instead of an impediment, and who, with ample time at their command, have an opportunity of pursuing the study of the science step by step. Fully aware of these difficulties, both general and peculiar, this attempt would not have been made, and certainly not persisted in, had it not have been for the instances of an intelligent, scientific and successful farmer, who has urged the completion of the task as an object likely to be beneficial to those, who, with perhaps equal zeal and native powers of mind, have not enjoyed like himself, the advantages of a scientific education.

The atmosphere which surrounds our earth is the first object to which our attention should be directed. This is the vehicle of the moisture, which, whether it fall in the form of rain or dew, run in streams or issue from springs, is absolutely essential to the success of the farmer's labor. It is also, as we shall presently see, important to him on other accounts.

The greater part of the atmosphere is made up of a mixture of substances, each of which has the same mechanical properties as the whole mass. These air-like substances are known to chemists by the name of *Gases*.

Of these gases, two make up by far the greater portion of atmospheric air, and exist in it in the proportion of about 4 to 1.—That which is the largest in quantity and makes up nearly 4-5ths of the whole atmosphere, is called, in the Essay of M. Puvis, by the name of Azot, but is more usually known in English by the name of Nitrogen.

This substance, although in the largest proportion, is the least important of the gases in its chemical effects. It does not aid in supporting the life of animals, nor in maintaining the burning (*combustion*) of inflammable bodies.

The part of the atmosphere which is absolutely necessary for these purposes, is called by the name of *oxygen*, and nearly makes up the remaining fifth part of atmospheric air. In its support of life it al-

ways, and in containing combustion often, unites with a chemical element, which is called *carbon*. This is familiarly known as forming the principal part of charcoal. In its union with carbon, oxygen forms a peculiar gas known by the name of carbonic acid.

Carbonic acid is always found in small quantities in the atmosphere, to which it is furnished by the breath of animals and the fumes of burning bodies. It is, when in considerable quantities, fatal to the life of animals, but is prevented from accumulating to an injurious extent in consequence of its being taken up by water; it is therefore dissolved, in proportions about equal to those in which it is formed by rivers, lakes, the ocean, and the moisture of the soil.

Water exists in the atmosphere in the form of vapour. The great source of this vapour is the extended surface of the ocean, and it is governed by a mechanical law, by which it is continually tending to distribute itselt uniformly over the whole surface of the earth. It may thus exist in as large quantities over the surface of the dryest land as over that of the ocean itself. The tendency to equal distribution is continually counteracted by the changes in the sensible heat (*temperature*) of the atmosphere, and of the surface of the earth, which follow the alternations of day and night, and the vissitndes of the seasons.—By these alternations and changes, the vapour is caused to fall (*precipitated*) in the form of rain, snow, hail, dew, or white frost, according to circumstances. As such changes of temperature are more frequent on the land than on the ocean, the water which falls on the former in either of these forms is greater in quantity than that which falls on equal surfaces of the latter. Thus by a wise and benevolent Providence, the water of the ocean is continually furnishing vapour, which is precipitated on the land for the support of vegetation and the supply of springs, and whose excess is poured back into the ocean in streams and rivers.

Water has been found by chemists to be a compound substance, made up of two elements. One of these, which forms 8-9ths of its weight, is the gas already mentioned under the name of oxygen; the other, a peculiar gas, known by the name of *hydrogen*.

Hydrogen, when free, is the lightest of all known bodies, rising and floating in atmospheric air; it not only combines with oxygen, to form water, but with carbon to form a great variety of compounds—gaseous, liquid, viscid, and solid. It also combines with nitrogen, and forms a gas known by the name of ammonia, which is well known by the peculiar smell it gives to spirits of hartshorn (*liquid ammonia.*)

Hydrogen also combines with sulphur, forming a gas known by the name of sulphuretted hydrogen; this exists in the atmosphere, but in such small quantities, as only to be detected by the nicest chemical tests. It combines in like manner with phosphorus, forming phosphuretted hydrogen gas, whose presence in the air is occasionally perceptible.

Oxygen, as we have seen, unites with carbon, to form a gas which we have called carbonic acid.

This receives the latter part of its name from its similiarity in properties to an extensive class of compound bodies, known by the name of *the acids*. The greater part of these, like carbonic acid, are combinations of inflammable bodies with oxygen. The most important of these in reference to our present object, are the sulphuric and phosphoric acids; named from the two substances (sulphur and phosphorus) which are their bases. Muriatic acid may also be mentioned here although its composition is of a different character. Oxygen unites with other bodies to form a class of compounds known under the name of oxides.

The acids unite with earths, alkalis, and metallic oxides, to form a class of compounds known, under the general name of salts. These are named from the two substances which enter into their composition; thus, the salt formed of sulphuric acid and the earth lime, is called sulphate of lime.—The substances which unite with acids to form salts, are called the *bases* of the respective salts.

Of these bases, the alkalis, it is only necessary to know the names of two, namely, *potassa* and *soda*, and to be aware that their distinctive properties, are: to possess an acrid taste, a caustic operation to render oils capable of mixing with water, and to neutralize the properties of the acids.

The earth which the chemists call by the name of silex or *silica*, is found almost pure in flint and rock chrystal; it is also almost pure in sharp colourless sands, and is by far the larger part of sands of every description. So far as the farmer need know its properties: it is hard rough to the touch, has no attraction for water, which it permits to filter through, or evaporate from it, with the greatest ease. It is capable of uniting with the other in compounds which are called silicates, and is the only earth which enters into the formation of soils uncombined with the others or with other elements.

The earth which chemists call by the name of *alumina*, is so named because it is obtained by them in a pure form from the well known salt called alum, of which it is the basis. Its most marked characteristic is plasticity; that is to say, it may be formed into a paste with water, will then easily receive any form which may be given it, and retain that form unaltered, even by violent heat. It never exists in soils unmixed, but in intimate association, or more probably chemical combination with silicia, it is the well-known substance called clay, or argillaceous earth. White clays are this combination nearly pure, and colored clays often contain it with no other addition than metallic coloring matter. Clay retains the plastic property of alumina; it therefore causes soils to be retentive of moisture; and when they dry, make them form tough clode or crusts, similar in character to sun-dried brick.

Soils which contain clay are often also mixed with sand, or with an excess of silicia in grains, which does not enter into the composition of the clay. Such a soil is less liable to form a tough crust than a pure clay, but it will require a very large proportion of sand to destroy this property altogether.

Clay mixed with sandy soils render them more retentive of moisture. Sand and clay have therefore been used as manures for each other; but it may reasonably be doubted whether all the advantage that has been anticipated by some from this process, can be realized, as such a mixture will be merely mechanical.

Loamy soils are generally said to be mixtures of sand and clay; they undoubtedly usually contain both these earths; and even sometimes a large excess of sand.—But we shall give reasons for believing that loams owe their peculiar value to a combination of clay with another substance, by which a change is produced in its chemical characters.

Lime is familiarly known by the same name that is generally used by chemists.—It is obtained by the aid of heat from rocks which go by the name of limestones.—These are combinations of lime with carbonic acid, which is fixed in them by chemical attraction, but which, when driven off by heat, takes the same form as the air of the atmosphere, or becomes a gas. This gas from this circumstance has been called *fixed air*, by which name it is often known when causing the sparkling and froth of cider and beer. The principal part of lime stone is therefore called by chemists *carbonate of lime*. Carbonate of lime is also found in shells, both those of living animals and those which exist in the ground in a fossil state. In the former it is mixed with animal matter which is more or less separated since the death of the shell fish.

Marl, in the sense in which the term is used by chemists, is a mixture of clay with carbonate of lime. The English writers on agriculture have not observed this distinction and the term is sometimes applied by them to a decomposed chalk, which may contain little or no clay: and sometimes to clay which contains no carbonate of lime. In fact, the name is frequently applied by them to any earthly matter found below the vegetable soil, which is capable of increasing its fertility. From this misapprehension, the substances which go by the name of marl in New-Jersey, Maryland, and Virginia, do not correspond with the chemical definition, but are generally beds of fo sil shells mixed in various proportions with earthy and saline matters of various kinds.

Lime is a substance very different in its characters from the two earths we have previously spoken. When prepared by heat from any of the original forms of its carbonate, it retains their shape unaltered, but may have its color changed, and always loses considerable in weight. It is now acrid, caustic and corrosive, and allkaline. Of these the most impoitant is, that it unites with acids to form compounds included in the general class of salts. Of the salts of lime which are important to the farmer, the three principal are: the *carbonate*, which, as we havo stated, is found in lime-stone,

chalk, and marl; the *sulphate*, in which lime is combined with sulphuric acid, and which in combination with water is the substance so well known to our farmers under the name of plaster of Paris, or less familiarly by that of gypsum; the *phosphate*, which constitutes a part of the bone of animals.

Lime, when exposed to the air, attracts carbonic acid, which is always to be found in the atmosphere; it thus passes back to the state of carbonate, but in so doing gradually falls to powder, and is then said to be *air-slaked*. If slaked with water, it also falls to a powder, which still retains the caustic character of the burnt lime; but this powder, when exposed to the air, unites with when carbonic acid more rapidly than in mass.

Lime, in its caustic state, has the property of rapidly decomposing vegetable and animal substances, thus hastening the natural processes by which they are finally destroyed; or, to speak more properly, have their elements resolved into new combinations. The offensive and unwholesome gases, which are given out by this compositioh, are absorbed by the lime, and probably by its other compounds; but in order that either this earth or its compounds shall manifest this property, they must be in small fragments, or, which is better, in fine powder.

Wet sand and plastic clay, and those soils io which they give their characters, also possess the property of absorbing gases; but they have this in a very inferior degree to lime and its compounds. As the gases generated by the decomposition of vegetable and animal substances form a large part of the necessary food of plants, it is obvious that a soil which contains the carbonate of lime, may retain and store them up for use, while they will be lost in soils of a different character.

Carbonate of lime may also be made a most important article in the preservation of the most valuable parts of putrescent manures, until they can be applied to the soil. In this way marl is applied to a great extent in China; the night soil of their numerous population is there formed into cakes like bricks, with marl, and thus loses its offensive smell; but when these applied as manure to the land, they give out the gases again as they are required for the nourishment of plants. So also in Nortolk, the site for dung-hills is prepared by a layer of marl, which is incorporated with the manure from time to time, and retains the gases which would otherwise be lost.

Lime may therefore be applied in its caustic form in some cases in agriculture, for it will hasten the decomposition of animal and vegetable matters which might be otherwise inert; it will also neutralize acids, which experienced farmers well know to exist in many soils, which they in consequence call sour. But the latter purpose will be answered as well by the carbonate of lime, which may be applied as it exists in marl or shells, or as it may be prepared by grinding limestone. Caustic lime is also dangerous in its application, for it will corrode and destroy living vegetables, and hasten the decomposition of the vegetable matter of the soil to such a degree as to injure its fertility. Except upon turf bogs, and land loaded with timber not wholly decomposed, quick or caustic lime ought not to be used; but to burn lime, and then by slaking to reduce it to the form of fine powder, which is speedily carbonated by exposure to the air, is a more ready, and generally a cheaper mode of obtaining the carbonate in a convenient form, than to grind imestone to powder in mills. Yet for many of the most valuable uses of lime in agriculture, the latter method, if as cheap, would answer as well.

Lime slowly combines with the earth silica, and produces a compound very different in character from either. It is this, to cite a fact in proof of our statement, which gives the sharpness and solidity to ancient mortar. The carbonate of lime will serve to form this compound: and thus, when it has time to act upon sand, it renders a silicious soil more retentive of moisture; while, if applied to clay, by combining with its silicious matter, it renders it more friable; and it is to the formation of this compound, by slow degrees, that we are inclined to ascribe the valuable mechanical properties of loamy soils, and the gradual amelioration produced by the use of lime, marl, and shells, as a manure.

Besides silica, alumina, and lime, an earth called magnesia is likewise found in some soils. It is also, in the form of carbonate, a frequent constituent of limestones. This earth has many properties in common with lime; like lime it is capable of neutralizing acids; and when deprived of carbonic acid by heat, corrodes vegetable substances.—It probably also hastens putrefaction, and both it and its carbonate are capable of absorbing gases let loose in that natural process. It is, however, of little interest in agriculture, except as a part of some of the limestones which are used as a manure.—This, if applied in large quantities, are sometimes very injurious to vegetation; the reason of this is, that magnesia does not repass to the state of carbonate as rapidly as lime, and therefore contains its corrosive quality long after the lime has again become mild by its union with carbonic acid. In less quantities, however, the magnesian limestones may serve as a manure, but their application requires great caution, particularly when the quantity of magnesia amounts to twenty-five per cent.

All of the simple substances we have mentioned, except perhaps the last, either separate or in various states of combination, exist in plants. The manner and character of the combination is influenced by the vital action of the plant which causes them to form compounds, often in direct opposition to the manner in which the ordinary laws of chemistry would direct. It thus happens that so soon as the plant ceases to live, these chemical laws being no longer impended, begin to avert their influence; and if it be in such a state as will admit of the several elements acting readily upon each other, a decomposition, more or less rapid, of the vegetable structure ensues. It is a law of chemistry, that its action is always aided by the bodies being in a fluid state, aud the action is often impossible when the bodies are perfectly free from moisture.—Hence the direct chemical action, and consequent decomposition, takes place with greater certainty and more rapidity in green juicy and succulent vegetables, than upon those which have been deprived of moisture either naturally or artificially. The grass, if heaped up in a recent state, decomposes, and if but partially dried, is heated, and may even take fire, by the chemical action of its elements; while, if dried by exposure to the sun and air, and then laid up in a dry place in the form of hay, it is almost indestructible. A moderate degree of heat and access to air is also necessary to promote the chemical action by which decomposition is effected. This decomposition is often attended with motion among the parts; and always, if the mass has a liquid form, as in the expressed juice of vegetables, or in the steeps employed by distillers and brewers, it goes in general terms by the name of fermentation. When the vegetable matter abounds in starch, the first change is the conversion of this principle into sugar. Sugar, if thus formed, is next converted into alcohol, as it is, if previously existed in the plant. The presence of alcohol gives the liquid in which it exists the charater of vinous liquors, and if these are permitted to remain in a turbid state, a farther fermentation converts them into vinegar; and finally vinegar is farther decomposed, and the vegetable matter, giving out an offensive smell, is said to putrify. If the substance be not an expressed juice or liquid steep, these several stages of fermentation ensue with rapidity, may be going on at the same time, and are sometimes so speedy in their course that no other action but the putrefactive fermentation can be detected. Animal bodies are subject to the same laws, and go through the same stages of fermentation, but the rapidity with which they run into putrefaction is even greater; still there are some cases, as in that of milk, where the vinous stage can be occasionally, and the acetic distinctly, observed.—Thus, a vinous liquor is prepared in some countries from milk, and the sour taste which appears in it when kept, arises from the presence of vinegar.

In the several stages of fermentation, parts of the vegetable assume the form of gas or vapor, and are given out to the air. The gases which have been detected, are carbonic acid, a gaseous compound of carbon and hydrogen, and in some instances ammonia. The vapor is that of water, which escapes in greater quantities than it would under ordinary circumstances, in consequence of the heat with which the process is attended. If exposed to rain, soluble salts with earthy and alkaline bases, are washed from the mass. Finally, a mass of earthy consistence alone remains, which, on examination is found to be made up of earths, insoluble salts, and carbon, being, in fact, identical with vegetable mould.

We may hence infer that the fol-

lowing elements exist in vegetable bodies:—

1. Oxygen, developed in the carbonic acid and water.

2. Hydrogen is in the water and carburets of hydrogen.

3. Carbon.

4. Earths.

5. Alkalis.

6. Nitrogen, occasionally developed in the form of ammonia.

7. Acids remaining in the insoluble, or washed away in in the soluble salts.

The chemical examination of vegetable bodies ought of course to lead to similar results. This examination has been conducted in 3 different ways.

1. With the view of discovering the nature of the compounds, called vegetable principles, which exist ready formed in plants.

2. For the purpose of discovering the chemical elements contained in these principles.

3. By the destructive action of heat, under which some of the elements are wholly separated, and others enter into new combinations.

In the first of these methods there have been detected:

I. Certain peculiar acids, of which we may cite

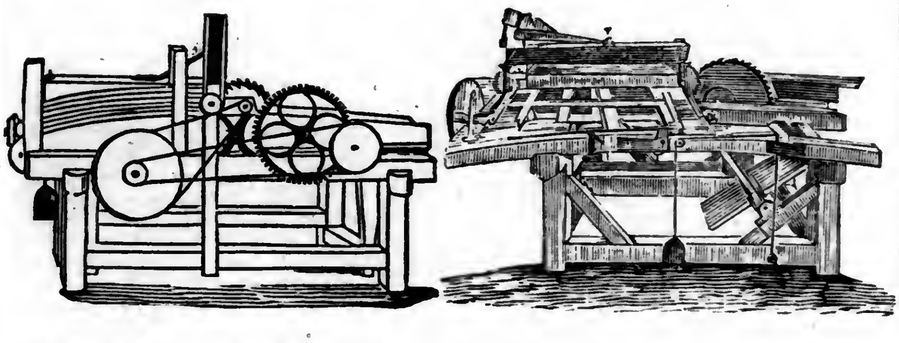
(1) Acetic acid, which, mixed with water, forms common vinegar.

(2) Citric acid, which is found in the lemon and orange.

(3) Malic acid, which exists in the apple.

(4) Tartaric acid, in the juice of the grape.

(5) Oxalic acid, in the wild sorrel.



CORNELL'S PATENT STAVE MACHINE.

Numerous inventions have at various times been patented to facilitate the making of staves for casks, barrels, &c., but few of which have proved successful. The one which is the subject of the present notice forms an exception. Competent judges give it a decided preference over any similar invention and are of opinion that it must eventually supersede the present economy of the branch of coopering which prepares the staves for the casks. This machine was invented by Philip Cornell a native of Vermont, but for many years a resident of Cayuga County, in this State, who died in 1834, soon after his invention was introduced to the notice of the public. At the last Fair of the American Institute this Machine was exhibited in operation and attracted great attention, and a gold medal was awarded as a premium to the proprietors by the Institute. The patent is now owned by a company in this city, who we understand offer for sale rights for making and using the machine on liberal terms. [Mr. Edwin Williams of this city, is Agent for the proprietors, office No. 180 Broadway.]

This machine is now in operation in several parts of the United States, and fully answers the expectations of the inventor and those who have purchased a right to use it. Like other labour saving machines which have been introduced into the mechanic arts, it has encountered the prejudices of many who are interested in the branch of industry to which it is applied, no doubt under the apprehension that it would lessen the demand for their labor. Experience will prove in this, as it has in other instances, that the apprehension is not well founded; that instead of lessening the demand for workmen, it will be increased, by the increased demand for the articles of which it produces but a part, requiring the hand of the workman to complete.

The sawing machine and the dresser, which together constitute a complete machine, will occupy a space of about ten feet square, and can be attached to an ordinary saw mill at an expense of geering not to exceed $50, and in most cases for a less sum. The power required to operate one machine, either steam, water, or wind, is equal to about seven horses. Two men will be required to a machine. An ordinary mill, with one saw, will supply timber for three machines. The timber is first sawed into plank 3¾ inches thick, and then cut to the length of the staves required.—Staves can be made from any kind of wood without regard to the grain. A machine will complete two thousand oak barrel staves per day, of ten working hours; these staves require assorting, and such as are unfit for tight casks, answer well for dry ones. The loss of stuff is very trifling. The cost of a machine for hogshead or pipe staves is $325, and for barrel staves $300, exclusive of the charge for patent right.

Extract from the Report of the Committee of the American Institute, adopted October 1, 1835.

"With dilligent attention and adequate power, one set of these machines, of which there are in effect three, two of them, the bevelling and smoothing machines being separate in their action, although constructed in one frame, and the machine for sawing out the staves being separate in another, it is highly probable that two men supplied with material at hand, could saw, bevel, and smooth *three thousand* barrel staves in a day of ten working hours.

"These machines are evidently great labor saving machines, and it is believed they are more perfect than any others designed for this manufacture. They possess the rare test of mechanical perfection. in being quite independent of great skill or cleverness in the operator. Any faithful, diligent, and industrious labourer, of ordinary intelligence, can work them with advantage.

"Your Committee recommend these machines as eminitely useful in the manufacture of staves, and anticipate that their perfection will suggest some corresponding improvement in the manufacture of barrel and pipe heads, yet much needed in this branch of the arts."

Copy of a letter from A. W. Edwards, *of Fulton, Oswego County, New-York, who had in use two of the Machines, and was waiting for the other.*

"I am in very great want of a dressing Machine. I have 30,000 staves already seasoned to dress, and plenty of contracts waiting to be supplied. I would not be without the Machine for ten dollars per day. I find no difficulty in cutting *ten staves* per minute, and I can very nearly average that from Oak timber, of which I use considerable.

From Brown, Lord & Co. *of Bangor, Maine, who have had a Machine in operation one year.*

"In answer to your request respecting Philip Cornell's Stave Machine, we are happy to state, that it fully answers our expectations, and all concur in giving it their decided approbation after seeing it. As it respects the market for the staves, we have no difficulty in disposing of all the staves that we make, at about twice the market price of similar staves made in the usual way. Brown, Lord & Co."

From the Washington (North Carolina) Whig, February 27, 1836.

"*Cornell's Stave Machine*,—The staves made by this Machine are, without exception the most beautiful and correctly jointed and dressed staves we ever beheld. A barrel made of Pine staves was exhibited full of *spirits of turpentine*, which had been filled about a week and remained perfectly tight. We were present when the same barrel had been filled with water before, and it was then perfectly tight also. There does not remain a doubt but that it (the machine) makes staves from any kind of wood, far superior to those dressed in the usual way. Barrels made of them need no flagging, and the staves must make a tight joint. The bilge or size of the barrel may be varied at pleasure, as well as the thickness or length of the stave."

Extract of a letter from Messrs Tannahill & Lavender, *Washington, N. C., May 25, 1836.*

"The sample of staves (made by Cornell's Machine,) sent by us to the West Indies, were very much approved, and contracts might have been made for cargoes."

From John P. Ober & Co. *Elsworth, Maine.*

The subscribers have had in operation for three months, at Elsworth, Hancock County, Maine, one of Cornell's Patent Stave Machines, and find it to answer our expectations in every respect; we have finished twenty-eight staves, thirty-two inches long, of beach wood, in five minutes, and can average two thousand every day of ten working hours. We obtain for the staves for barrels of Beach, Birch and Ash, from

twelve to fifteen dollars per thousand, (nett 1,000.) We have proved the barrels and casks made with the Machine, and find they will answer for liquor or dry casks, as well as those made from any other staves.

JOHN P. OBER & Co.

(One of this firm is a Practical Cooper.)

Those who wish to see the Machine in operation in this city may have an opportunity by calling at the office of the Mechanics Magazine and Railroad Journal, 132 Nassau street.

AGRICULTURAL PAPERS.

While contemplating the immense and incalculable benefits which must necessarily result not only to the farmer and planter, but to the public in general, and to every class of the community in whatever occupation engaged, from the general improvement of agriculture and the powerful tendency of agricultural papers to produce such improvement, the man of reflection, who loves his country, and who feels any regard for the happiness of his fellow men, cannot but be struck with astonishment, not only at beholding so many of those who are devoted to the profession of agriculture, and who are entirely dependent on it for the supply of all their wants, voluntarily debarring themselves from the easiest, the most agreeable, the cheapest, and the most effectual mode of acquiring knowledge in their profession—but at the short-sighted views of those who are obviously not less deeply interested than the farmer himself, in producing that state of improvement, on the production of which the prosperity of all is alike dependent. Let every man but ask himself, what would be the effect on the public prosperity, and on that of every individual of which society is composed, whatever may be his occupation, were the fertility of the land and the quantum of his annual production to be doubled, trebled, or quadrupled—all must see at a glance, that the national wealth and resources would be in the same degree enhanced. The government would be enabled, with far less inconvenience to the people, to raise double, treble, or quadruple the revenue which can now be collected, either for the purpose of defending the country against foreign enemies, improving it by roads, canals, &c., or for what is of still greater importance than either, the establishing and sustaining a system of Universal Education, by which, and by which alone, liberty can be perpetuated, the people elevated to that dignity and worth of which they are capable, and which it should be considered the first duty of every Republican Government to confer. The farmer and planter would be benefitted by receiving a double, a treble, or quadruple reward for his labor, to be expended in supplying his wants, increasing his wealth, or promoting his comfort. The merchant, the lawyer, and the mechanic, will be benefitted by a double, treble, or quadruple ability in their customers to purchase their goods, or to reward them for their services; and above all, the laborer of every description, would be benefitted by constant employment, and good wages paid in ready money. In a word, universal prosperity would overflow the land, and universal intelligence and increase of virtue, would enable and dispose the people so to use it, as to banish from the country by far, the larger portion of that misery and distress under which mankind, in all ages and countries, have heretofore groaned, and which must continue to be their lamentable lot, until by an elevation of the intellectual and moral character of the mass of the people, they shall be qualified so to improve the resources which a benignant Providence has placed at their command, as to enable every one, by moderate labor, to acquire the necessaries and comforts of life. That such would be the ultimate effects of doubling, trebling, quadrupling the products of the earth by the industrious exertions of the agricultural community, if guided and directed by intelligence, is too plain to require proof. Would the general circulation of agricultural papers, by diffusing knowledge, and by continually presenting to the mind of the agriculturist, clear, unequivocal and demonstrative proof, that great and amply rewards, are the sure and certain consequence of such exertions, have a tendence to stimulate the community to active and intelligent exertions? He who doubts this, must believe the gross and palpable absurdity, that the greater the knowledge a man possesses of the business in which he is engaged, the more will he be disqualified to pursue it with advantage, and that the more clearly and distinctly the prospect of reward for his labor is held out to the farmer, the greater will be his indolence. With those who can believe these propositions, if any such there be, it would be vain and idle to reason—they can believe any thing they wish—their error proceeds not from the head, but from the heart—what they want is not the capacity, but the inclination to discover truth. To all others, of whatever character or occupation, we would say, if you believe that agricultural improvement would be thus beneficial to your country, conducive to the best interest of yourselves and of your fellow citizens, of every class and description, and that the wide and general circulation of agricultural papers would have a tendency to produce that improvement, do not patriotism, philanthropy, and an enlightened regard to your own interest, all conspire to demand, that you should exert yourselves by every means in your power, by your example, by your exhortations, by your instructions, and by your influence, to extend as widely as possible the circulation of papers entirely devoted to the diffusion of agricultural knowledge and the production of agricultural improvement—papers whose influence, while it may be productive of such incalculable good, can by no possibility be injurious to any human being? We ask you, calmly, soberly, and deliberately, to consider the subject, and then to act in such a manner as reason, conscience, patriotism, and an enlightened regard to your own interest, shall dictate. For ourselves, we entertain not a particle of doubt, that were some well conducted agricultural paper generally circulated and read in every neighborhood in the United States, its salutary influence would, in a few years, be clearly exhibited in the intellectual and moral improvement of the people, in the increase of the national wealth and resources, and in the increased happiness and prosperity of all classes of the community. To the production of such results we are not only willing, but desirous of contributing our utmost exertions, and it is therefore, that we solicit all those who have it in their power by the communication of agricultural knowledge, and by their exertions in promoting its diffusion to the widest practical extent, to afford us their aid and co-operation—on that aid and co-operation, we are fully sensible, must the success of ours, and similar efforts, in a great measure depend.—[Tenn. Farmer.]

From the Southern Agriculturist.

ON THE PRIDE OF INDIA TREE, AS AN ARTICLE FOR FENCING.

DEAR SIR,—At your request, I furnish you with my observations on the Pride of India Trees, as an article of fencing, in places where timber is scarce and of indifferent quality. I have, myself, been at some pains in cultivating this high valuable tree; and bringing it to that state of perfection, which I have heard it attains, in its native clime. The result of my experience is, that it may be made one of the most useful and profitable fencing and timber trees known to the southern plantation. Our country is becoming, every year, more thickly settled, and as cultivation is pushed on, the vast primeval forests which cover the land, must necessarily disappear before the woodman's axe. The consequence is, that in a few years we will begin to feel the want of the necessary wood and timber for our farming purposes, and see the utility of setting out plantations of the more valuable forest trees. Indeed, I am aware of the existence of this want of timber on some of our sea-islands, and fertile rice lands, and it is particularly to the planters of those sections that I address these remarks.

The best method of cultivating the Pride of India, that I have yet discovered, is the following. Run a plough in a straight furrow, and return, ploughing up another furrow to the one made, then take a hoe, and at the distance of eight feet, open a hole about one foot wide along the ridge, which fill with well rotted manure from the stable, or heap of compost, into which drop four or five berries. This should be done in March or April. Cover them lightly and attend the young plants as you would cotton, keeping down grass and weeds, and pulling up the weak and slender shoots, leaving but one of the most healthy and vigorous. Go over this twice in the course of three months, with a plough, turning over the furrow to the plants. The young trees will rapidly grow to the height of six or eight feet. During this time, you must occasionally strip off the leaves and lateral shoots, in order to train the stems to a certain length. Keep them merely straight twigs to which they will naturally tend, until the next spring, when you will direct them to grow as upright as possible, keeping down weeds and grass as in the year before. In this year they will attain the thickness of about twelve inches in circumference; and by the next spring the height of twelve or fifteen feet. The growth may, however, be improved by the use of the hoe and manuring. They may now be permitted to put out lateral limbs, suffering the most vigorous to continue, and taking off the weak ones while young, with a pruning knife. This will preserve the quality and beauty of the timber, making it fit in fifteen years for all manner of furniture.

The value of the wood cannot be too highly appreciated. It may be sawed into boards from twelve to eighteen inches wide, fit for almost any purpose, or into wainscoting of the most beautiful shades. It is a light, sonorous wood, not apt to split, and capable of a very high polish. It is entirely divested of any resinous matter, and thereby fitted to receive the most beautiful varnishes. It possesses powerful vermifugous qualties, and thereby fitted for all furniture of the bed chamber, as no bugs or any other insect will infest it. The texture or quality of the wood may be improved by being grown on land of a clay bottom, but will grow well on the loosest sandy loam.

It should be raised from the seed in the manner I have described. If transplanted, its tap-roots will never grow, and the quality of the wood is much impaired. Besides, it will be more apt to be blown down, being supported only by lateral roots, these taking their sole pabulum from the rich loam on the surface, and giving to the wood a soft spongy texture.

As an article for fence posts, I can safely recommend it as one of the cheapest and most durable. In this latter quality it approximates more nearly to cedar than any wood I know. It may be planted where the fence is intended to be run, and your rails may be nailed to the body of the tree. The superfluous branches will afford an excellent fire-wood.

The foilage of this tree affords a wholesome provender for cattle. Horses, cows, hogs, sheep, &c. will eat the leaves greedily. When dried and mixed with hay, I know of no better medicine for cattle of every kind. Such are the vermifugous qualities of the entire tree, that I never fail to give it to my animals every spring. A few leaves given to horses once or twice a week, will afford them a most beautiful coat of hair. A decoction of its root administered in small doses to children every morning for nine days, will effectually destroy worms in them.

A correspondent of yours has already testified as to the excellence of Pride of India leaves and berries as a manure; and also as a preventive to bugs. To his testimony, I can safely add my own. I have tried both experiments, and have experienced the most beneficial results.

With every wish for your success, Mr. Editor, I subscribe myself

COLBERT.

From the Genesee Farmer.

WHO WILL NOT PLANT A LOCUST TREE?

A Mr. Hale of Westhampton, (Mass.) obtained last year for thirteen locust trees, delivered at the river in West Springfield, 50 cents per cubic foot including all the limbs, except those quite small. The trees measured 306 feet, and amounted to 153 dollars; thus producing 153 dollars for less than two and a half cords of wood. Let us make this fact the basis of a little calculation. The locust will thrive abundantly on favorable soils when planted a rod apart, or one hundred and sixty on an acre. Mr. Hale's trees averaged him $11,72 a tree, which for an acre of trees of the same size would bring one thousand eight hundred and seventy-five dollars twenty cents. It has been estimated that six locust trees of twelve years growth will produce a cord of wood, and in many instances they have far exceeded it; but to be on the safe side, we will take six and a half and let them grow eighteen years instead of twelve, and then the avails of the acre will exceed one hundred dollars a year for the eighteen years. If this is not a handsome profit we know not what is; and there is this additional circumstance attending it; locust timber will not fall in price, as the demand, from the nature of the case, must continually increase. Then plant the locust by the way-side, fill up the vacancies in your woodlands with it—remembering that every one that grows, puts in your pocket 100 per cent per annum. G.

ELECTRICAL SHOCK FROM A SHEET OF PAPER.

Place an iron japanned tea tray on a dry, clean beaker-glass, then take a sheet of foolscap writing-paper, and hold it close to the fire until all its hygrometic moisture is dissipated, but not so as to scorch it; in this state it is one of the finest electrics we have. Hold one end down on a table with the finger and thumb, and give it about a dozen strokes with a large piece of India-rubber from the left to the right, beginning at the top. Now take it up by two of the corners and bring it over the tray, and it will fall down on it like a stone; if one finger be now brought under the tray, a sensible shock will be felt. Now lay a needle on the tray with its point projecting outwards, remove the paper, and a star sign of the negative electricity will be seen; return the paper, and the positive brush will appear. In fact, it forms a very good extemporaneous electrophorus, which will give a spark an inch long, and strong enough to set fire to some combustible bodies, and to exhibit all the electric phenomena not requiring coated surfaces. If four beaker-glasses are placed on the floor, and a book laid on them, a person may stand on them insulated; if he then holds the tray vertically, the paper will adhere strongly to it, and sparks may be drawn from any part of his body, or he may draw sparks from any other person, as the case may be; or he may set fire to some inflammable bodies by touching them with a piece of ice.

I beg to remain,
Yours, &c.
G. DAKIN.

Oxford, March 20, 1836.

We suppose that every one having occasion to clean paper with Indian-rubber during the past winter, has noticed the remarkable force with which the paper adheres to the table.

Agriculture aided by science, will make a little nation a great one.

All the energy of the hero, and all the science of the philosopher, may find scope in the cultivation of one farm.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

RAILWAY IRON.

95 tons of 1 inch by ½ inch.
200 do 1¼ do ½ do
40 do 1½ do ½ do
800 do 2 do ½ do
800 do 2¼ do ½ do
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
Superintendent, Newcastle, Delaware.
feb 20—ytf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitmore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq., (Civil Engineer,)	Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.
Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersunk heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.
Also, Flange Tires, turned complete.
J8 ROGERS, KETCHUM & GROSVENOR.

MILL-DAM FOUNDRY.

WILL be sold at public auction, (unless previously disposed of at private sale,) the above well known establishment, situated one mile from Boston. The improvements consist of—

No. 1. Boiler House, 50 feet by 30 feet, containing all the necessary machinery for making boilers for Locomotive and other steam Engines.

No. 2. Blacksmith's Shop, 50 feet by 20, fitted with cranes for heavy work.

No. 3. Locomotive House, 54 feet by 25, used for putting together Locomotive Engines. Several of the best Engines in use in the United States have been put in this establishment.

No. 4. A three story brick building, covered with slate, 120 feet by 46, containing two water-wheels, equal to 40 horse power; Machine Shop, filled with lathes, &c.; Pattern Shop; Rolling Mill and Furnaces, capable of rolling 4 tons of iron per diem, exclusive of other work; three Trip Hammers, one of which is very large; engine for blowing Cupola Furnaces, moved by water-wheel; one very superior 12 horse Steam Engine, which could be dispensed with; and a variety of other machinery.

No. 5. An Iron Foundry, 80 feet by 45, with a superior air Furnace, and two Cupolas, Core oven, Cranes, &c. fitted for the largest work. Attached to the Foundry is a large ware-house, containing Patterns for the Castings of Hydraulic Presses, Locomotive and other Steam Engines, Lead Mill Rolls, Geering, Shafts, Stoves, Grates, &c. These were made of the most durable materials, under the direction of a very scientific and practical Engineer, and are supposed to be of great value.

No. 6. A building, 65 feet by 36, containing a large stack of chimneys, and furnaces, for making Cast Steel. This building is at present used as a boarding-house, and can accommodate a large number of men.

No. 7. A range of buildings, 200 feet long by 36, containing counting room, several store rooms, a Brass Foundry, room for cleaning castings, a large loft for storing patterns, stable for two horses, &c. &c.

The above establishment being on tide water, presents greater advantages for some kinds of business than any other in the United States. Coal and Iron can be carried from vessels in the harbors of Boston, to the wharf in front of the Factory, at 25 to 30 cents per ton. Some of the largest jobs of iron work have been completed at this establishment; among others, the great chain and lift pumps for freeing the Dry Dock at the Navy Yard, Charleston.

The situation for Railroad work is excellent, being in the angle formed by the crossing of the Providence and Worcester Railroads. The Locomotive "Yankee," now running on the latter road, and the "Jonathan," purchased by the State of Pennsylvania, were built at these works. With the Patterns and Machinery now n the premises, 12 Locomotives, and as many tenders, besides a great quantity of cars and wagons, could be made per annum.

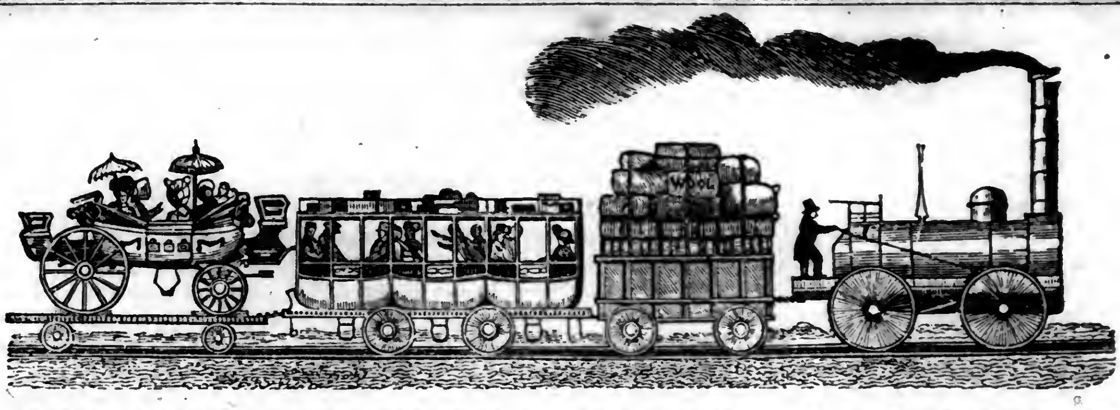
For terms, apply to
THOS. J. ECKLEY, Treas. &c. Boston,
or to ROBERT RALSTON, Jr. Phila.
Boston, April 21, 1835. j25—4t

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JULY 9, 1836. [VOLUME V.—No. 27.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 9, 1836.

NEW ARRANGEMENT.—I take pleasure in announcing to the readers of my periodicals that I have taken as a partner, in the business pertaining to them, Mr. GEORGE C. SCHAEFFER, a gentleman of education and a practical engineer.

Mr. Schaeffer will hereafter have the principal charge of the editorial department of the Journal and Mechanics' Magazine—in the discharge of which duties he has for several months past taken an active part—and, as we have reason to believe, much to the satisfaction of our readers and patrons.

With our united efforts we hope to render the periodicals worthy of a more extensive circulation.

D. K. MINOR.

New-York, July 2nd, 1836.

The undersigned has the pleasure of announcing to his friends and to the readers of the Rail-Road Journal and Mechanics' Magazine, that he has become joint proprietor and editor with Mr. D. K. MINOR, who has conducted these journals since their commencement.

In making this announcement the undersigned begs leave to waive the formality of making the usual protestations and claims to favor further than to state that the perseverance and zeal with which these journals have heretofore been conducted are guaranteed to them on the part of Mr. MINOR—while he hopes by his own endeavors to add to their usefulness, his connexion with them for the last six months having already introduced him to the routine of business.

His family circumstances being such as to forbid the pursuit of the profession out of the city, will not prevent him from continuing his favorite studies to the interest and benefit of others.

Should he succeed his most earnest desires will be gratified.

GEORGE C. SCHAEFFER.

July 1st, 1836.

ENGINE.

A powerful *fire engine* has recently been exhibited in this city, by Mr. Thomas A. Chandler, of St. Lawrence county.

The peculiarities of this engine are, that it has four pumps or pistons, and two brakes, which may be worked together, or one at a time, as may be convenient. The piston rods are worked by *rack and pinions*, and against friction rollers, instead of with chains, as in the ordinary engine.

Mr. Chandler's Engine has been tried twice in this city—first in Broadway, opposite the City Hall, next in the corporation yard.

The first trial was made without any arrangement to man it, and therefore was worked by boys and such as were disposed to take hold of it; and from this and other causes, it did not work satisfactorily to its owner, who found, on taking it apart, that a quantity of *gravel had, by some means*, got into the machine, which probably prevented it from having a *fair* trial.

At the second trial, water was thrown 75 feet high with twelve men, and through 104 feet of hose, 122 feet *beyond the pipe*, with 16 men. In both instances a $\frac{7}{8}$ inch stream was thrown at the latter trial.

NEW YORK AND ALBANY RAILROAD.

The books of this important work, we are informed, will soon be opened. Its friends have had a topographical examination of the route, made the last month by Mr. J. D. Allen, an engineer of talents, and favorably known to the public on the Chenango canal, and several important works constructed by this State.

We understand there are several highly favorable routes: 40 miles, on a very direct line. may be graded to *nearly a perfect level*, and at a very moderate expense, from the abundance of the requisite materials to construct the road. The line of the Road, on any of the routes, will not exceed the distance now traversed by the steamboats from this city to Albany, (160 miles.) A locomotive will diminish the distance one-third *in time*, and if requisite, to 6 or 7 hours, with perfect safety to the passengers. Boston will be placed within 12 hours of us.

The country through which the line will probably pass, (which generally does not exceed 25 miles from the Hudson,) may be compared with the rich valley of the Mohawk, and with equal facilities for the construction of a Railroad, *without stationary power and on a very direct line.*

It is most singular that this road, so important to our citizens and state, has not earlier claimed their attention. It will connect us with the rich *agricultural* and *manufacturing* districts of New England, and the counties of Westchester, Putnam, Dutchess, &c.; Albany and Troy at *all seasons of the year*; and with the *Northern line* of Railroads now constructing, by Utica, to Buffalo, on the *West*. On the *East*, it is proposed to run branches (allowed by the amended charter) to several points in Connecticut, and also to connect with the great Boston Western Railroad, at Stockbridge, the centre of our best iron and marble dis-

tricts. These valuable productions of nature abound on three fourths of the entire rout, of the best quality. A Railroad from Stockbridge, by Pittsfield, Cheshire, and Adams, to Bennington, in Vermont, is in contemplation. The manufactories now in existence on this route alone, and from South Berkshire, would pay a handsome interest on a road to this city.

The road will pass through one of the most fertile parts of Dutchess county, pronounced by judges amongst the best cultivated districts of this state. From Dutchess, Putnam, and Westchester, we now draw largely for supplies to our markets, at a very heavy *expense of transportation to the consumer;* whilst large portions of their produce daily wanted on our tables, are permitted to go to waste on their hands, for want of a *direct* and *cheap* communication with this city at all seasons of the year. We could enumerate many articles, besides iron and marble; such as hay, the coarse grains, beef, poultry, vegetables, and regular supplies from the Dairy, in a cool and pure state, the want of all which, was severely felt last winter, and has yearly increased, with our daily growing population.

Within the period of twelve years from this date, we shall number 500,000 souls. We venture little in predicting, that then this road will be considered next in importance, to supply the necessaries and comforts of life, to the aqueduct from the Croton, to supply us with water.

LOCOMOTIVES ON INCLINED PLANES.

It is the fault of imperfect humanity that different impressions are conveyed by the same object to different persons. "Stubborn facts" are not to be gainsaid—yet the deductions from the facts must of course be as diverse as the dispositions of the observers. It is owing to this that disputes even in regard to the most certain and fixed branches of science will occur; and it is to this circumstance that such remarkably discordant views are entertained in regard to the capabilities of locomotives.

One day we receive a communication stating a certain performance, the certainty of the fact not being subject to a doubt.

Presently some one writes us, saying—I have no doubt that such and such statements are true; but I cannot see why; for they are in direct contradiction to established laws of mechanics—presuming that our data are correct.

Some time since we published a communication signed C. W. R., Montreal, 29th March, 1336, on the same subject. It was from a friend whose object we know to be—as he therein stated—to elicit truth.

We have since received the following letter in regard to the communication of C. W. R. We have omitted the name of the gentleman whom Mr. Campbell has discovered to be the author of that article, as we do not desire personalities to be bandied in our columns; And we cannot but add that, in our opinion, Mr. C. has mistaken the spirit as well as the letter of C. W. R.'s communication.

We refer to the last paragraph of the communication of C. W. R., in support of our opinion. He says—"*In conclusion, I beg leave to state, that I shall be much pleased to be proved in error as to the power of locomotives, and should any of your numerous contributors undertake the task, it will be received with the spirit in which this is offered—that of seeking the truth.*

"Yours, &c.,
"C. W. R."

We have but one remark more to make. In the first place, the statements of the "extraordinary performances" on the Baltimore and Ohio Road, &c., were not intended as samples of every day work; but to prove that locomotives could do what very many have asserted they cannot. In this matter C. W. R., and others taking the same ground, are in error.

Again: C. W. R. wishes, as well as others, to know what improvements have been made enabling locomotives to overcome greater obstacles than formerly, every thing else may grow and improve; but the laws of nature, and among them those of mechanics, have not that "India rubber" elasticity that man's laws possess, on the contrary are fixed and immutable. This being the case, these gentlemen, as they themselves say, would desire to have the reasons, in "black and white," for this unlooked for increase of power.

That reasons good and sufficient can be given we have no doubt. Meanwhile, we shall be much obliged to Mr. C. for such particulars as he may be plessed to send us, in regard to his engines.

The fact is, we are in a fair way to know much more about locomotion in this country than in England, if we do not already excel; and improvement coming in so rapidly, entirely astounds some people.

We also give a communication from a gentleman who, as we understand him, goes beyond C. W. R. in his calculations.

All we want to see is fair play, and information and truth will result.

Philadelphia, June 20, 1836.

To the Editor of the Railroad Journal:

Sir—My attention this morning was directed to a communication, in your Journal of the 30th April, signed "C. R. W.," and dated "Montreal, 29th March." It is well known to me that this communication is from Mr. ——, Engineer of the —— Railroad. I have not the honor of a personal acquaintance with Mr. ——, but as he has chosen to term some statements, in a former report of mine to the West Philadelphia Railroad Company, "*extravagant,*" I submit for his acceptance the following proposition:—

I will bet Mr. —— one thousand dollars that my statements in the West Philadelphia Railroad report are correct, and that any engine made by Mr. Baldwin will perform the same on any well-constructed Railroad, if the engine is kept in proper running order. I will also bet Mr. —— one thousand dollars that I will turn out an engine of my own manufacture within the present season. that shall carry 200 tons gross over the Columbia and Philadelphia Railroad, which has grades of 45 feet rise per mile, at an average speed of 12 miles per hour: the train to consist of 50 cars.

I deem it proper also to remark, that Mr. Baldwin now constructs all his engines after one pattern, and that they are as nearly alike and of the same weight as they can possibly be made. About a year since, he constructed 4 or 5 engines with outside connexions, which differ slightly from some 20 or 30 others constructed by him. They are, however, of about the same power as those with inside connexions.

It is an easy matter for young men of little experience to call in question the statements of others, and to figure in a public newspaper. I have no time, and but little inclination, to enter into a paper discussion of this subject with any one. I have no objections, however, to give Mr. —— a practical lesson on the subject of motive power, and to back my assertions with my money.

I desire you to publish this letter, and hope to hear in a short time of Mr. ——'s acceptance of one or both of my propositions.

I am, Sir, very respectfully,
Your obedient servant,
H. R CAMPBELL,
No. 351 North Sixth street, Phila.

To the Editor of the Railroad Journal.

BALTIMORE AND OHIO RAILROAD EXPERIMENT.

Sir—The Baltimore and Ohio Experiment reported in your Journal of the 12th March last, being frequently referred to as a proof of the facility with which steep grades on Railroads may be overcome by locomotive engines, it is to be feared is calculated to produce an injurious effect on the cause of internal improvement, by exciting hopes which cannot be realised, as the majority of persons interested in Railroads are unacquainted with the mathematical and mechanical principles necessary to enable them to form correct conclusions in such matters.

It is stated in the report that an engine weighing $8\frac{1}{4}$ tons drew a load of $20\frac{3}{4}$ tons, including its own weight, up a plane ascending 264 feet in a mile. This is certainly a very extraordinary performance, and shows the immense power of the engine employed. We shall make this more apparent by examining the matter a little in detail.

The relation between the load, friction, adhesion, inclination of plane and weight of

engine may be expressed by the following equation:—

$$W = \frac{E\,(a - \sin.\,i.)}{b + \sin.\,i.}$$

Where W represents the gross weight exclusive of the engine, E the weight of the engine, *a* the adhesion expressed in fractional parts of the weight, *b* the friction of the axles &c. expressed also in fractural parts of the weight and *i* the inclination of the plane. By substitution and reduction the equation in the case before us becomes 122 + 1.44 b = a. This equation may, it is evident, have several values; but, from the nature of the inquiry, they must be confined within certain limits. Thus, if *a* were equal to .122 the equation would become

$$1.44\,b = .122 - .122 = 0$$

whence *b* must be equal to nothing or the friction of the axles &c. be absolutely annihilated, this we know cannot be the case, it is therefore, certain that the adhesion of the wheels cannot be so small as .122. By the published reports of the B. & O. R. R. Co. we are informed that the friction of the carriages on their road has been reduced to the $\frac{1}{400}$ of the weight, we shall therefore, assume this for the value of *b* in our equation and shall consequently have .12566 for the corresponding value of *a*. By substituting these values of *a* and *b* in our primary equation and taking sin. i = o we shall have 427.2 tons for the value of W, that is an engine hearing sufficient adhesion to enable it to ascend a plane rising 264 feet in a mile with a load of $20\frac{3}{4}$ tons would have sufficient adhesion to drag 427.2 tons on a level road exclusive of the engine."

The mechanical power requisite to draw $20\frac{3}{4}$ tons up the plane is

$$20.75\ \sin.\,i. + \frac{20.75}{400} = 1.0885,$$

and 1.0885 × 400 = 435.4 is the load which the same power would draw on a level at the same rate of speed, and if we assume the load to be inversely as the speed half this weight or 217.8 tons at double the speed.

Let us now, in order to show the effective performance of locomotives on level and steep grades, suppose the road to be level to the foot of the plane in question, and the plane itself to be half a mile in length, the engine would, as we have just shown, drag a load of 217.8 tons on the level at the rate of from 10 to 12 miles per hour, and on the plane $20\frac{3}{4}$ tons at half that speed. The engine and tender, it appears by the report, weigh nearly 13 tons, whence $7\frac{3}{4}$ tons is the greatest effective load that can be drawn up the plane at one time, the engine must, therefore, ascend and descend the plane 28 times in order to get this load to the top, and as each ascent would, at the rate of 6 miles per hour, occupy 6 minutes, and each descent the same time, the whole load could not be got up the plane in less than $5\frac{1}{2}$ hours.

Instead of the locomotive, let us now suppose the load to be drawn up the plane by a stationary engine of the same power, the whole power of the engine would, in this case, be effective, as the weight and friction of the rope would be counterbalanced by the load which is supposed to draw out the tail rope, hence the whole load would be drawn up in 10 trips of 6 minutes each, or one hour. This calculation presents the matter in its true position, and shows the immense waste of power consequent upon working steep grades with locomotive engines; in the case before us, it is equivalent to raising 13 × 28 = 364 tons up a plane $\frac{1}{2}$ a mile in length, ascending 264 feet per mile.

The communication of your correspondent C. R. W., in the Journal of the 30th April, contains some very just remarks on the subject of steep grades and locomotives, but his calculations as to the power of the engines are very erroneous. The mere statement that an engine capable of drawing 200 tons on a level and 100 tons on a grade ascending 25 feet per mile, does not furnish sufficient data from which the traction, when the power is supplied by locomotives, can be estimated. The adhesion of the wheels forms an important element. The greatest weight an engine of $8\frac{1}{2}$ tons could draw up a plane ascending 25 feet per mile, by assuming $\frac{1}{211}$ for the traction, and $\frac{1}{12}$ of $\frac{4}{15} = \frac{1}{15}$ for the adhesion, as given by C. R. W., is

$$\frac{8.5 \times \frac{1}{15} - 8.5 \times \frac{25}{5280}}{\frac{1}{211} + \frac{25}{5280}} = 55.9 \text{ tons},$$

and not 100 tons as stated by him. In order to enable the engine to ascend the plane with this load of 100 tons, the traction must be much less than $\frac{1}{211}$ of the weight, and the adhesion much greater than $\frac{1}{15}$. The ratio between these two quantities, as we have shown in a previous investigation, may be varied within certain limits without affecting the result.

If we assume the traction at $\frac{1}{400}$, the adhesion must be a little less than $\frac{1}{11}$, or accurately .0894, and the power necessary to draw 200 tons up the plane in question is,

$$\frac{100}{400} + \frac{25 \times 100}{5280} = .72,$$

and .72 × 400 = 280 tons, the load which the same power would draw on a level. This investigation shows that there is no descrepancy in Mr. Seymour's statement, that an engine capable of drawing 100 tons on an ascent of 25 feet per mile, would draw 200 tons on a level. Yours, &c.,

W. L.,
C. E.

Schenectady, N. Y., June 14, 1836.

☞ The article referring to *Little Falls*, which appeared in our last, was by accident put to press without having the proof properly corrected—It is therefore republished.

LITTLE FALLS.—This picturesque and thriving village is situated on both sides of the Mohawk river, 72 miles west of Albany, and 22 miles east of Utica. The great western canal passes through it, on the south side of the river, and is connected with the main part of the village by a beautiful stone aqueduct over the river, which serves as a feeder, receiving the water from the old canal on the north side, and affording to the village every convenience desired for business.

This beautiful village was, until within a few years, owned by an English gentleman,) Mr. Ellis, we believe,) and its *immense* water power was for many years, indeed almost since the revolutionary war, nearly useless, as the proprietor declined to sell, or even to give permanent leases, and the village of course made but slow progress in the march of improvement which has marked the course of many less favored places farther west.

Fortunately, however, here, as in many other places, a change has come over the aspect of things—a foreign proprietorship has given way to one of true American spirit. The title was about two years since transferred to a gentleman of this city, who viewed things as an AMERICAN. He caused the property to be surveyed, streets and public squares to be laid out, and has contributed largely to the erection of churches, and has sold freely and at fair prices to those who desired to improve its advantages. Those who, like ourselves, recollect its appearance *twenty* years ago, and have witnessed its progress under the fostering care of its present proprietor, need no description of its present condition, or its delightful surrounding scenery—but to those who have not witnessed its beauties, a brief description may not be uninteresting.

The village of Little Falls is situated in a narrow defile, which appears to have been formed by the waters of the river in its passage from the lakes to the Hudson. On the west, and also on the east are the beautiful and fertile flats of the Mohawk; but on the north the village is hemmed in by hills, covered with forest, approaching in some places nearly to the water, with abrupt and almost precipitous acclivities; whilst in other places the village extends for half a mile or more from the main street. It is on the south side, however, that we behold the mountains in their majesty. The canal, which hugs the side of the precipice, and winds its way amongst the rocks, is about 30 feet above the river; and the summit of the hills are more than *three hundred feet*, and in some places almost perpendicular, above the canal. This was indeed a herculean task; and to others than Americans, an attempt to construct such a work would have been deemed almost chimerical. It was however, accomplished, and is now the admiration of the hundreds of thousands who annually pass on its waters.

The improvements of the place are progressing with spirit—its water power is estimated equal to 750,000 spindles and several sites with power have recently been sold.—

There are now in operation three furnaces, one turning shop, three paper mills, one machine shop, two saw mills, one flouring mill, one grist mill, one plaster mill, three tanneries, one distillery, two malting houses, three blacksmith shops, one axe and scyth factory and one carriage manufactory. A woollen factory, and two flouring mills with four runs of stones are to be erected the present season. This place being the centre of a rich agricultural country carries on a considerable trade with Albany and New-York. The item of cheese alone produced in Herkimer county, and shipped by its merchants, on the canal during the last season amounted to upwards of $350,000.

It is surprising to us who know and appreciate its advantrges, that a situation so eligible, so healthly and with such immense water power should have been until this period overlooked by this shrewd money making and speculating community. They will not longer be disregarded as proper attention is now directed to it; and the period is not distant when LITTE FALLS will boast of its numerous manufactories, its rapidly increasing, intelligent, and wealthy population and its flourishing schools. May it long continue to flourish; and its worthy proprietors, as well as its enterprizing population, reap a rich reward for their labor.

From the Newark Daily Advertiser.

The following communication comes from a responsible quarter. The writer has given much attention to the subject, and may properly be supposed to be entirely familiar with. His project looks well on paper at least:

NEW YORK AND BINGHAMPTON RAILROAD.

Few persons are aware of such a road, as the New-York and Binghampton Railroad. Indeed the Statute Book will be searched in vain for a law incorporating such a company, to construct a road with the above title; yet, I will endeavor to demonstrate, that there is such a road, if not by the above title, yet by a continuation of roads, authorised by *Pennsylvania and New Jersey*, extending from *Jersey City to Binghampton*, and, at this time, in progress of being made; and of its final completion there cannot be a doubt.

The following companies have been incorporated to construct this great work, to wit: the *Newark Railroad*,—road finished. The *Essex and Morris Railroad Company*. This road, which is connected with the Newark road, will probably be completed to Morristown the present season. The *Delaware and Hudson Railroad Company*, authorised to make a road from the *Delaware to the Hudson*, opposite New York, chartered for 99 years!!—This company will probably commence at *Morristown*, and terminate at *Milford*, on the Delaware, or at *Carpenter's Point*. Capt. Beach, the Engineer, is now engaged in surveying this route through Culver's Gap; the route is favorable

From Milford, a company has been incorporated by the State of Pennsylvania, with the title of the *Delaware and Lackawanna* Railroad Company. This road has been surveyed by Henry G. Sergeant Esq. an engineer of reputation, and a favorable report made, terminating on the Lackawanna at *Centerville*, in the very heart of the great Coal region. Another company has been incorporated as above, called the *Legget's Gap Railroad Company*, commencing at *Centerville*, on the Lackawanna, and terminating at the Susquehannah river near *Binghampton*. This road had been surveyed by Mr. Seymour, a gentleman now employed on the New York and Erie road; and his report is very satisfactory as to practicability of construction, &c.

Thus, Mr. Editor, I think I have shown that a great and important railroad is in progress from *New York* to *Binghampton*, and which may not improperly be called, "the *New York and Binghampton Railroad*," where it must necessarily connect with the New York and Erie road, as well as the Chenango Canal; circumstances of the highest interest.

A great road from the city of New York to the western part of that State, has long been a subject of deep interest to the Merchants of that city, as well as to the inhabitants along the whole line of this route through the three States. Here then is presented to the merchants of New York, what they have so long and anxiously desired,—"a direct and practicable route" to the western part of that State, and *in* actual progress of being made. The distance, too, is said to be less by nearly one hundred miles, than by the projected New York and Erie road. What an immense saving of time and money must result from this great difference of distance.

This road, too, passing through the center of the great coal region, is another circumstance of the greatest importance to the inhabitants of New York as well as New Jersey: this inexhaustible supply of coal is but about 120 miles from the city, by this road. A full supply of fuel and lumber could be poured into the city at all times, particularly the winter season when most wanted, and when supplies by Canal cease. What a relief will this be to the poor, as well as the rich; and let it be remembered that the Erie road shuns the coal country altogether.

Here then are the most powerful inducements to the merchants and capitalists of Newark and New York, to come out in aid of this great route, in which case the work would be speedily accomplished. The stock must be profitable.

SUSSEX.

We deem that the following information may be of information to our agricultural readers.

TEAZLES.

A trial took place at the term of the Supreme Court sitting at Greenfield, last week, at which a decision was made, and much information elicited, respecting an important branch of business connected with manufacturing. It is reported in the Greenfield Mercury.

Lester Tilden vs. *Harvey Graves*. The plaintiffs reside in Barre, Vt. and the defendants at Hartfield, and the action was on a contract entered into in September last, by which the defendants engaged to receive all the merchantable teazles, not exceeding fifteen hundred thousand, that the plaintiffs might purchase and deliver between that time and 1st of March last, and pay therefor four dollars and fifty cents a thousand—provided that none should be considered merchantable, which should not *measure* one inch and five-eighths in length.

It appeared that soon after the contract was entered into, teazles had fallen to about $2 per thousand, and the price, during the time limited, had fluctuated in the market from $1 75 to $3 00.

About the first of February the plaintiffs had delivered 800,000 under the contract, which were received and paid for by defendants, although there was then a controversy in relation to the measure. Two days before the expiration of the time limited in the contract, the plaintiffs again purchased of Bodman & Root of Williamsburg, a large quantity of teazles, which they took to Hartfield and offered to the defendants, who refused to receive them, unless the plaintiffs, in determining which of the lot were one inch and five-eighths in length, according to the contract, would measure from *within* the husk at the bottom, to the end of the pitch or core only, at the top. The plaintiffs accordingly notified the defendants that they should leave the teazles at a place which they should designate, which they did accordingly, at the same time having the quantity determined by Mr. Stearns of Williamsburg, who had adopted the rule to measure from *outside the husk at the bottom to the firm part of the bur at the top*, allowing all those as merchantable which came up to one inch and five-eighths according to that measure, and throwing in all others as not coming within the provisions of the contract. Measuring by this rule, Mr. Stearns made out the merchantable teazles in the disputed lot to be 642,000 in number.

Here was the *knob* of the case—and there was much testimony of manufacturers and dealers upon it. The rule adopted by Mr. Stearns was supported as the usual and true one by his testimony and that of Mr. Isaac Gere and Mr. Sanderson of Williamburg; while Mr. Buckland of Springfield, and Mr. De Witt of Oxford, testified to one more favorable to the purchaser, which would have thrown out, as unmerchantable under the contract, about one hundred thousand of those included in Stearns's measuerment.

There was also much curious inquiry on incidental points into the customs of the trade—the state of the market, &c.; and manufacturers from Leicester, Spencer, Oxford, Ware, Springfield, Williamsburg, Greenfield and Milbury, were examined upon the subject.

The jury found for the plaintiffs, and adopted the rule of Mr. Stearns as to the admeasurement. So let all teazle dealers remember that the proper way to measure teazles under a contract specifying the

length, is from outside the husk at the bottom to the top of the firm part of the fangs or burs. The Court had instructed the Jury that the property in the teazles had passed but was yet in the plaintiff's hands; and that if they found against the defendants, they would be bound to ascess damages to the amount of the difference between the market price or value at the time of the offer and refusal, and the price stipulated for in the contract. The jury had found these at 1505; but the parties, while the Jury were out, had agreed that upon the Jury's finding the measure and so the quantity delivered, the defendants should take them at a stipulated price. Judgment was accordingly entered for the plaintiffs for $2753 damages, and ninety-five dollars costs. The plaintiffs, with Bodman and Root who were also interested with them, have probably made a profit of between two and three thousund dollars upon this contract, including the profits on the eight hundred thousand first delivered.

One of the particulars relative to the teazle business, which came out in the course of the evidence, was that there were three kinds of American teazles known in this market, none of them quite equal to the foreign teazles, and all differing from each other in value. The Connecticut or Wethersfield teazles are the best native ones, and are worth twenty-five cents more by the thousand than the Williamburgh teazles which are raised in Williamsburgh, Hartfield, and vicinity. These last, again, are better than the Vermont teazles, which are raised principally in the Valley of the White River. One of the witnesses expressed the opinion, that the short summers of the north, promoting rapid growth, was the cause of the burs growing coarser and looser.

It is not a little singular says the Mercury, that no satisfactory artificial substitute for the teazle has ever been invented, though many have been tried. It is used, as our readers are aware, for raising a regular nap upon cloth; its long barbs being drawn over the cloth repeatedly till they have combed out all the knots and made it perfectly smooth. Should the barb of the teazle, when in use, become fixed in a knot, or encounter sufficient resistance, it yields or breaks without tearing or injuring the cloth —thus combining pliancy and stiffness to a degree which has not as yet been equalled by any mechanical contrivance for the same object. Both in England and in this country, it is emphatically termed a "casualty crop"—liable to a great variety of mischances, and of course exceedingly uncertain as to profit. We have been told that a large proportion of the teazle plants on the Connecticut river have perisehd during the past winter: if this is the case, the price will of course run up again.

The average price of teazles in England is stated in an English work, to have been for some years past about three dollars per thousand. They have varied, however, in that couutry, from two to ten dollars, and the extremes of fluctuation have been yet greater in this country.

From the American Gardener's Magazine.

NOTICE OF SOME OF THE EPIPHYTÆ, AND PARASITIC PLANTS OF THE U. STATES, WITH REMARKS ON THEIR PHYSIOLOGICAL CHARACTERS. BY JOHN LEWIS RUSSELL, PROF. BOT. ETC., TO THE MASS. HORT. SOC.

Although the tropics are peculiarly rich in these curious vegetables, which luxuriate in the dark and rapidly growing and decaying forests, yet even our more northern clime, can furnish a few no less interest ing to the lover of science, though far less attractive to the artificial taste of the florist. Several genera may be found in the New England States, which, independent of their parasitic character are remarkable for the singularity of their form. In your summer ramble through the dense and damp woods, you may perchance meet with a curious cluster of brown, or yellowish, and extremely succulent, vegetables, covered with a pubescence, and instead of leaves, invested, with minute scales. Should your curiosity prompt you to stoop and examine the anomalous and fungous-looking body, you will discover, gentle reader! the curious and beautiful native epiphytic *Orobanche*, whose minute examination may repay your attention.— This genus forms the type of the natural order of *Orobancheæ* of Jussieu and of Lindley, and under this same order is its cogenus ***Epiphagus*** of Nuttall; which being a parasite on the roots of the beech (*Fagus*) has received from him its beautifully appropriate name One species, the "E americanus," is said to be found in Maine, but not in this vicinity.

Perhaps not far distant, and in the same ramble, you will notice the remarkable, and ivory Monotropa, in which nature seems to have forgotten her usual livery of green to invest one of her fairy and delicate production in a vesture of entire, unsullied purity. By a sort of desecration, it has received, in common language, the trival name of that instrument, which affords an exhilarating solace to many a devotee to the "fragrant weed." But however apt its resemblance or name, it may be a question, whether the simple taste which dictates the admiration of the flower, would not have proved as beneficial to the general happiness, as that more luxurious taste which invented both the name and its origin. Another cogenus, and you have Hypopithys, of which "H. lanuginosa" is by no means rare in the neighborhood of Boston, and is a distinct parasite, affixing its densely crowded stems to the roots of trees.

And have you not often observed the golden and glittering thread-like branches of the twining *Cuscuta*, climbing with an aspiring habit, not unlike its more gigantic, though not parasitic sister vegetables, up the slender stem of some delicate grass or plant herb; by the rapidity of its growth, and predatory disposition, draining the very vital energy from its supporter, till overclimbing and overreaching, it still progresses onward, over the topmost foilage, and lays hold of whatever next presents itself, till all are involved in inextricable confusion; and then, as if in triumph at the mischief it has occasioned, cover its leafless, voluble stems, with a mass of clustered flowers?

The first growth of the *Cuscuta* exhibits an anomaly of a vascular plant with perfect seeds, germinating without any cotyledon. A few other plants arranged under the exogenæ on account of their organization, are, in common with this, in fact, acotyledonous. The absence of cotyledons, has led to the theory of their presence in a consolidated, and consequently unfolded or undeveloped condition.

Throughout the Western States, you will find particularly upon the branches of the elm, the sempervirent mistletoe (*Viscum verticillatum*), whose parasitic and epiphytic character, and supposed virtues so early attracted notice. It is one of the few plants connected with the superstitions of a barbarous age, and from its rare occurrence on the oak, was estimated, when discovered in that situation, as peculiarly sacred. But like many other things that have nothing but antiquity to recommend them, its fictitious good qualities are overlooked, while its more prominent character of disfiguring he branches of its otherwise graceful and elegant supporter, are only noticeable.

Farther south, in Florida, and on the sea coast of Georgia and Carolina, we meet with a species of the true and genuine epiphyte, in the "Epidendrum conopesum." This is the only representative in the U. States, of that curious genus. It has been found growing on the trunks of the noble "Magnolia grandiflora," both by Nuttall and Elliott, and by the latter, observed also on several species of oak.

In the last number of the American's Gardner's Magazine, for April, it is incautiously stated, in speaking of this plant, that it is "interesting as the only parasitical plant yet discovered in the U. States."— (p. 144, Vol. II.) It is true that it is the only epiphyte connected with the numerous congeners and co-species so common in other and tropical climates. That we have other parasitic epiphytes, has been already shown.

An almost innumerable family of less perfectly organized vegetable forms, which are to a certain extent parasitic, is composed of the Lichenes, Fungi, Hepaticæ, etc., but these deriving no necessary nutriment from the vegetables on which they are found, and growing also on the surface of rocks and of other bodies, are termed false parasites. None the less important are they, however, in the great economy of nature, which renders each minute particle of organized matter a great and necessary agent in her operations. Yours,

JOHN LEWIS RUSSELL.

South Hingham, April, 1836.

An Englishmen has just erected, on the river Theiss, in Hungary, a mill in the form of a colossal man—the head being the dwelling house, the eyes the windows, the nose the chimney, and the machinery in the body, driven by a stream of watar in a canal, in the form of an immense bottle, emptying into his mouth.—[Daily Times.

From the Journal of the Franklin Institute.

REPORT ON THE USE OF THE HOT AIR BLAST IRON FURNACES AND FOUNDRIES. BY A. GUENYVEAU, ENGINEER AND PROFESSOR IN THE ROYAL SCHOOL OF MINES.

(Translated for this Journal, by Prof. A. D. Bache.)

Concluded from page 205.

II. *Application of the Hot Air Blast to Cupola Furnaces, to Smith's Forges, &c.*

The hot air blast appears to have been applied with great advantage, in England, in furnaces for remelting pig iron. The consumption of coke, per ton of iron, was reduced from 400 to 280 lbs., one ton of metal passing per hour. The blast was heated by an apparatus placed at the trunnel head. There are various advantages resulting from this application. The fusion of the metal takes place in about half the time required to melt it by the cold blast; it is thus less exposed to the injurious action of the blast, and while twice the quantity of iron can be melted in a given time, the quality of the material is better. It is further stated that the quallty of the iron is improved by the melting, and that it is more easily cast, owing to its greater fluidity.

At Vienne, France, there are two cupola furnaces supplied with hot air. The apparatus is at the trunnel head, and consists of two-bell-shaped vessels, through the interstice between which the draught is forced. This form of apparatus is decidedly bad, the alternate expansion and contraction of the parts renders it leaky in a very short time. The efficacy of the hot air blast is felt, however, even at this furnace.

In applying the heating apparatus at the trunnel head of furnaces, for smelting lead, copper, &c., care must be taken to protect the pipes from the sulphurous and metalic vapors, which, issuing from the furnace, would destroy them very rapidly.

The fan, or rotary, blowing machine is used in several establishments at Paris, Rouen, &c. for supplying cupola furnaces with air. This though a simple means of applying power, does not seem to be an economical one. Even when great velocity is given to the fans, the force of the blast is inconsiderable, but by increasing the opening of the blast pipe, the quantity of air thrown in may be rendered very great. In one case at Rouen, by increasing the diameter of the tuyeres from 30 to 54 lines, the daily yield of the furnace was nearly doubled, and an economy of fuel (coke) of 20 per cent. resulted, the cold blast being used in both cases. At La Voulte the fan makes from 800 to 1000 revolutions per minute, and the pressure at the tuyere is only four-tenths of an inch of mercury. Three and a half to four inches is the ordinary pressure with other blowing machines. If the air were to be heated, this machine would be hardly applicable, as the friction in the tubes of the heating apparatus would tend materially to diminish the draught.

Unsuccessful attempts have been made both in England and France, to apply the hot air blast to bloomery furnaces.—The causes of failure are, however, not known.

A similar application to finery furnaces, using charcoal as fuel, has succeeded.—Mr. Combes states that at Lausen, (in Wirtemburg) the blast is heated by pipes below the earth of a finery furnace, and has its temperature raised to 390° Fah. With the cold air blast, they used 40 cubic feet of charcoal to produce 200 lbs. of bar iron, and the weekly yield of the furnace was 6,000 lbs. Now, with the hot air blast, they consume 30 cubic feet of charcoal to the two hundred pounds of iron, or about one part by weight of charcoal, to one of malleable iron; the weekly yield is from 7,200 to 7,800 lbs. On several occasions the consumption of charcoal per 200 lbs. of iron was as high as 36 cubic feet, which the workmen attributed to their using pig iron obtained by the hot air blast, which they considered more difficult to refine than that made with the cold blast.

This last conjecture is opposed to the experience at Konigsbronn, where they do not consider iron reduced by the hot air blast as difficult to refine. The economy of fuel by this method of refining, has been rather more than one-sixth, and the loss in rendering the iron malleable is diminished. This successful result is obtained by using the hot air blast in melting the metal, while it is decarbonized by the aid of the cold blast. This method of operating has been followed with success at the finery furnaces at Creusot and Decazeville.

I was present at some trials made upon a catalonia forge by an association of iron masters of the department of Ariege.—These were entirely unsuccessful. In the last of them the consumption of coal was not greater than with the cold blast, but the iron was of very inferior quality.

The hot air blast has been applied to the smith's forge with success. The iron was brought more rapidly to a welding heat, and the loss by oxidation was less than with the cold blast. There was no gain in the consumption of fuel. This method will probably be found useful in the working of steel, but no experiments have yet been made of a decisive character.

On the Use of Raw Coal, or of Wood, in High Furnaces, &c.

In order to produce a high temperature in a furnace, it is obviously necessary that the fuel should be consumed rapidly, and should not give off when heated, any vapors or incombustible gases, to carry off heat. The air thrown in by the draught contains four-fifths of its weight of nitrogen, which becoming heated causes a waste of fuel; if in addition to this vaporizable matters are present in the fuel, the loss of heat is greatly increased. Charcoal, coke, &c. make such hot fires because their volatile parts have been driven off by previous heating.

In high furnaces wood has been used to advantage, even in the smelting of iron, while it has failed in law ones. In the former the fuel descends slowly, and after having its temperature gradually raised, reaches the part of the furnace in which the blast is most operative. At this place the highest heat is to be found, and here the principal chemical changes take place. Thus in fact the fuel is gradually dried and carbonized before it reaches the place of greatest heat. If it were otherwise, the working of the furnace would be very unsatisfactory.

Experiment has proved the position just taken, however liable to objection it may seem on the score of the high heat which may be supposed, in every furnace, much above the tuyeres. It was found in the Hartz, by trial in a furnace of twenty feet in height, in which lead and copper ores were smelted, that the wood used as fuel came within six or eight inches of the tuyeres, without having been carbonized. The experiment was made by having small openings made at intervals in the stack, through which the progress of the operation could be examined. In this case the use of wood was abandoned, the furnaces being worked, as before, with charcoal.

A further proof of the same position may be drawn from the fact that raw coal, although substituted for coke, with advantage, in some high furnaces, has not been used in cupolas.

It is then absolutely necessary that the wood, or coal, should be converted into charcoal, or coke, before reaching the reducing part of the furnace. When this does not occur, and this is proved to be sometimes the case, the working of the furnace is unsatisfactory. The nature of the coal will produce different effects in the same kind of furnace. Thus at Alais a gradual deterioration in the working of the furnace resulted from the use of raw coal; at Creusot it was found necessary to mix the raw coal and coke in nearly equal proportions; in Scotland the hot air blast is required to enable them to use raw coal, while in Wales and at Decazeville they use raw coal with the cold air blast. The effect of the hot air blast is doubtless to facilitate the carbonization of the raw fuel.—To use wood for the smelting of iron, even in high furnaces, it has been found necessary to dry it before charging with it. This is true both in the Russian furnaces, and at Plons, in the latter of which the hot air blast is used, and the wood is mixed with charcoal. It should be observed further, that resinous woods, easily charred, have been the only ones hitherto tried.

This reasoning shows also why the more or less perfect roasting of an ore, the more or less moist state of the materials of the charge, the more or less complete carbonization of the wood or coal, produce such important effects, even in the largest furnaces. It is plain that the temperature just above the point when the ore is reduced is low, since coal, or wood, is not charred, and that to this we must look for the reason why it is so difficult to use these combustibles in the raw state.

M. Lampadius, of Freyburg, in his essay, "on the use of combustibles in their crude state,"* has shown how necessary it is to heat the wood, or turf, to a point near to that in which it begins to carbonize, before using it as fuel. He remarks that the cost of transporting wood or turf being, of

*Erdmann's Journal of Chem. and Technology, vol. XII. 1831.

course, much greater than the freight upon the charcoal from them, will prevent their use in many cases. Thus if it be supposed that there is a gain of twenty-five per cent in the quantity of charcoal, by using wood not carbonized, as was the case in the Russian furnaces, the balance would at Freyburg, be against the use of the raw material, on account of the cost of transportation. M. Lampadius concludes that when the material is at hand, or the cost of transportation low, uncarbonized wood may be used to advantage, in high furnaces, for smelting iron, if it has been duly dried; a result due to the heat given out in the combustion of the gases driven off from the wood, and to their reducing power.

The cause just assigned seems to me insufficient to explain the very great economy sometimes resulting from the use of the raw material; I consider the effect mainly due to the mode of carbonization, by which a much larger per centage of the carbonized fuel results than by the ordinary methods. The volatile parts of the fuel are driven off by the heated and incombustible gases passing through it, and there is no waste, by combustion. Being carbonized slowly, uniformly and without sensible waste, the greatest useful effect must result, and it is easily understood why a given weight of dry wood, or coal, may when thus circumstanced, yield a fourth, or even a half more charcoal, or coke, than it would by the ordinary method, and thus may be competent to reduce a fourth, or half more ore.

It must be admitted however, that this explanation does not account satisfactorily for the very great advantage found in the use of raw coal, in the high furnaces of Scotland, with the hot blast, and at Decazeville with the cold blast. At Decazeville, coal more than replaces an equal weight of coke. Thus one part by weight of coke was used for the fusion of 1.131 of mixed ore and flux, and now one part of coal is used to 1.675 of ore and flux. This coal would yield but .38 (^{3}ths) of its weight of coke, and melt therefore but .43 of mixed ore and flux. The causes assigned by M. Lampadius, are therefore probably correct, being necessary in addition to that just examined, to explain the various effects.

On the Causes of the Efficacy of the Hot Air Blast.

It is plain that if cold materials are introduced within a furnace, they tend to lower its temperature, while their own is raised. If then the fuel and the blast be heated before they act chemically, to a temperature nearly equal to that of the part of the furnace at which the combination takes place, this heated portion will be increased in extent, its temperature will be higher than it would be under other circumstances, and the amount of heat, therefore, available in melting the ore, &c. will be greater. In smelting furnaces the fuel and ore are always thus heated. This is not the case, however, with the blast. In fact it has hitherto been considered an advantage to have the air as cold as possible, that it might contain more oxygen in a given bulk, and experience showed, in conformity with this view of the matter, that blast furnaces worked better in winter than in summer, and better at night than during the day.—The expansion of air by heat causing, under a given pressure, less oxygen to be thrown into the furnace, will produce a diminished consumption of fuel, and yield of metal. In wind furnaces, in reverberating furnaces, and generally in all where an ordinary draught is used, an increased temperature in the air diminishes the draught. It can only be increased by raising the temperature of the air in the furnace, by the use of a more freely burning fuel, by additional attention in firing, &c. The same difficulty occurs in the blast furnace, if the power of the blowing machine cannot be increased.

It so happens that at the very time the air is warmest, springs are lowest, and the condensation of steam most difficult, two facts which will explain why the working of furnaces, both as to quantity and quality, is better in winter than in summer. If the weight of air thrown into the furnace had been made the same in summer as in winter, by increasing the power of the blowing machine, and the area of the blast pipes, it is probable that the working would not have been worse, in the former season than in the latter.

An artificial heating of the blast should produce the same effects as that just alluded to, and it is by no means surprising that the efficacy of the hot blast has been doubted. It remains to be seen whence this efficacy results.

M. Dufrenoy* has, in his explanation of the advantages of the hot air blast, shown the difference between the quantities of heat introduced into the furnace with the hot and cold blasts, and in an assumed case has determined this difference to amount to about one-sixteenth of the heat evolved by the combustion of the fuel. Since less air is thrown into the furnace in using the hot blast, there is of course, on that account, less cooling effect to contend against than in the other case.

M. Clement Desormes concluded by calculating from data in an assumed case, that the temperature within the furnace is increased between 270° and 360° Fah. by the heated air blast; an increase which he considers adequate to explain all the observed effects.

These theories are far from settling entirely, the question in an economical point of view. They suppose indeed, that the consumption of fuel in heating the air may be equal to that saved in the reduction of the ore, which is by no means the case.

I propose therefore to classify the observed effects, and to point out their relative degrees of importance, and their connexion with each other and with established physical principles.

The effect of heating air being to diminish its density, and the consequences of this being decidedly bad when the air is but

* Annales des Mines, vol. IV. This Journal, page 119, vol XV.

and there is no doubt a point at which this effect begins, and another beyond which it would hardly be sensible. Observation confirms this explanation. Bars of iron are readily raised to a welding heat in a smith's forge, supplied with hot air, in half the time required by the cold blast, and as the same quantity of coal is consumed per day in both cases, the greater effect in the former can only result from an increased intensity of combustion.* In the most successful trials the air was heated to 370° and the diameter of the blast pipe not being changed, the quantity thrown in was actually diminished, and yet there was an increased consumption of fuel. It is then the temperature of the air, and not its density, which determines the intensity of the fire.
slightly heated, why should a further increase of temperature, even in a diminished pressure and density, produce so great advantages? The explanation is that the temperature of the air has a most important effect on the intensity of combustion,

In the furnace, then, the fuel is burned to the greatest advantage; but, further, the heat thus produced is rendered most effective.—There can be no doubt that, in order to the regular working of the furnace, the different layers of the charge must descend regularly and horizontally. By the hot air process, the fuel is more completely converted into carbonic acid, than in the old process; more fuel is consumed in a given place, the temperature of which is, therefore, higher than in the former case; and this place of intense heat is more extended. As consequences, a greater mass of ore is reduced in a given time by the same weight of fuel, and more refractory ores can be reduced.

The charges descend more slowly, probably, because it requires more time to consume a large quantity of combustible in a given place, than to burn it through a considerable extent of the furnace. The air being completely deprived of its oxygen in the lower part of the furnace, cannot consume any of the combustible higher up. The charges have all moisture, or gaseous matter, completely driven off by the hot gasses passing through them, and arrive, duly heated, at the place where the most intense heating effects are produced. This diminished rate of descent is entirely consistent with an increased yield of metal, since the amount of ore in each charge is increased.

From the intense action referred to above, results a greater fluidity in the slag, a diminution in the quantity of flux, the possi-

*Anthracite coal merely requires its temperature to be sufficiently raised to make it keep up the combustion by the heat which it gives out. Iron wire, to burn in oxygen, requires its temperatures to be first raised, and may be burned in chlorine if first fired by the combustion of copper wire. Iron filings, finely divided, burn in the air, and in the experiments of Mr. Tyler, a fire was made in a smith's forge, from iron turnings, by raising the temperature with fine turnings. At last the whole burning mass was iron, and a welding heat was produced upon a bar thrust into it.—[Trans.]

ble use of more refractory ores, or an increased proportion of others in the charge, and the production of gray pig iron, by proportions in the charge in a furnace, which, before, would yield only white, or mottled, castings.

In conclusion, it may be remarked that some changes may probably be made with advantage in the forms of furnaces using the hot air blast. It is difficult to point them out, and their determination will require repeated trials, and with the precise ores and combustibles intended to be used in a particular case. I would suggest, however, especially where forged iron is to be made, enlarging the furnace at and above the boshes, diminishing, at the same time, the height of the whole furnace.—This latter change is understood to have already been made with advantage, in certain furnaces using charcoal as a fuel.

Effects of Drawing, Rolling, Annealing, &c., of the Metals.

In a paper on the ductility and malleability of certain metals, and on the variations of density which they undergo by different operations, M. Baudrimont developes the following interesting facts.

At a temperature rather above a cherry red, iron wire remained three months, surrounded by charcoal, without cementation taking place. A white heat, in five minutes, gave the properties of cast iron to a square bar of malleable iron, of four-tenths of an inch on a side.

Wires of copper, and of alloys of copper and zinc, are increased in diameter, and diminished in density, by annealing. The operation of rolling condenses the metals more than that of wire drawing. The density of iron and copper is greater, if the metals are heated before being passed through the rollers. The reverse is the case with alloys of copper and zinc. The density of the metals is greatest when drawn into very fine wires.

Wires may be increased in length in two ways, by a diminution in the area of their cross section, or by increasing the distances between their particles. When wires are lengthened in the manner last named, they return to their former length by annealing.

Hydrogen has an action on copper and silver, at high temperatures, which permanently separates their particles. On alloys of copper and zinc, and even of silver and copper, it has no such action.

Wires of different metals, which, after passing through the same hole in the wire drawing plate, have different diameters, acquire equal diameters by annealing.

The diameter of a wire increases, very slowly, by time, after passing through the wire drawing plate. Wires which have been bent, and then straightened, re-acquire a curvature.

Wires exposed to a high heat, lose a part of their tenacity. They require to be annealed in wire drawing, not to render them more tenacious, but to allow the particles to resume the positions from which they may again be displaced. The loss of tenacity is common to copper, iron, platinum, and the alloys of copper and zinc.

Brass wire approaches to iron in strength, while copper is inferior to it. Brass may be used instead of iron, where the latter would oxidate too rapidly.

The iron wires are given at strengths from 79,000 lbs. to the square inch to 127,600 lbs. The brass wires, from 78 to 87,000 lbs. to square inch. Copper, from 38 to 44,000 lbs. The diameters of the least and greatest wires were, iron, .014 inch, and .205 inch; brass, .070 and .267 inch; copper, .019 and .285 inch.

The finer wires bear greater weights, in proportion to their areas, than the coarser ones, because the particles of the former are compacted through the whole cross-section, while those of the latter, for a certain depth only, are thus forced together.—[Ann. de Chim. et de Phys.]

A short Remark or two on what is commonly called Dry Rot, by Chas. Waterton, Esq.

Dry rot is a misnomer. This disease in timber ought to be designated a decomposition of wood by its own internal juices, which have become vitiated for want of a free circulation of air.

If you rear a piece of timber, newly cut down, in an upright position in the open air, it will last for ages. Put another piece of the same tree into a ship, or into a house, where there is no access to the fresh air, and ere long it will be decomposed.

But should you have painted the piece of wood which you placed in an upright position, it will not last long; because, the paint having stopped up its pores, the incarcerated juices have become vitiated, and have caused the wood to rot. Nine times in ten, wood is painted too soon. The upright unpainted posts, in the houses of our ancestors, though exposed to the heats of of summer, and the blasts of winter, have lasted for centuries; because the pores of the wood were not closed by any external application of tar or paint; and thus the juices had an opportunity of drying up gradually.

In 1827, on making some alterations in a passage, I put down and painted a new plinth, made of the best, and apparently, well-seasoned foreign deal. The stone wall was faced with wood and laths; and the plaster was so well worked to the plinth, that it might be said to have been air-tight. In about four months, a yellow fungus was perceived to ooze out between the bottom of the plinth and the flags; and on taking up the plinth, both it and the laths, and the ends of the upright pieces of wood to which the laths had been nailed, were found in as complete a state of decomposition as though they had been buried in a hot-bed. Part of these materials exhibited the appearance of what is usually called dry-rot; and part was still moist, with fungus on it, sending forth a very disagreeable odour. A new plinth was immediately put down; and holes, 1½ inches in diameter, at every yard, were bored through it. This admitted a free circulation of air; and to this day the wood is as sound and good as the day on which it was first put down. The same year I reared up, in the end of a neglected and notoriously damp barn, a lot of newly felled larch poles; and I placed another lot of larch poles against the wall on the outside of the same barn. These are now good and well seasoned: those within became tainted the first year, with what is called dry rot, and were used for fire-wood.

If, then, you admit a free circulation of air to the timber which is used in a house (no difficult matter) and abstain from painting that timber till it be perfectly seasoned, you will never suffer from what is called dry rot. And if the naval architect, by means of air-holes in the gunwale of a vessel (which might might be closed in bad weather), could admit a free circulation of air to the timbers; and if, he could, also, abstain, from painting, or doing with turpentine, &c., the outer parts of the vessel, till the wood had become sufficiently seasoned, he would not have to complain of dry rot. I am of opinion, that if a vessel were to make three or four voyages before it is painted, or done with turpentine, &c., its outer wood would suffer much less from the influence of the weather, than it usually suffers from its own internal juices, which cannot get vent, on account of artificial applications to the pores. But still the timber would be subject to the depredation of the insect. To prevent this effectually, Mr. Kayan's process must absolutely be adopted; and it must also be adopted to secure wood from what is called the dry rot, in places where a free circulation of air cannot be introduced. I consider Mr. Kyan's process perfectly unexceptionable.—The long arrows which the Indians use in Guiana are very subject to be eaten by the worm. In 1812, I applied the solution of corrosive sublimate to a large quantity of these arrows. At this hour they are perfectly sound, and show no appearance that the worm has ever tried to feed upon them.

I have penned down these transient remarks by way of preface to others, which I may possibly write, at some future time, on decay in living trees.—[Loudon's Archi-ect. Mag.]

New Spirit Lamp.—A new and convenient spirit lamp, with an eolipyle having a vertical jet, is described by M. Pelletan, the invention of M. Breuzin, of Paris.—The entire apparatus is placed on a neat tripod stand, arranged for holding the vessel to be heated. The wick of the lamp is hollow, and is raised or depressed by a screw and rack. Above the lamp is an eolipyle of cylindrical shape, through the middle of which the flame of the lamp passes. The vessel to be heated being placed above the eolipyle, retains the full effect of the flame of the lamp. The jet pipe from the eolipyle passes downwards, and by a bend is introduced into the axis of the cylindrical wick of the lamp. The alcohol flame is thus entirely vertical, and the apparatus is much more convenient than the common eolipyle where the jet is horizontal. By using vessels properly arranged to economise heat, a pint of water may be boiled in five minutes, and at a cost

of less than half a cent (at Paris). In a common coffee biggin, the same quantity of water may be boiled for about a cent.—[Jour. Connaiss. Us. et Prat.]

Application of Tannate of Gelatin to taking Casts from Medals, &c.—This substance is obtained by adding a decoction of gall nuts, sumac, oak bark, or other substance containing tannin, to a solution of glue or isinglass, in water. It is fibrous and nearly insoluble. When exposed to the air in thin layers, it hardens. When moist, it is elastic.

The substance which was found to give the best mixture for casts, was finely pulverized slate. Silica, emery, &c. give pastes which harden, and may be used for razor straps.

In making casts of the mixture of tannate of gelatin and pulverized slate, it must be left for a certain time in the mould, in order to preserve the impression. If, however, it is allowed to remain there too long, it adheres strongly. The only difficulty in the application is to ascertain the precise time required for due hardening.

This substance may replace bronze in ornaments, papier mache, card work, &c.—[Ibid.]

Analysis of two varieties of Bronze.—These specimens were analyzed by M. Berthier. The first was intended for the manufacture of cannon, but proved of bad quality; its composition was ascertained to avoid the same proportions in other mixtures. It consisted in 100 parts, of copper 83.8, tin 15.7, lead 0.5.

The bronze used at Paris for the striking parts of clocks, was found to be composed in 100 parts, of 71 to 72 of copper, 26.56 to 27 of tin, 1.44 to 2 of iron.—[Ann. des Mines, vol. VII.]

Sheathing of Ships with Bronze.—The sheathing of this metal has been found by experiment, to lose but half the weight, in a given time, which copper would have lost. The composition used for making sheet bronze is 91 of copper and 9 of tin.—[Ibid.]

Durability of Acacia Wood.—It was found that in the mining galleries at Carmaux, (France) the oak timber used to support the sides and top of the galleries, decayed very rapidly, being effected by the dry rot. A comparative experiment was made with acacia wood, from which it resulted that the latter wood is much more durable than the former, when exposed in such situation. Oak timber decayed in three months, while the acacia was unacted upon, except at the sap-wood surface, four years.

The lateral strength of this wood is about equal to that of Norway pine.—[Ann. des Mines, vol. VII.]

From the American Journal of Science and Arts.

ACCOUNT OF AN AURORA BOREALIS, WITH A NOTICE OF A SOLAR PHENOMENON; BY CAPT. R. H. BONNYCASTLE, R. EN., TORONTO, UP. CANADA.

I. *Aurora Borealis.*

Having witnessed from the days of my boyhood, the splendid phenomena of the Boreal Aurora, in almost all the latitutudes under which it is usually seen, as far north as to have observed the sun at midnight, and particularly during a long sojourn in Shetland, where the people imagine, from its extremely swift changes and inexpressible vividness, that they can actually hear its rushings, I have ever been anxious to seize all opportunities of endeavoring to catch its Protean forms, and to describe them, in hopes that by exciting attention to facts concerning this wonder of northern skies, science might be more attentive to its appearances, and that at length it might become a portion of the duty of meteorologists to detail in their columns, all circumstances concerning it, which they might observe.

The Aurora in the high northern latitudes, when at its extreme, is almost dazzling, and the quickness of its motions approaches that of lightning. In other situations, it has also been observed to assume irised colors. But although all these combined are eminently wonderful, and strike the spectator with profound admiration and awe, yet perhaps the regions of Upper Canada, bordering on Lake Ontario,* exhibit, though not so splendid and varied a display of this mystery, yet one equally, or perhaps more, interesting to the philosopher. I have now witnessed the Aurora at Kingston for upwards of four years, and in a former volume of the Transactions, have described a magnificent scene, which occurred there two years ago.

During the winter months, on Lake Ontario, the Aurora may be said to be almost constant companion of the dark and cheerless nights, and it occasionally presents itself at all other times of the year, nor is it in winter a mere display of a glorious phenomenon, the utility of which has not yet been exemplified by science, for it sheds a continued and pleasing light, which resembles that of the crepuscular. The light does not, as in Europe, emanate from the vivid streamers which dance over the starry floor of the heavens, in ever changing and inexplicable mazes, but proceeds from the northern horizon, over which a pale, luminous, low, and depressed arch, embracing an extent of from sixty to ninety degrees, is commonly thrown. This arch is generally luminous in its whole body, not on the rim or verge only, which fades away into ethereal space, but from its superior circumference to the chord formed by the horizon itself, and varies in its elevation, from ten to fifteen and twenty degrees. Wherever it embraces stars, these luminaries are either veiled or dimly seen, being strongly contrasted on a fine star light night, with their fellow orbs of the southern heavens, which appear to shine out with double brilliancy.

Within the space comprehended by this arch of light, continual changes are operating, if the Aurora assumes a splendid shape. Dark volumes of vapor, not like clouds, but blackening in a moment, rise and fall, whenever a ray or an interior arc begins to form, and it is remarkable, that this darkness usually accompanies the commencement of every change in the scene, thereby increasing the majesty and beauty, as well as the brilliancy of the spectacle.

But it is impossible for any pen adequately to describe a phenomenon, which is continually presented in these regions, and it is with diffidence that I continue a task imposed on myself. It will, therefore, be more satisfactory to detail the circumstances attending a very recent repetition of one of the most beautiful of those which have been seen at Kingston this winter, nearly the whole of which I saw, and whatever escaped me was related by a very accurate observer.

On the evening of the 11th of December, 1835, the sky, after the sun had sunk, was dark and gloomy, and although there were but few clouds visible, and the stars were rapidly brightening, a change of weather was apparent. Snow had fallen, for the first time, on Wednesday, the 8th, after a short space of great cold, to the depth of about five inches, and the thermometer had sunk afterwards to 16°, at which it stood on Monday, the 13th. On Tuesday, it rose to 30°, and rain in abundance falling, removed the snow entirely. It was exactly midway between the extreme cold and the thaw, that the Aurora took place, the thermometer at the time standing at about 26°, and the wind, a gentle breeze from the north west. The barometer stood at 29.9, at 9 P. M., at an elevation of forty feet above the lake, which is two hundred and nineteen feet above the level of the sea.*

Its first appearance, after darkness had completely set in, was by the luminous arch above mentioned assuming its wonted place. From this arch, in the north, arose almost incessant streamers of bright white light, which shot upwards to the zenith, and streaked the dark sky with their silvery lines.

Once a mass of light suddenly opened in the zenith, and from it darted out innumerable pencils of bright rays, overspreading the dark vault of heaven with their glories, and seeming for a moment to illuminate the sky with a star which its vast space was scarcely capable of containing.

Again, rods of white light would dart forth from the northern horizon, and one single one, in particular, spanned the whole arch of heaven, touching the southern horizon over the great lake.

This play of the Aurora continued from seven till near nine, and was most brilliant and magnificent about nine, when it assumed another and not less singular attitude, of which the following is a faint attempt to delineate.

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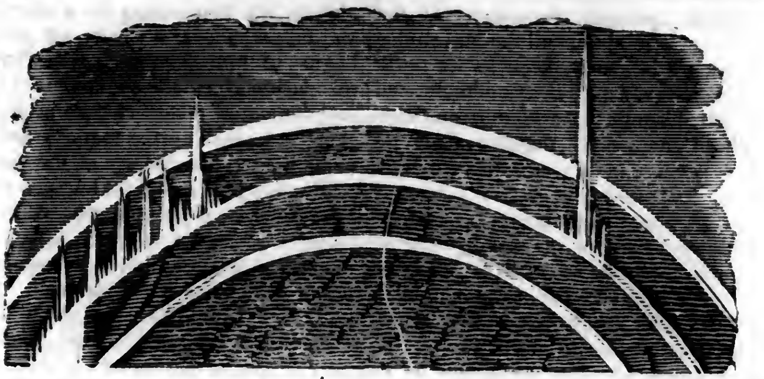
* Not having observed it elsewhere in Canada, I peak only of locality as a personal observer.

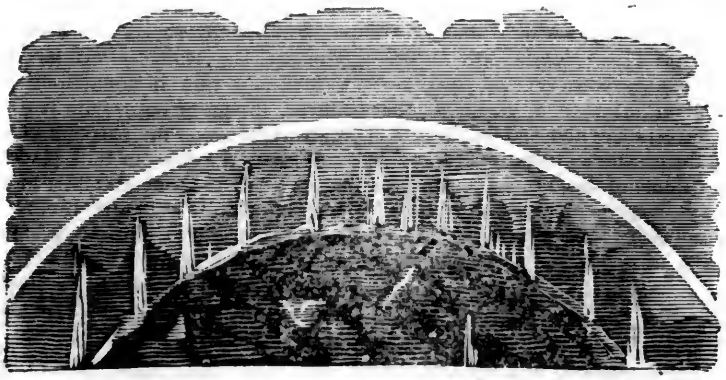
* The barometrical observations were made at the Hospital on Point Henry, by a very accurate observer. On the 10th December, it indicated, at 9 A. M. 29 5, at 9 P. M. 29 7; on the 11th, at 9 A. M. 29 8, at 9 P. M. 29.9; on the 12th, at 9 A. M. 30.1, at 9 P. M. 30.1.



These arches are not so flat as they should be, but the space is insufficient to show them exactly. The lower one was usually the boundary of a very dark black, changing mass; between the lower arch and the second, the space was not so dark; and between the second and third, or upper arch, it was still lighter, excepting where the coruscations shot upwards out of the second arch, and there it was very dark. The second arch was incomplete.

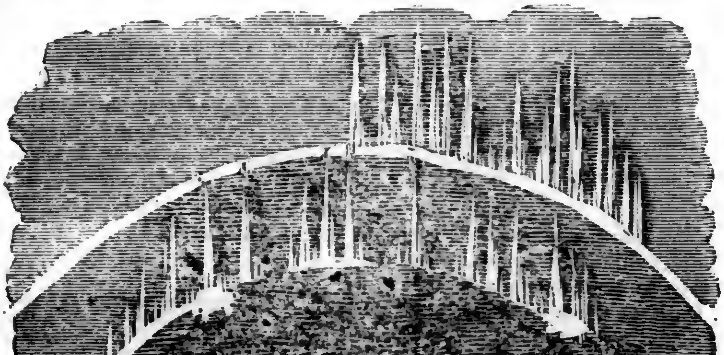
The ray shooting up on the right was brilliant in the extreme. Stars were partially visible above the third arch, but the bright ones in Ursa Major, on the left, had lost all their splendor, and the constellation could just be traced. The obscuration of the heavenly bodies reached almost to the zenith, above the centre of the arch, and was less over the extremeties.

The first appearance lasted long enough for me to go into another part of the house and make a hasty sketch; or my return to the window, it was alt ring to the following form.



The lower arch had somewhat heightened and become darker, with here and there spots of light in it, whilst from its circumference shot out brilliant rays and pencils of light. The second arch had altogether disappeared, but the upper one held its wonted place. It must be observed, that the upper arch was always paler, and more indistinct in its outline than the others. Faint stars now appeared through the darkish vapor, between the two bands or arches of light, and the lower band was indistinct, excepting to the left of its central space, where it was vividly depicted and extremely well defined, by a sharp, None of the pencils or rays, which soth out of either of the c hanges of the Aurora, were so quick or so intensely vivid in their action or light, as those seen in the more northern regions, nor were they colored; but they were always accompanied by the black vapory shroud, which hid every thing else from view, and added greatly to the lustre of their exodus from the horizon.

Having made the foregoing sketch, I again returned to view the Aurora, which had somewhat changed its appearance. band of bright light, cut off, both above and below, by very black vapory masses. This second appearance lasted, also, long enough to enable me to make a hasty sketch of it.

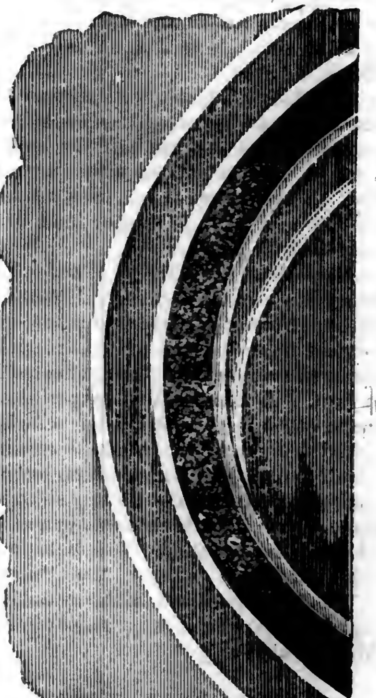


Both arcs or belts were now less distinct, the lower one almost obliterated, but still its place was well marked by the arch of vapor below, which was darker than ever. Three large spots of intense light now displayed themselves, one on the horizontal chord, and one an each side of the lower arch, whilst this lower zone shot out innumerable pencils and floods of light fiom its dark nucleus, the upper zone also darting forth long lines of brilliant rays; all these rays from both hands, moving in a very stately march or progression from east to west.

Towards the southern and western portions of the heavens, all was clear blue-black starlight, Orion being particularly brilliant; the north was as if overspread with a thin veil, through which the stars were barely visible.

I watched these alterations of the phenomenon until after ten; and the last I observed presented this form; after which the arches became less distinct, and eventually, with the exception of the great arch, passed away.

In this fourth change the Aurora, it will be observed, resumed its three arches, but they were no longer concentric, the third being broken on the right into a portion of a fourth. Between the second and third the darkness was the darkness of blackness, whilst the third arch was light itself; but the lower arches were not so bright, and the lower nucleus was only darkish, which was contrary to every state that it had presented, under any former observations for several years.



The constant arch of the Aurora of the Lakes has, I believe, never been noticed in any scientific publication, as is well worthy the attention of the learned. Whether it is created by a peculiar locality of the matter, of which the substance of the Aurora is composed, or whether the Aurora itself, as

the magnetic influence, has a peculiar pole from whence its effluences emanate, can scarcely be, at present, determined; but it is at all events highly singular, that in a latitude so low as 44°, the Aurora should assume forms, unknown in the higher northern regions where its powers were hitherto supposed to have developed themselves in the highest possible state.

Not having been very well when this singular scene occurred, I did not take all that notice of it which it deserved. I trust I shall be able during the winter to note the atmospheric phenomena which accompany it, more particularly, as well as to give more detailed accounts, and more perfect drawings.

II. *Solar Phenomenon.*

Immediately previous to the alteration of the weather at Kingston on Lake Ontario. after an unusual duration of severe frost, and about the middle of March, at near four o'clock in the afternoon of Sunday, I observed a singular species of halo or rainbow.

The day was mild, and there was scarcely any wind, and no rain, but the face of the sky was overclouded, and the sun appeared as it does through a slight fog.

Around the luminary, at a radial distance of perhaps twenty degrees, there was a dark halo of the usual defined character and appearance; and circling this halo in various places, a rainbow was visible. This rainbow was brightest in the eastern and western parts of the halo, where it assumed that peculiar appearance which seafaring men call weather dogs, and which are of very frequent occurrence in the northern division of the Atlantic ocean.

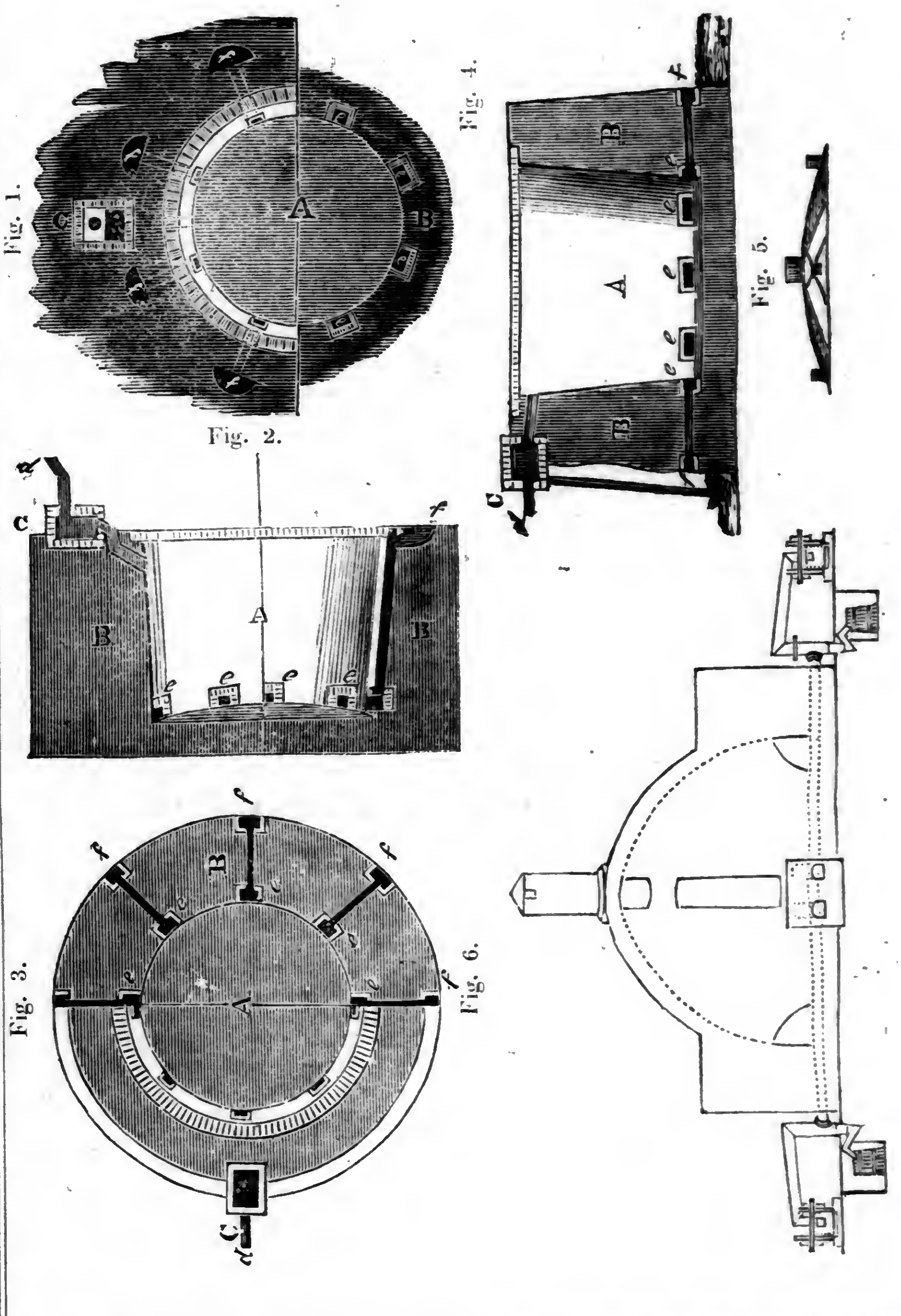
It was evident from the dull whitish light, that was diffused about those portions of the circumference of the halo on which the prismatic colors were not perfectly defined, that, in some situations, an observer might witness the singularly interesting spectacle of a circum-solar rainbow, in which the prismatic colors formed a complete circle, concentric with the sun.

In the course of the winter season, during changes of the weather from frost to a thaw, I have frequently observed a small portion of a vertical arch of the above description, although the sun was hardly visible. Usually these occurrences have taken place when the sun has been at the same elevation, as in the instance here described. They have always happened when there was no rain.

I am unable to say whether the appearances might not be created by reflection from the brilliant surface of such a vast body of ice, unincumbered by snow, as has been presented by Lake Ontario during the last winter, as it is difficult to account for the formation of a rainbow of so small a diameter on the usual principles, since the sun at the time was forty degrees above the horizon.

I have used the word rainbow in the above description, although it is not a correct one, as there were no appearances of rain during the presence of the phenomenon, although it is true there was a slight mist or fog.

Since writing the above, I have seen an almost complete circum-solar rainbow which appeared at Toronto, (U. C.) July, 1834, at 7 in the morning.



Applications of Chemistry to the Useful Arts, being the substance of a Course of Lectures delivered in Columbia College, New-York, by James Renwick, Professor of Natural Experimental Philosophy and Chemistry.

V.

APPLICATIONS OF HYDROGEN, CARBON, AND THEIR COMPOUDS.

1. AEROSTATION.

The only direct use to which gaseous hydrogen is put, is to the filling of balloons. The hydrogen for this purpose is prepared in the mode usually practised in chemical laboratories but on a larger scale. The substances employed are water, clean iron filings, and sulphuric acid. The apparatus is composed of a number of barrels which are arranged in the circumference of a circle. In each of these, iron filings is introduced to the depth of a few inches, and the barrel is then headed up. Through the head of each barrel a leaden pipe is introduced which reaches nearly to the bottom of the barrel and is formed into a funnel on the outside of the cask. This serves for the introduction of the water and sulphuric acid. Another leaden pipe is passed through the head of each barrel without

entering beneath its lower surface. These pipes serve to convey the gas generated in each barrel to a common reservoir, placed in the centre of the circle around which they are arranged. This reservoir is of the character of the chemical apparatus called a gasometer. It is formed of two large tubs, one of which is inverted within the other. The space between them, as well as the inner tub, is filled with water, the air being allowed to escape from the latter by a tube adapted to its head and furnished with a stop-cock. As soon as this tub is filled with water the stop-cock is closed.

The tubes which convey the gas are passed over the edge of the outer tub or through its staves, and their open ends pass beneath the cavity of the inner tub. The gas therefore enters it, and rising to the surface of the water tends to buoy it up, which action is aided by a counterpoise until the balloon is ready to receive it.

Balloons are bags of a spherical or sphersidal form, made of gores of silk, coated with a varnish which renders it imperrious to air. The best for this purpose is made of caoutchouc. Each of the gores is prolonged into a rectangular strip, and these, when sewed together, form a long cylindric tube. The air having been forced from the balloon by compressing it, this tube is tied to that which is adapted to the inverted barrel, the counterpoise being removed, and the pressure, if necessary, aided by loading the gasometer with weights, the contained gas, with that which is subsequently generated in the barrels, is forced into the balloon until it is completely inflated.

Hydrogen gas having not more than $\frac{1}{14}$th of the density of atmospheric air, the joint weight of a large balloon and the gas which it contains, is far less than an equal bulk of atmospheric air, and it will not only rise itself but will carry with it a considerable additional weight. In order to attatch a weight to it, a net work is formed of cords in such manner as to embrace the upper half of the inflated balloon, and from its equator, straight cords proceed, to which a car is tied. The balloon must be of such size as not only to carry up the persons who are to mount, with their necessary equipment, but also a considerable quantity of ballast. This is in the form of sand tied up in canvass bags. The object of this combined with a valve in the top of the balloon, is to enable the aeronaut to ascend or descend at pleasure as long as the ballast and the gas in the balloon are not wholly expended.

This valve is placed on the top of the balloon and is thus constructed: the gores, instead of meeting in a point, are united upon a ring of whalebone, and thus leave a circular opening; to this a circular shutter of silk, spread upon a similar ring, is adapted by a hinge; two cords proceed from this, over the net work, in opposite directions to the car; by one of these the valve can be opened, and by the other, closed.

Then the balloon is released by cutting cords which held it down, the tube which proceeds from its lower point, and is long enough to reach the car, is left open, in order that the gas in the balloon may be at liberty to escape as it tends to expand itself, in consequence of its reaching regions in the atmosphere less dense then those nearer the surface of the earth. Although the escape of this gas renders the balloon somewhat lighter, it must finally reach a position where its weight is exactly the same as that of an equal bulk of the surrounding air, and must cease to ascend. A farther height may be attained by throwing out ballast. This is done by opening the bags in which it is contained.

When it is wished to descend, the valve in the top of the balloon is opened until the collapse caused by the escape of the gas renders the balloon heavier than an equal bulk of the surrounding medium, and the force which causes the descent will be an increasing one, as the collapse is increased by the increasing pressure of the denser air. It may therefore be necessary to check it by the discharge of ballast, and by doing this in sufficient quantity, the balloon may be rendered stationary or caused to ascend again. In the latter case it is no longer necessary to allow the gas to escape by the tube beneath, which is therefore closed by knotting it.

A balloon has no other capacity of being directed except in ascent and descent. No power has yet been discovered, which can be called into action, of sufficient intensity to propel a balloon through the air, and make it move in a direction contrary to the currents of wind, and which shall be produced by apparatus sufficiently light to be carried up by a balloon.

USES AND PURIFICATION OF WATER.

Water as found in nature is never absolutely pure. Even when it contains no solid matter, either in solution or mechanically mixed, it is charged with gases. The most important of these are carbonic acid and oxygen. These however, so far from being injurious, are absolutely necessary to render water palatable, and probably increase its usefulness in the animal economy. Water which falls in cities where coal is used as a fuel, contains sulphurous acid gas in solution, which gives it a disagreeable taste. This may be readily separated by heating it to the boiling point; as,however,the othus gases will also be driven off, water ther purified must be exposed to the air for some time, in order that it may again absorb oxygen and carbonic acid. The water of rivers is often turbid, in consequence of their carrying with them earthy matter in a state of minute division, it may also contain animal and vegetable matter, or even living animalculæ. Such organic matter renders it unwholsome. The earthy and heavier organic matter may be separated by placing the water in tanks and reservoirs where it may remain at rest, and the clear fluid may be drawn off, but in this way living animals and lighter substances will still remain. It is therefore better to purify it by filtration. In order to deprive it of all disagreeable taste or smell, a part of the filter should be composed of charcoal. By long use, the charcoal will finally become so charged with the offensive matter that it will cease to act. The filter must then be opened and the charcoal replaced by another portion of the same substance, or the old charcoal purified by heat.

The same property of charcoal may be applied to the purification and preservation of water in ships. For the first purpose it is only necessary to mix thoroughly with the water in the casks a few ounces of powdered charcoal; for the latter the casks may be charred within. The purification of water from insoluble matter by filtering is performed by nature on a large scale within the crust of the earth, and that which issues from springs, and is found in wells is usually purified; but it may thus receive soluble impurities, although there are unquestionably some cases where the natural filter has the property of decomposing and retaining the soluble matter. Thus, on islands which are mere sandbeaches, fresh water may often be found by digging, which can have no other source than the neighboring water of the ocean, but this natural process has not been imitated by art.

The mere separation of insoluble matter from water has sometimes been effected on a large scale by taking advantage of natural circumstances. Thus at Glasgow, instead of pumping water from the River Clyde, tunnels of brick laid in sand are sunk in the gravelly bank of the river; through this water filters, and is drawn from the tunnels by a steam engine. At Toulouse, the reservoir which supplies the city is a basin dug in a gravelly bank, and separated from the river by a narrow dyke, through which the water passes perfectly clear. This reservoir has another valuable quality which we cannot avoid mentioning. The lower part of it is filled with large boulders, on these smaller water worn stones are laid; these are succeeded in turn by gravel, and the gravel by sand. The water which occupies the spaces between the stones is thus maintained throughout the year at an uniform temperature, and is neither affected by the frost of winter, or the scorching heats of summer. This temperature too, which is that of native springs, is such as causes the water to retain the greatest quantity of the gases which render it palatable.

Water which is conveyed great distances in pipes, or is precipitated in falls, loses these gases and will not regain them until exposed to the air. A remarkable instance of the last sort occurs at the Falls of Niagara, where the water above the fall is agreeable, and in the pool below as nauseous as that which has been boiled. The same action has even been applied to procure air separated from falling water, to be used in the manner of that forced from a bel lows.

Water which comes from springs in the vicinity of the sea or its arms is often impregnated with marine salt. It is then said to be brackish, and for this no remedy has yet been propsed except the costly one of distellation. That from inland springs often holds in solution carbonate of lime by excess of acid, and sulphate of lime.

These give the water the character called *hard*, rendering it unfit for the solution of soap, for making vegetable extracts, and for being used in the arts of bleaching and dyeing. It is also less wholesome as a drink, and, except to persons whose taste has become vitiated, disagreeable.

Nature has provided a slow but sure remedy for this defect. On exposure to the air the excess of carbonic acid which holds the carbonate of lime in solution, is dissipated, and that earthy salt percipitated. If on the other hand sulphate of lime be contained in the water, the superior affinity of that earth for carbonic acid will cause it to attract that acid from the atmosphere, by which this insoluble carbonate will be formed. Thus the water of stagnant ponds, even in countries where calcareous matter abounds, may be well adapted to manufacturing purposes. Such water is however unwholesome, as it undergoes decomposition from the presence of putrescent vegetable matter. But when large rivers flow for a great extent, with a regular and steady course, these chemical changes take place without the corresponding inconvenience arising, and in addition by an action not yet explained, all animal and vegetable matter is rendered insolubie. For this reason the waters of the Nile, the Ganges, and the Mississippi have a well founded reputation for their delicious taste. Even the water of rivers which receive every species of offensive animal and vegetable matter, is, when filtered, almost perfectly pure.

We learn from this, that in supplying cities with water, the true plan is to bring it so far as possible in channels formed like a canal in the natural earth. Channels of masonry are of all the most to be avoided, as the water cannot fail to be contaminated with calcareous matter which will render it unfit for use in any of the chemical arts. The antients did not feel this objection to the use of aqueducts of masonry, partly because they had not reached that advance in the chemical arts, which now makes their practice almost a necessary of life, but more particularly from the very superior quality of their masonry, which was so accurately jointed as hardly to admit the edge of a knife. This perfectiou is not beyond the reach of modern art, but would involve an expense which would not be submitted to.

When water holds calcarous matter in solution, the lime combines with certain acids which exist in all soap, and form with that earth an insoluble compound, which is lighter than water and floats at its surface. The sulphate of lime, which is most frequent, may be decomposed by the salts of ammonia and hence the use of putrescent urine in the art of bleaching.

As this sulphate has the property of combining with vegetable matters and rendering them insoluble in water, water may be rendered soft by boiling in it for a long time some muculaginous vegetables. A more speedy method of rendering hard water soft is as follows:

To purify 100 gallons of water; dissolve six pounds of pearlash, or subcarbonate of soda in a gallon of soft water, boil the solution, when it boils add two ounces of soap cut into small pieces, and stir the boiling liquid until the whole of the soap is dissolved. When this solution is added to the water to be purified, the soap and sulphate of lime mutually decompose each other, the insoluble compound of the acids of the soap with the lime rises and coagulates at the surface, whence it may be skimmed off.

The sulphate of lime may be more slowly decomposed, by adding a small quantity of carbonate of soda or potash. The acid of this will finally convert the lime into carbonate, which will be precipitated when the excess of acid is expelled. The mode which immediately preceeds, is however, more certain and rapid, and will fit the water for every use in the arts. This is the mode which was referred to in speaking of the bleaching of wool as capable of superceding the offensive matter which is now in use.

Water is most extensively used in preparation of our food, and the proper application of it to this purpose is by no means so simple as it might at first appear. The fibrous flesh of animals is made up of two distinct substances, albumen and gelatine. The former is insoluble in water, and coagulates at the temperature of boiling; the latter is slowly soluble in cold, and more rapidly in boiling water, by which it is previously softened. Albumem exists nearly pure in the white of an egg, gelatine when separated from other matter becomes glue.

When meat is to be cooked by boiling, if it be suddenly exposed to the boiling temperature, the albumen coagulates, and forming a hard coat, protects the gelatine from the action of the water, and although by long continued boiling the latter may be dissolved, the meat will remain in the form of tough stringy fibres. But if it be slowly raised to the boiling heat, the albumen retains its viscid liquid form until the gelatine is softened and partially dissolved; part of the former also separates and rises to the surface of the fluid whence it may be skimmed off.

It is the solution of the gelatine in water, with a part of the liquid matter of the meat which forms the broth which is the basis of soup.

It will be easily seen from what has been stated, that sudden heat and rapid boiling will render the meat tough, or if continued until it be tender, stringy and tasteless. On the other hand, if gradually heated to the boiling temperature without being ever permitted to boil rapidly, the broth will be more readily charged with gelatine, the meat will be tender and full of its original juices.

It is to the proper application of these principles that the great superiority of French over the English and American cookery is mainly to be attributed, for the broth is not only used by the French in the form of soup but is the vehicle of all their sauces, and the meat whence the soup is prepared, instead of being useless as with us, is the most important of their dishes.

The fat of animals is rendered soluble in water by vegetable matters, and this furnishes an important addition to the means of preparing food. Vegetables fried in butter or fat, and boiled in water, furnish a nourishing and palatable liquid, the *soupe maigre* of Catholic countries. The bones of animals contain large quantities of gelatine, but this is so intimately mixed with an insoluble substance (the phosphate of lime,) that it cannot be separated, except from the mere surface, by water at the ordinary temperature of boiling. Water, however, heated in close vessels to a higher temperature, acquires the power of separating gelatine even from bones. For this purpose, an instrument was invented about 150 years since, by Papin, and called by him the digester. It is a strong vessel of copper, to the mouth of which a circular lid is close fitted by grinding. The vessel stands in in an iron frame having four feet. To the top of these feet a cross of iron, which rests upon the lid, is fastened by screws, and thus the lid is prevented from rising when the first steam is generated within. To complete the arrangement, a safety valve is provided, by the weight of which the pressure of the steam within, and consequent temperature of the water is regulated.

The arrangement for closing the lid of Papin's Digester is too complicated for domestic use. In order to simplify this part, the digester has been modified into the Autoclave. The mouth of this is of an oval form; the shape of the lid is the same, but larger in each of its dimensions. In consequence of both having this figure, the lid may be passed into the vessel and turned around within it, until its longer axis is in the same direction as that of the mouth. In this situation, the first steam that is generated presses the lid close against the vessel, and effectually closes the mouth.

The presence of sulphate of lime renders vegetable matter insoluble in water. Hence green vegetables can only be well cooked, and appear of a good color, in soft water. The latter effect may, however, be attained even with hard water, by adding a small quantity of pearlash to decompose the sulphate of lime.

MANUFACTURE OF CHARCOAL.

Rationale.—When wood is burnt in the open air, under favourable circumstances, as a considerable part of it is either inflamable or volatile, it is dispersed in the process of combustion. The residue is earthy in appearance, and is known by the name of ashes. The quantity of ashes given by different woods, and by different parts of the same tree, vary very materially. Thus the wood of the linden yields eight times as much ashes as the wood of the pine, and bark from 15 to 30 times as much as the wood within. The linden seems to yield the largest quantity of ashes, which is as much as much as five per cent; oak yields about 2½ per cent; and pine eight tenth per cent. The character of these ashes varies in different kinds of wood, but the substances which are almost always found, are the cabonate of lime and magnesia; phos phate of lime; chloride of potassium, and the sulphate and carbonate of potassa; and silicia, either pure or combined with potassa and lime.

By distillation and heat in close vessels,

and condensing the volatile parts, the whole of the matter of the wood maybe collected. This is now found to consist of a black mass, retaining the figure and structure of the wood, and known by the name of charcoal, composed of carbon, and the earthy and saline matter mentioned as found in ashes; water; acetic acid held in the water: tar, partly unmixed, and parly dissolved in the water by the action of the acetic acid; with carbonated hodrogen, carbonic oxide and carbonic acid. At the temperature of 340° Fahr. the quantity of solid matter left is nearly double that left at a red heat, and if exposed suddenly to a heat above redness, the quantity of charcoal left, is diminished. The charcoal is itself a product of sufficient value to be sought for to the exclusion of the rest; at other times the decomposition of wood is effected principally for the sake of the acetic acid; the carbonated hydrogen has in some few cases been collected and applied to the purpose of illumination, and when this is the case the tar is also saved.

Manufacture.—The most perfect mode of manufacturing charcoal, is that which corresponds most nearly with the distillation referred to in the preceding section. Wood is introduced into iron cylinders, which are closed, and placed in a heated furnace.—The action is continued as long as any gaseous or volatile matter appears. The cylinder is then removed, and replaced by another also charged with wood. As the gas which is evolved is principally of an inflamable character, it is, after the condensable substances have been separated in a proper refrigerator, carried by a pipe to the furnace, where it is inflamed by the burning fuel, and by the heat of its combusiion, aids in the distillation of the remainder of the wood. This method is employed in the manufacture of charcoal for gunpowder.—In this process, it has been found that dry wood yields 28 per cent. of charcoal, and requires 12½ per cent. of the same wood, used as fuel, to effect its decomposition.

That part of the volatile matter which consists of water holding acetic acid, and tar in solution, goes by the name of pyrolignous acid. This process is sometimes conducted principally in reference to this product, which may be used in the preparation of vinegar, and as a source of pure acetic acid.

The apparatus used in this method is too costly to permit it to be employed in making the great quantities of charcoal which are required in various chemical and mechanical arts. and for domestic purposes. In these cases, recourse is had to the simple and ancient mode of carbonising the wood, in what are usually styled *coal-pits.*

The wood which is to be converted into charcoal, is cut to the usual length of cord wood, say about four feet. A floor is first formed by laying logs radiating from a centre, with an interval of a few inches between them, and filling the sectors of the circle included between them with other logs. At the centre of this circle, a stake is set up vertically, to the top of which two short pieces, crossing each other, are adjusted. Four logs are placed on end, leaning against the stake and supported by the cross. Around these, other logs are placed leaning against them, thus forming a truncated cone resting on the horizontal layer. If the quantity of wood permit, a second and a third range of logs are piled up in the same manner; the rule to be observed, being that the height of the truncated cone shall be about half the diameter of the base. The heap being completed, the outside is covered with small wood, on which are laid twigs and branches. Upon these, a layer of earth, from 4 to 6 inches thick, is placed, covering the whole heap, except a few openings, one of which is in the middle of the top, and others correspond to the radiating passages in the horizontal layer.

The pit being thus finished, it may be set on fire either by pushing burning brands to the centre of the base through one of the horizontal passages; or by drawing out the central stake of the upper layer, and dropping in burning fuel.

A thick smoke will first ooze through the hole at the top of the heap, which will be followed, after a time, by flame. As soon as flame appears, this hole is closed by laying a sod over it. It now becomes necessary to pay particular attention to the regulation of the combustion, by closing and opening the remaining holes, in proportion to the energy of the combustion. If it be too rapid, too large a portion of the charcoal will be consumed; if too slow, the logs will be only partially charred, leaving what are called brands. In addition to the holes already left, it may be necessary to open others at points where the combustion is too slow, and to stop up crevices which may be formed by the cracking of the earthen covering. A regular and proper action is marked by smoke flowing slowly and in equal quantity from all the openings but that at the top, where the greater rapidity of the current causes a larger quantity of smoke to make its way from under the sod laid upon it. When the outer logs of the pile have been reached by the fire, which will be shown by the outside appearing of a dull red heat at night, the process is completed; all the openings must then be carefully stopped, and a second layer of earth applied to the whole surface. After a few hours, these coats of earth are removed, and replaced by a third, which must be so applied as to prevent all access of external air.

In a pit of a single layer, the whole process is finished on the fourth day, and the charcoal fit to be drawn. In the largest heaps, it may not be finished for from 15 to 30 days.

This process would be perfect, were no more wood burnt away than is sufficient to drive off the volatile matter of the remainder. It is, however, hardly possible to attain this, although it is said to have been approached in Sweden, in some instances, when the heaps were of the largest size. In this operation, even when performed under favorable circumstances, it rarely happens that 112½ lbs. of wood yield more than 17 of charcoal, while by distillation in a cylinder, the same quantity, as we have seen, yields 28 lbs. It is also impossible, in this method, to collect the pyrolignous acid or gas.

The waste which thus takes place, has led to various attempts to improve the process. Among these, has been the formation of moveable enclosures of basket-work, by which the pits might be surrounded, and which, if carefully guarded from combustion during the first time they are used, are so much charged with pyrolignous acid as to be thereafter almost incombustible. Another method is, to form the floor of the pit of iron sheets, or cast iron plates, beneath which is a cavity that serves as a furnace; no air holes need be left in this method, and thus little wood is burnt away. It has been proposed, by Mr. Marcus Bull, to effect the conversion into charcoal, at the expense of fuel of inferior value; for this purpose, the whole space between the logs is filled up with the refuse charcoal of former burnings, which, being more inflammable than wood, burns first, and chars the logs.

By either of these methods, the product of 112½ lbs. of wood may be raised to 22 lbs. The last is obviously easily practicable; as wherever the preparation of charcoal is carried to a large extent, the removal and handling leaves a considerable quantity of dust and small fragments which may be applied to the purpose.

At the Bennington furnace, (Vermont,) where the coal is obtained from a tract of wood land which has never before been cut, a mode of preparing charcoal, different from any we have described, has been put in practice. The trees were of so large a size, as to render the labor of cutting them in lengths, and piling them on end, excessive. They, in consequence, were not reduced to less dimensions than 12 feet in length, and were rolled together into piles in which they retained their horizontal position, and which, therefore, had a prismatic form. These heaps were covered with earth, and lighted from the top; the draught vents were at the ends. The management, in other respects, was the same as in the conical pits, and the charcoal was of superior quality.

(Concluded in the next)

AGRICULTURE, &c.

From the New England Farmer.

FARMERS' WORK.

Roots for Cattle.—It is impossible to manage a farm to advantage, or raise stock to profit without feeding cattle with roots; and among the best of roots for that purpose is the ruta baga, or Swedish turnip. We believe that the person most instrumental in introducing the culture of that excellent root into the U. S. was the late William Cobbett. The following directions for raising that root are extracted from a treaties written by that famous agriculturist; and perhaps are as as plain and correct as can be prescribed.

Mode of saving and preserving the seed.—The ruta baga is apt to degenerate if the seed is not sowed with care. In England we select the fairest roots and the best form for seed, rejecting all such as are of a whit-

ish color or greenish towards the neck, preferring such as are of a *redish cast.* These when selected should be carefully preserved over the winter, and set in the month of March or April, in a rich soil, remote from any roots of the turnip or cabbage kind, to preserve the seed pure and unmixed. Two or three roots if they do well, will yield seed sufficient for an acre of land. Let the seed remain in pods until the time of sowing.

Time of sowing.—The time of sowing may be from the 25th of June to the 16th of July, as circumstances may be.

Quality and preparation of the land.—As a fine, rich garden mould of great depth and having a porous substratum is best for every thing that vegetates except plants that live best in water, so it is best with ruta baga. I know of no soil in the United States, upon which this root may not be cultivated with the greatest facility, excepting a *pure sand* and a *stiff clay,* which are very rare in this country.

Manner of sowing.—My ploughman puts the ground up in little ridges, having two furrows on each side of the ridge, so that each ridge consists of four furrows, and the tops of the ridges were about four feet from each other; and as the ploughing was performed to a great depth, there was of course a very deep gutter between every two ridges.

I took care to have the manure placed so as to be under the middle of each ridge, that is to say, just beneath where my seed was to come, which was sown principally in this manner:—A man went along by the sides of each ridge, and put down two or three seeds in places ten or twelve inches distance from each other, just drawing a little earth over and pressing it lightly upon the seed, in order to make it vegetate quickly, before the earth became too dry. In this method four pounds of seed sowed seven acres. Two men sowed the whole seven acres in two days.

After culture.—When the plants were fairly up, we went with a small hoe, and took out all but one in each ten or twelve inches, and thus left them to stand single. We next went with a hoe, and hoed the tops of the ridges about six inches wide on each side of the rows of plants, and then horse hoed between the rows, with a common horse plough, after the manner of tilling Indian corn, or potatoes, by first turning the earth from the plants, and next towards the plants at the second hoeing. There is no ground lost in these wide intervals, for the lateral roots of the large turnip, as well as the ruta baga will extend six feet from the ball of the plant; and my crop of thirty three tons, or thirteen hundred and twenty bushels to the acre, taking the whole field together, had the same intervals; and less than this, as was practiced by my neighbors, always diminished the crop. Wide as the intervals were, the leaves of some of the plants would nearly meet across the rows, and I have had them frequently meet in England.

From the May No. of the New-York Farmer.

CASHMERE GOATS.—We were invited, a few days since, by Mr. J. DONALDSON KINNEAR, of Albany, to view a Cashmere Goat. Mr. Kinnear, through the aid of relatives in France, purchased a pair of these beautiful and rare animals, from a gentleman who owns the only flock in France; and they were brought from Paris to Havre in the Diligence, and there put on board of one of the packets, but from some cause, the voyage was too much for the buck, which died, as well as the young kid, which was added to the family on the voyage. The doe, however, survived; and although very lean, is a beautiful animal; being, as we were informed, the *first ever imported into this country,* will, we hope, be the first of *numerous flocks* which shall in a few years cover our hills; and we trust that Mr. Kinnear may soon replace his loss, and be successful, in rearing a flock which may be profitable. Why may we not, in a few years, manufacture Cashmere shawls, as well as silk? We MAY—and shall do it—and compete with the foreign manufacture in this as in every thing else we undertake.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July,; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILWAY IRON.

95 tons of 1 inch by ½ inch.
200 do 1¼ do ½ do
40 do 1½ do ⅜ do
800 do 2 do ½ do
800 do 2¼ do ⅝ do
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2¼, 2½, 2¾, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitmore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Louis'a.
Capt John Bottom,	Tonawandu, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Rail oad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

MILL-DAM FOUNDRY.

TO BE SOLD OR LEASED the above well known establishment, situated one mile from Boston. The improvements consist of,

No. 1. *Boiler House*, 50 feet by 30 feet, containing all the necessary machinery for making boilers for *Locomotive* and other steam Engines.

No. 2. *Blacksmith's Shop*, 50 feet by 20, fitted with cranes for heavy work.

No. 3. *Locomtive House*, 54 feet by 25, used for putting together Locomotive Engines. Several of the best Engines in use in the United States have been put in this establishment.

No. 4. A three story brick building, covered with slate, 120 feet by 46, containing two water-wheels, equal to 40 horse power; Machine Shop, filled with lathes, &c.; Pattern Shop; Rolling Mill and Furnaces, capable of rolling 4 tons of iron per diem, exclusive of other work; three Trip Hammers, one of which is very large; engine for blowing Cupola Furnaces, moved by water-wheel; one very superior 12 horse Steam Engine, which could be dispensed with; and a variety of other machinery.

No. 5. An Iron Foundry, 80 feet by 45, with a superior air Furnace, and two Cupolas, Core oven, Cranes, &c. fitted for the largest work. Attached to the Foundry is a large ware-house, containing Patterns for the Castings of Hydraulic Presses, Locomotive and other Steam Engines, Lead Mill Rolls, Geering, Shafts, Stoves, Grates, &c. These were made of the most durable materials, under the direction of a very scientific and practical Engineer, and are supposed to be of great value.

No. 6. A building, 65 feet by 36, containing a large stack of chimneys, and furnaces, for making Cast Steel. This building has been used as a boarding-house, and can accommodate a large number of men.

No. 7. A range of buildings, 200 feet long by 30, containing counting room, several store rooms, a Brass Foundry, room for cleaning castings, a large loft for storing patterns, stable for two horses, &c. &c.

The above establishment being on tide water, presents greater advantages for some kinds of business than any other in the United States. Coal and Iron can be carried from vessels in the harbors of Boston, to the wharf in front of the Factory, at 25 to 30 cents per ton. Some of the largest jobs of iron work have been completed at this establishment; among others, the great chain and lift pumps for freeing the Dry Dock at the Navy Yard, Charleston.

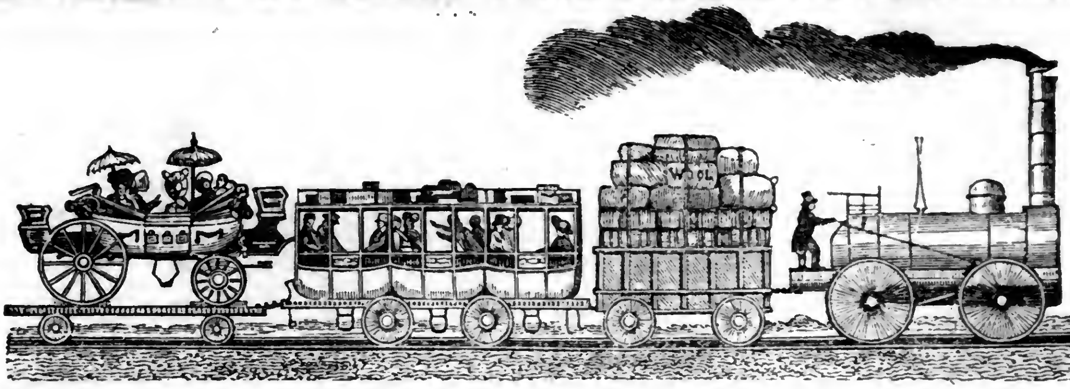
The situation for Railroad work is excellent, being in the angle formed by the crossing of the Providence and Worcester Railroads. The Locomotive "Yankee," now running on the latter road, and the "Boston," purchased by the State of Pennsylvania, were built at these works. With the Patterns and Machinery now in the premises, 20 Locomotives, and as many tenders, besides a great quantity of cars and wagons, could be made per annum.

For terms, apply to
THOS. J. ECKLEY, Boston,
or to ROBERT RALSTON, Jr. Phila.

Boston, April 21, 1835. j25—4t

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JULY 16, 1836. [VOLUME V.—No. 28

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 16, 1836.

We would call attention to the advertisement of the Messrs. Ralston of Philadelphia, in this number of the Journal, in relation to Railway Iron and Locomotive Engines.

The Messrs. Ralston have been engaged more than six years in the business, and have ordered over 100,000 tons of iron for State governments and companies; and their experience in the business, and the residence of one of them, or of a competent agent, in London, to inspect before shipment, every thing ordered by them, will insure to those companies who purchase of them, or give orders through them, the most favorable terms the market will allow.

LOCOMOTIVE ENGINES ON INCLINED PLANES.

BETTER AND BETTER —It is with great pleasure that we lay before our readers, the following statement of a remarkable performance, handed to us by Mr. W. Norris of Philadelphia. We hope to see some one take up these facts and reconcile them to the theories hitherto adopted.

Meanwhile we will take a trip to the Columbia Road for the express purpose of witnessing a series of experiments upon that road with this engine.

"The Locomotive Steam Engine "George Washington" made for the State of Pennsylvania by William Norris of Philadelphia, was placed on the Columbia and Philadelphia Railroad on Saturday afternoon the 9th inst. On the following morning her powers were tested in ascending the Inclined Plane near Philadelphia. This plane is twenty eight hundred feet in length, with an ascent in that distance of one hundred and ninety-six feet, or at the rate of 369 feet to the mile, or seven feet rise in one hundred feet, or one foot in thirteen. The weight of the Engine is 14,930 lbs. only. The load attached weighed 19,200 lbs. including the weight of 24 persons who were on the Tender and Burthen Car. The Engine started immediately at the base, without a running start, and dragged up said load of 19,200 lbs. the above distance of 2800 feet in the space of two minutes and one second, or at the rate of 14¾ miles per hour; pressure on the boiler a fraction under 60 lbs. to the square inch. The Engine then descended the Plane with the same load at various speed, frequently stopping to test the security. The valves being reversed, or set for going ahead, and when it was desired to stop altogether, the steam was let on very slowly which brought her to a dead stand for a second or two, when she would immediately start up the grade. In this way, stopping and starting at pleasure, the time occupied in descending the 2800 feet, was from 12 to 15 minutes, thus testing the perfect security of her performance on the Plane. She again ascended the Plane with the same load and took her place on the road, the same morning, ready for use."

NEW JERSEY RAILROAD AND TRANSPORTATION COMPANY.

We owe an apology for not laying before our readers the account of the proceedings at the opening of this road.

We were promised a copy of the proceedings; but it was not received, notwithstanding we delayed the Journal of last week one day for it; and as we do not receive the Newark papers, though we have for many months sent the Journal to the Daily Advertiser, we have now to content ourselves with the following concise notice of the pleasures and performance of the day.

The cars with a large company left Jersey City about 9 o'clock on the 7th inst. Proceeding over the ridge—by the temporary road, laid until the proper bed is formed

through the cut—the road crosses the meadows and reaches Newark. From Newark a train of thirteen cars was taken in fine style by the "New Brunswick," a very fine engine. The train stopped and additional company was taken on board Elizabethtown, and Rahway. The road was passed over in fine style though no attempt was made at a quick trip.

The enthusiasm of the people was great. Vehicles of every description were drawn up on the sides of the road, some of them evidently from a distance—the family seated under the nearest tree decked in their best—the ladies waiving handkerkchiefs—the men and boys cheering along the whole road.

Schools were turned out and the grandmother of eighty years, shook her head and raised her hands in astonishment, hardly believing what her eyes beheld.

The company were most hospitably entertained at New Brunswick, where a general holiday seemed to be held. The cars stopped opposite the town on the hill and the company proceeded by way of the Old bridge—the new one not yet being completed—to the town hall.

Here a very appropriate address was delivered by the Mayor of New Brunswick, which was responded to by Gen. Darcy, president of the company.

A number of toasts evincing the spirit and good will of the company were given—and all present seemed delighted.

In the afternoon we returned with a large company in addition from New Brunswick, and again received hospitable entertainment at Newark.

The value of this road is very generally known. A continuation of it will give the shortest and best route for general travel to Philadelphia.

Amicable arrangements have been made we understand with the Camden and Amboy Company, and we may soon have a choice of routes offering every conveninoe for travel and transportation of goods and passengers bstween the two cities.

We think that this road reflects great credit upon Mr. Sykes its engineer.

His rail is a very good one, and some of his contrivances in the mechanical details of the work are of such importance as to merit a separate and more extended notice.

We think that some short curves, and arms of double curvature, might in some instances have been avoided. A few hundred dollars additional expense in excavation are not too much to pay for a direct road. These curves, however, may have been dictated by circumstances of propriey, of which we are not aware.

On the whole, we think that Mr. Sikes deserves much credit, and has earned a reputation, by so far finishing his road, which will not, we are sure, be impaired by its completion.

He is connected with enterprising men, upon whom merit will not fail to make the proper impression.

For the Railroad Journal.

CLINTON.—NO. V.

One hundred and six miles, on an air line, from the City Hall to the heart of the Anthracite Coal Valley of Luzerne County, Pennsylvania! This is the text: this is the text I preach from. Sooner or later it must have its effect in your great city. Fifty miles nearer to New-York than Albany. Not further from the Park on a straight line, than Washington Square in Philadelphia is, on the route travelled, from the coal mines of Schuykill, is it not apparent, to a moments reflection, that those Luzerne coal deposites are so near to New-York, and so easily accessible, as to render them objects of first rate importance to the consideration of all who are concerned in the business and prosperity of the city? Cannot New York, by these mines, enter into fair competition with Philadelphia, in the coal trade? And if she can, is not that already great and rapidly growing business, worthy of her earnest, prompt and early attention?

Before I close, my purpose is to give a brief description of the Luzerne Anthracite Coal Valley. One or two remarks, however, press on my mind, and I may as well put them down here.

First. In a late number of the Journal it is mentioned that the Darlington and Stockton Railroad, in England was expected, when made to transport 50,000 tons of coal. Lo! beyond all expectation, or even hope, during the past year there have been transported on it near 500,000 tons: So it is: So, too, on all the canals and Railways in England, leading to coal mines, the business in coal has very greatly surpassed the most excited expectation: So, too, would it be here, were the proposed railroad fairly in operation.

I wish, Mr. Editor, you would add to the interest and value of your very interesting Journal, monthly, or once in three months, prices current of railroad and canal stocks, in our own country and in Great Britain.

Second. In a note to my former number you mentioned the probable price, per ton, at which coal could be taken from Pittston to New York. In my opinion that price was much to high, for, you must consider, that the return cars would all go back loaded. I pray you to remember, that, from Philadelphia to Mauch Chunk, and from Philadelphia to Schuylkill, the boats have to return nearly empty, because they go into a barren, uninhabited region, without trade or population, except such as is derived from, and dependent on, the coal trade. Hence the descending freight, or coal, must necessarily bear the burden of the returning cars or boats nearly freightless. Not so will it be with cars on the New York and Pittston Railroad; for at Pittston the Susquehannah River is struck, the Wyoming Valley, and Lackawana Valley, rich, populous, productive, and rapidly advancing, will be reached. From Pittston the State canal is already completed down the river to Columbia, and will be soon finished up the river to the State line. A vast extent of country, already rife with business and population, now supplied, imperfectly by circuitous routes, will require and receive by the direct line from New York, fish, plaster, salt, sugar, molasses, oil, coffee, hides, grindstones, domestic and foreign goods and merchandize of all sorts, which will all bear handsome tolls, and enable the stockholders and carriers to place the toll and carriage on coal so low, that this necessary and leading article may be transported to your city, at a moderate cost.

Suppose the distance of the Railroad from Pittston to New York to be 130 miles, and this is making a large allowance for deviations from the straight line, cars, going down with coal, at the rate of 11 miles an hour, would, at this season of the year, leave at sun-rise, and arrive at New York at half past 4 P. M. There would be then time to load with merchandize, and with their lighter freight return to Pittston before morning. Shorten the road, as it is believed may easily be done, from its present circuitous location, 10 miles, and with a speed entirely consistent with safety, the trip out and back may be made in a day. Can any one of your readers tell us how many days a boat on the Schuylkill Canal, or Lehi and Morris Canal, is usually engaged in making a trip for coal? I am fully persuaded that, in a very few years, the coal trade from the Luzerne mines to New York, will be one of the most extensive and lucrative branches of business carried on by your enterprising city. And this consideration should be borne in mind by capitalists disposed to make investments in lands in Luzerne; namely, that the balance of trade will naturally be large in favor of the Anthracite Valleys; and that every district which has the balance of trade in its favor, consequently grows rich, and therefore that all property therein goes on steadily appreciating.

I have stated the suppositions that the Railroad might be 130 miles: if so, and the

toll be fixed at 1 cent a ton per mile,	$1,30
Transportation 2 cents a ton per mile,	2,60
	$3,90

Then the actual cost of taking coal to New York from Pittston would be three dollars and ninety cents. Add 40 cents for raising and 50 cents for its value per ton in the mine and you have $4,80. On canals

the cost of transportation, independent of tolls should not exceed 3 quarters of a cent per ton per mile, and does any rational man doubt, but, with the improvements every day making in Railroads, transportation by that mode will ultimately be reduced to nearly the minimum of cost on Canals?

I did intend in this number, to give a description of the Luzerne Anthracite Coal Valley, but it is impossible to do so consistently with the brevity prescribed to myself, I therefore defer such description to my next.

Rail-Road.—A new locomotive engine on the Lowell Rail Road a few days since brought from Boston 190 tons, weight of engine, cars and loading included. The same engine without any load except the Tender, passed from the watering place to Lowell, a distance of fifteen miles in 20 minutes; that is at the rate of 45 miles per hour. This is quick time, forward march! Such a car as this would be convenient "to send after the Doctor."

June 17, 1836. H. C.

FOREIGN RAILROAD ITEMS.

A deputation, consisting of Colonel Knox Gore, Lord Lieut. of the county of Sligo, on behalf of the county of Mayo Committee of the Blacksod and Broadhaven Railway, Sir H. Meredith, Hon. Sir F. Stanhope, R. Murdock, Esq., agent to the Earl of Arran and to Mrs. Leslie, Mr. Leahy, Solicitor, etc., have had an interview with the Lord Lieutenant, at Dublin Castle, relative to the survey of the harbours on the western cost of Ireland, with a view of selecting an eligible one as a packet station; and also for the purpose of getting his Excellency's instructions to the Board of Works to have a calculation and statement made of the expense of a survey of the intended line of railway from Dublin to Blacksod and Broadhaven harbours by Mullingar, Longford, Granard, Carrick-on-Shannon, Boyle, Ballina, Castlebar, etc., and from Mullingar to Galway, by Athlone, Ballinasloe, etc. His Excellency received the deputation most graciously, and stated that he would communicate with the Board of Work.—*Dublin Packet.*

The Brussels Journals contain accounts of the opening of the iron railroad between that capital and Antwerp on Tuesday. At half past 11 o'clock, the *Belge* steam-tug started towing after it 12 carriages in which were the Ministers, the Governor, the municipality, and other notables of the city. These were followed by *Stephenson*, drawing an infinite number of vehicles containing the provincial authorities and other persons invited. They stopped an hour at Malines, where the whole party partook of an elegant breakfast. The convoy then proceeded to Antwerp, where, on arriving at the suburb of Borgerhout, it was received by the King and Queen, who were under a tent, and surrounded by their court, the foreign ambassadors, and other great personages. M. Roger, Governor of the Province of Antwerp, and the Burgomaster of the town, delivered addresses to his Majesty, who replied in suitable terms. The whole way from Brussels to Antwerp was lined with troops, and notwithstanding the rain fell in torrents, an immense concourse was assembled to view the ceremony. The carriages were all richly adorned with Belgian, French, English, and American flags and other decorations.

Last week an experiment was made in the Champs-Elysees, in the presence of a Committee of the *Societe d'Encouragement pour l'Industrie Nationale*, and a number of engineers, on the possibility of running wagons on iron railroads, having curves of a radius less than 50 metres, at an extraordinary velocity, according to the system of M. Laignel. A wagon weighing 500 kilogrammes, loaded with 1360 kilogrammes of paving stones, started on an inclined plane of one decimetre in every metre, went safely along a curve of 32 metres in length at the rate of 15 leagues an hour; without going off the wheel way, though the outer band of the ridge was not more than one centimetre in height, and was the only opposition to the centrifugal force. The trial succeeded perfectly, and appears to have resolved a difficulty which has hitherto been considered as insuperable. The system of M. Laignel is extremely simple and is applicable to all railroads.

Notwithstanding the very heavy rains during the whole of the past week, and the present difficulty of access to the commencement of the London and Greenwich railway, as well as the company having been able to work only one engine and seven carriages in a train, the receipts of the week amounted to 550*l.* 17*s.* 6*d.* —*Courier.*

Accounts of the 23d ult. from Rome mention that it is in contemplation to establish regular steamboats between the mouth of the Tiber and Naples. M. Torlonia, the noted banker, is at the head of the company organising for this enterprise.

A letter from Trieste of the 19th ult. says:—"Yesterday the steamboat of 100 horse power, which is to be employed as a packet between Constantinople and Galatz, left this port for Smyrna. The passage will it is said, be made in six days. She will touch at Corfu and Athens."

Arrangements are making on the London and Greenwich Railway to convey 300 passengers at a trip at Easter Fair As the carriages make four trips per hour, this would give 13,200 persons; and as this may be fairly doubled during the holidays, we do not think it too much to suppose that they may carry 26,400 persons *per diem.*—*Chronicle.*

Few persons would even ten years ago have thought of making a tour in the Levant and round the Mediterranean in 74 days including a sojourn of 51 days in 15 different places. An advertisement in this day's Journal announces the above interesting voyage to take place in May next, from Marseilles, in a splendid steamboat, having every accommodation and luxury that can be desired by the most fastidious traveller. This novel and attractive design will doubtless meet with great encouragement.—*Galignani Mess*

The expense of keeping the Bath turnpike roads since the appointment of Mr. M'Adam as general surveyor, in 1826, has been so reduced, as to enable the trustees, with an increase of only 18,000*l.* to the debt, to lay out nearly 45,000*l.* in lowering hills and making new roads, entirely to give up the statute labour, to reduce the tolls upwards of 3,700*l.* a year, and to remove several of the toll gates.—*Standard.*

The *Augsburgh Gazette* gives the following from Holstein, dated the 17th inst.: "A report is spread of the English company having found a more direct road for the commerce of the Baltic: they propose establishing a railroad to begin at Glukstadt, and end at one of the Baltic ports, probably Kiel. The circuitous course of the Elbe by Hamburg would thus be avoided, and considerable duties upon the transit of goods would be economised. Some steps have already been taken with the Government upon the subject; the report, however, merits confirmation."

RAILROAD AND CANAL INTELLIGENCE.

Railroad from Alton to Galena.—The Charter is a liberal one. The capital stock to be $1,000,000, and power to increase it to any amount. The Company is not required to pay any bonus or tax. The road to be completed in ten years, or at least one-fourth part. This road will pass through the most wealthy and fertile part of our State. Galena, the Potosi of Illinois, is for upwards of six months in the year, shut out from market by ice and low water. This country, which has such a vast hidden treasure in its bowels, will not be shut thus long from market. By this road we will be enabled to send our surplus produce to a near and safe market. We will at some future time take this subject and try to show the great necessity and importance of this work.—*Rushville Journal.*

Detroit and St. Josephs Railroad.—We hear favorable accounts of this road. No pains have been spared to advance the undertaking.

It is expected that the road will be finished as far as Ypsilanti by the first of January next.

Railroad from Pensecola to Columbus.—Major Graham of the U. S. Eng. is engaged in locating this road. Much of the iron is contracted for, as also six locomotives from Lowell.

St. Andrews and Quebec Railroad.—The agents sent to London to obtain an appropriation for the survey of this road have succeeded.

Lord Glenelg the colonial minister with the consent of the king having appropriated 10,000*l.* for the expenses of the survey.

This liberality has called forth the proper

spirit. The following is from the Morn. Courier, Montreal.

It is gratifying to learn that the inhabitants of New Bsunswick are to lose no time in making the proper use of the 10,000*l.* lately granted by government for the purpose of effecting a complete survey of the St. Andrews and Quebec Railroad. A letter from Mr. Wilson, of St. Andrews, (N. B.) to Mr. Auldjo, of this city, explanatory of the steps the Railway Committee are about to take is subjoined :—

St. Andrews, June 14, 1836.

Dear Sir,—You will ere this have received a plan and prospectus of our projected Railroad, from this place to Quebec, and probably have heard of our expectations having been so happily realized by our noble government in England, granting us 10,000*l.* the more fully to explore and ascertain the practicability of making the road. And we have the strongest assurances from Government, that on this point being ascertained, we shall not be disappointed in the grant of Crown lands through which this road will pass; as well as aid in money from our Casual and Territorial revenue. With these high favors we are fully confident of ultimate success in this great work.

A deputation is now at Fredericton advising with Sir Archibald Campbell, our Governor, so as to make the necessary arrangements for the exploration.

We purpose to begin at Point Levi, and from thence proceed the whole route to St. Andrews. As the season is advancing, we wish not to lose any time in commencing the survey, and the invaluable services of Captain Yule we fully calculate on, and as many other scientific gentlemen to be selected at your City and Quebec, as may be necessary for the work; the object, therefore, in taking this liberty is to ask the favor of your communicating with Capt. Yule, and should he be absent from your City, be pleased to address him advising him of our wishes: and that a Deputation will leave here in eight or ten days for Quebec via. Montreal, with a view of the necessory arrangements for starting to the exploring party; when they will have the honor to wait upon you. I am, very respectfully, &c. yours,

John Wilson.

George Auldjo, Esq.

Rome and Watertown Railroad.—The preliminary survey of this road has been undertaken by W. Dewey, Esq. of this city, assisted by R. F. Livingston formerly of the St. John and Laprairie road.

This road will be one of many intersecting this region, and destined to bring into play the resources of this section of country.

From all that we can learn it is evident that the proper spirit is about to prevail in Watertown on this subject.

It is needless to insist upon the advantages of the location of this place, recent sales of land in the vicinity having satisfied capitalists on that score.

Improvement of Muskingum river.—The survey preparatory to this improvement has been undertaken by Charles Hill, Esq. of Zanesville. The selection of this gentleman appears to find general favor.

We perceive by the following extract that Major McNeil, Chief Engineer and Agent of the Boston and Provicence Railroad has resigned his situation.

This gentleman has charge of the Long Island road to which it is said he is about to devote his entire attention.

The compliment is deserved, and shows how highly Major McNeill is esteemed.

Extract from the Records of the Boston and Providence Railroad Company, June 11, 1836.

Voted, that the resignation of Major McNeill, as tendered in his letter of May 28th be accepted, and that the following vote of thanks, and for the payment of his salary to the 1st of July next be communicated to him by the President.

Voted unanimously, that the thanks of the Board be presented to Wm. Gibbs McNeill, Esq. for the distinguished ability and fidelity with which he has conducted the affairs o. the Corporation as their principal agent and engineer; and the gentlemanly deportment which he has uniformly displayed towards all the officers of the Company.

Voted unanimously, that the salary of the principal Agent and Engineer, be continued until the 1st of day of July next, and the Treasurer is hereby directed to pay the same accordingly.

Office of the Boston and Providence Railroad Company.
(Signed) Wm. W. Woolsey, Pres't.

From the Times.

RAILROAD AND TRADE UP THE CONNECTICUT RIVER.

The obstructions in the navigation of the river above, are only so many arguments for entering heart and hand in favor of a Railroad through the valley. The further north we go, we find that the number of merchants who visit this market decreases and that the amount of merchandize freighted up the river, is as compared to the amount sold there, exceedingly small and to a great degree composed of salt. The reason why more of other articles are not purchased in this market, is not because they cannot do as well as they could elsewhere, but because they cannot get them home in season to meet the demand, and are therefore compelled to transport them by land from other markets.

Limited quantities of light goods are sold to go up into the upper section, but they are reluctant purchasers of them. It may be said that whatever success the merchants here have experienced in the sales of such goods, has been entirely owing to their untiring activity and persevering energy to induce the up river trade to make our city their market.

In 1831 and 1832 when an effort was made to offer increased facilities for getting goods up the river, and with greater despatch, many of the traders who had not previously been to this market, were persuaded to try it for their light as well as heavy goods, but high water and the usual difficulties of navigation at the canals and sand bars, caused such delays as finally exhausted the patience of the sufferers. It has now retrograded nearly to the old spot again. The quantity of salt heretofore freighted has been large and as a general rule, been bought, not because it was wanted immediately, but to make up a full freight for the boats, and kept on hand from the summer months until wanted in the winter. During the past two years an important change has occurred in the price charged by the transportation lines from Boston on this article. They engage to bring salt to the door of the merchant for the same price per ton as is charged on the river, or deliver it at a certain price per bushel, at their option.

For instance to Wells River, the river price is 60 cts per bushel, or \$15,00 per ton. The transportation lines deliver salt at \$15,00 per ton or at one dollar per bushel including cost in Boston. The preference already shown by some to the transportation lines, is extending to others and will not only be felt here, but also by the proprietors of the locks and canals in their receipts for tolls. The moment this is taken away from us, just so certain will the trade for others follow, because it is an important article, on which the boats rely to make up the deficiencies of other freight and also in order to make constant and regular trips.

On freight from Wells River to Hartford the expense for labor as compared with the tolls, is 1 to 4½ for every five dollars and a half paid out. On freight going up the river for every twelve dollars, labor compared with the tolls, is as 4 to 2½, making on an average up an down, the charge for tolls about the same as for labor, which to say the least is unfortunate for the business of Hartford. The distance to Wells River is 190 miles and the charge for freight on a Railroad, as charged on others which have paid semi-annual dividends of four per cent, would be \$13,60—whereas it is \$15,00 up \$7,00 and down the river. If we can open facilities by which the merchant up the river can have his goods deliverd early and late with certainty and in a given time, they will all come this way for their light and heavy goods together, nor would a trifling difference in expense on their light goods deter them from using a Railroad. Light goods are as essential to the transportation lines to make them profitable, as salt to the boats on the river.

It is fresh in our recollection what the state of navigation was on the river last year after the first of July, and the vast amount of property that was prevented from arriving here until this spring, altho' it was ready to come and part of it on the way as early as September and October, yet no effort of ours can overcome them, nor counteract the causes which prevent the merchants from using the river for the transportation of certain descriptions of merchandize.

Salt carried up in 1834 was not all sold until this spring, also some in 1835 was not all disposed of a few days since;—owing to the low price it was freighted across the country from Boston. These things require the serious consideration of our citizens in view of the future prosperity of Hartford as well as of the merchants engaged in the trade. Something ought to be done to arrest the emigration of our active and enterprising young men to the west where facilities for communication with the interior from the seaboard, and our great lakes and rivers, are multiplying every year.

It is probable a Railroad would only be used for carrying passengers and light freight; now if this is true, why can we not expect a rapid increase of the northern trade for all descriptions of goods, and that the river would still be used for the transportation of heavy articles of merchandize; and in fact be augmented beyond its present amount as soon as the Railroad was completed? If the proprietors of the locks and canals would consent to a reduction in the price of tolls and ration it in equitable proportion among themselves, would they not benefit themselves as much as the steamboats between here and New York did in reducing the fare from five to three dollars?

QUECHEE.

THIRD ANNUAL REPORT TO THE DIRECTORS OF THE UTICA AND SCHENECTADY RAIL ROAD COMPANY. MADE BY THE COMMISSIONER, JUNE 6, 1836.

REPORT.

To the President and Directors of the Utica and Schenectady Railroad Company.

Gentlemen—I herewith submit the following report of disbursements in constructing the road of this company, its present condition and future prospects.

1. *Of Disbursements.*

The total amount of monies expended by me at the last annual meeting of the board, was		$266,435 11
Since then, up to the period of my last settlement with the Treasurer, on the 30th ult., I had disbursed		698,126 15
Making a total of		964,561 24
Of this sum there has been paid, For preliminary surveys,	16,730 83	
Engineering,	35,297 57	
Lots purchased and appraised in the city of Schenectady, and the expenses of procuring titles,	39,382 87	
Do. do. at Little Falls,	34,381 34	
Do. do. at Utica,	15,237 45	
Other lands, fencing,* damages and procuring of titles,	182,734 71	
Grading, including alteration of turnpike,	324,141 87	
Masonry,	62,790 73	
Slope or river wall,	17,924 41	
Bridges,	61,003 71	
Red Cedar timber,	40,619 54	
Timber other than red cedar, and exclusive of that used for bridges,	48,143 77	
Superstructure of road, including transportation of materials,	34,160 14	
Coaches and wagons,	18,390 32	
Carriage houses, barns, shops and other depot buildings,	23,039 82	
Printing, stationery and advertising,	716 06	
Fuel for locomotive engines,	2,539 69	
Miscellaneous expenditures, including salary of commissioner,	7,236 51	
From which is to be deducted, one half the cost of the depot grounds at Schenectady, to be refunded by the Mohawk & Hudson Railroad Company,	6,375	
The monies advanced on the appraisal of the depot grounds at Utica, which are to be refunded by individuals owing real estate in that city,	8,840	
Fuel purchased for locomotive engines, chargeable to the transportation account,	2,539 69	
And monies advanced for red cedar for the second track,	5,000	
		22,754 69
Leaving		$941,806 55
The Treasurer has also advanced on account of Iron,	150,084 62	
Southern pine rails,	35,667 54	
Locomotive engines,	25,705	
And for miscellaneous purposes,	10,061 61	
		221,518 77
Making a total of		$1,163,325 32

* The fencing in a great proportion of cases is to be perpetuated by the owners of adjoining lands—a covenant having been inserted in their conveyances to that effect, and an extra compensation allowed therefor.

With the monies thus expended, all the necessary lands, with a slight exception, have been purchased—the fencing, grading, masonry, and bridges nearly completed—the iron plates procured—nearly two thirds of the timber and superstructure for a single track paid for—and an important advance made towards engines, carriages and depot buildings.

2. *Of the present condition of the Road.*

With a few unimportant exceptions, the road is graded for a double track from State street in Schenectady to the terminating point at Utica, and about two thirds of the surperstructure of a single track completed. Had the Oswego and Seneca canals been open as early as usual, and the navigation of the latter remained uninterrupted, so that the timber under contract could have been received within the time originally contemplated, the road would have been put in operation as early as the 15th or 20th of July. But the delays incident to this interruption will prevent the running of carriages until about the middle of August; when it is believed the whole line will be in readiness for the conveyance of passengers. Preparatory to this, five of the eight locomotive engines ordered last year will be placed on the road, and the remaining three delivered soon thereafter.—Added to which, fifty pleasure carriages, carrying 24 passengers each, and fifty wagons for the accommodation of emigrants, are nearly completed. Arrangements are also making to construct, without delay, an additional track of from 12 to 15 miles long, equi-distant from Utica and Schenectady—so that until the second track shall have been finished, a convenient passing place of sufficient extent may be afforded, to prevent any delay in the transmission of passengers. But with a business of such magnitude as already exists on the line of this road, and which must be greatly augmented whenever it is opened, it will undoubtedly be found important to complete the second track at as early a day as may be practicable. That the period of such completion should not be extended beyond another season, I believe will be admitted by all who are conversant with the amount of travel through the valley of the Mohawk.

From the unusual depth of snow which fell during the last winter, it had been anticipated that on the breaking up of the Mohawk and its tributary streams, the rail road would receive serious injury, and much pains had been taken to open the ditches and culverts in exposed localities, and guard the bridges with stone and other burthens. But the result has shown that even these precautions were unnecessary. No injury whatever was experienced; but on the contrary, the gratifying evidence furnished, that the road will always be beyond the reach of the ordinary annual freshets, and probably beyond any that will ever occur.

3. *Of the cost of the Road.*

The amount already expended, on account of construction as heretofore stated has been $1.163,325 32

The estimated cost of completing the single track and putting the road in operation, is as follows :		
On the first division, extending from Utica to the Nose, so called, in Palatine, about 46 miles, agreeably to the estimates of Mr. Higham, the resident engineer,	$70,850	
On the second division extending from the Nose to the Ballston road in Glenville, about 30 miles, agreeably to the estimates of Mr. Lee, the resident engineer,	33,150	
On the third division, extending from the Ballston road to State street in Schenectady, agreeably to the estimates of Mr. Lake, the resident engineer,	38,707 15	
Balance for engines and putting them in order, about	31,000	
Do. for carriages and wagons,	37,281	
Do. for timber, including the central branch of fifteen miles, about	20,000	
Do. for iron, about	5,000	
Engineering,	8,000	
Horses,	5,000	
Harness,	1,000	
Miscellaneous, estimated at	5,000	
		254,998 15
To which must be added the purchase of the Mohawk turnpike, required by the charter of this company,		62,000
Total,		$1,480,323 47

Calls to the amount of $1,500,000 having been made of the capital stock, no further payments from the stockholders will be necessary during the present year. The laying of a second track and an increase of engines and carriages to correspond with an increase of business, will probably require an expenditure of the residue of the capital. I have therefore, in the estimates which follow, assumed as a basis, that the road, when completed, will cost $2,000,000. That it will not exceed that amount, I think is evident from the expenditures and progress already made in the work.

4. *Of the future prospects of the Company.*

On this subject, I have seen nothing to change the opinions expressed in my first annual report. On the contrary, much has transpired to render it highly probable that the statements then made will be fully realized. If any proof, indeed, were wanted, that the travel on this road would equal the anticipations then entertained, it might be found in the great increase which has since taken place, and which must continue to increase, not only from the rapidly growing population of the west, but from the many facilities which are now in progress to render the communication between the western lakes and the Hudson river easy and expeditious. The remaining links in the great chain of railroads from the Hudson to Buffalo having been authorized by the legislature at its late session, it can hardly admit of a doubt, that in less than three years the line will be completed, and the transportation of passengers by steam effected on the entire route. Should the road from Lake Erie to the Ohio river, recently commenced, be completed within the same period, this, with the Saratoga and Washington road now in progress, will form an uninterrupted communication in the interior by steam from Quebec to New Orleans, less in extent by several hundred miles than the routes usually travelled at the present time.

Considerable pains have been taken to ascertain the number of persons who passed in stages and canal boats between Utica and Schenectady during the last year.—From the packets and stages official returns have been received; but from the line or freight boats nothing of a definite character has been obtained. The collector at Little Falls, it is true, was requested to procure voluntary returns from these boats, and performed that duty as far as was in his power; but as the proprietors commute with the state at a sum in gross for passengers—were interested in withholding correct information—and were under no obligations whatever to make returns, it is evident that the statements made by them were very imperfect; especially when the number of passengers reported falls so far below the estimates of numerous persons on the canal familiar with this kind of travel. Even the collector himself is satisfied that many boats passed from which no information was received; and that from others, the returns made, and especially from those passing in the night, were much below the actual number. Still, from the information thus obtained, the passengers over 12 years of age, reported to him from the 25th of April, ten days after the navigation had commenced to the close thereof, amounted to 76,463. One of the lock tenders at the same place counted the passengers for a limited period, and fixed upon 750 as the daily average for the season—a number corresponding with the views of several other well informed persons. This number, allowing the canal to have been navigable for 220 days, made an aggregate of 165,000. The amount of lockages during the season at the lock in charge of the tender here referred to, was 24,982, corresponding precisely with the lockages at Fort Plain, as reported to the canal board. Of these lockages, about 2600 were of packets and cribs, leaving a little more than 22,000 of freight boats. Most of these boats carried passengers, and many of them to an extent nearly equal to the packets.—Supposing, however, that one third were confined exclusively to freighting, and that the remainder had an average of 10 passengers each, the aggregate would have been 146,670

The number of passengers in the packets and stages during the year was	53,560
The number passing over the turnpike in private carriages, who would take the railroad when completed, has been estimated at	5,000
Total,	205,230

Of this number, it is believed that two thirds, or 136,657, would take the pleasure carriages, and the remainder, or 68,333, the wagons.

In my first report, I gave an estimate of the annual expenses and repairs of the road. That estimate was based, in some measure, on an experiment which had been made on the Saratoga road, and a detailed report of a committee of the directors, showing the probable cost of transportation and repairs. The sum fixed by them was $19,000; and two years experience have shown its correctness—the average expense of each year having been $18,520 62. I am also assured by the agent of the company, Mr. Costigan, (and my own observation enables me to concur with him in opinion,) that the sum thus expended and the power employed, (in carrying freight as well as passengers,) have been amply sufficient to transport 200,000 passengers over the road—the number which I have estimated to pass between Utica and Schenectady annually. The length of the Saratoga road is 22 miles; that of the Utica and Schenectady 78. From the nature of the business on the Saratoga road, locomotive engines cannot be used economically for so long a period in the year as on the Utica road, and the cost of horses must necessarily be proportionately greater. The expenses, too, of conducting a short road bear an unequal comparison with those incurred on a more extensive route; so that four times the disbursements on the Saratoga road, or $76,000, though the Utica road is less than four times as long, would seem to be a sufficient annual provision for conducting the operations of the latter road. But to this I have added $33\frac{1}{3}$ per cent., making a total of $101,230.

The present price of conveying passengers in the packets and stages between Utica and Schenectady is $3,50, and in the line boats exclusive of meals, from $1,20 to $1,50. The rail road company, by their charter, are authorized to charge 4 cents a mile, or $3,12; but as experience has shown that a moderate fare is always attended with more prosperous results; that competition is in that way more effectually

avoided, and the prejudices existing against incorporations of this character materially lessened, it will doubtless be deemed desirable by the directors to fix upon such a standard of prices as shall accomplish these objects. In this report I have supposed the fare in the pleasure carriages to be $2,50, and in the waggons $1.

Allowing, then, that these estimates are within proper limits, and that the present travel through the valley of the Mohawk will be transferred to the rail road, the following abstract will show the result:

136,667 passengers,	at $2,50	$341,667
68,333 do.	at $1	68,333
		$410,000
Deduct for annual expenses and repairs,		101,230
Leaving		$308,770

or a little more than 15 per cent. on the entire capital of $2,000,000, admitting the whole to be expended.

In the foregoing, no allowance is made for an increase of travel, nor for the transportation of the mail, both of which may be anticipated. With no other than the present means of conveyance, the increase of passengers through the valley of the Mohawk has been from 20 to 25 per cent. per annum for several years past; and that it will be greatly augmented when this road shall have been put in operation, there can be no doubt. From the permission given by the legislature to the Syracuse rail road company to carry freight, on paying tolls when the canal is navigable, it is fair to presume too that a similar permission will be granted to this company. But I have made no account of these matters.—The increase of travel will doubtless provide for any diversion that may take place; and the carrying of freight would afford a fair remuneration whenever the canal was closed, and the transportation of passengers limited. But without these, it will be seen, if the foregoing estimates are entitled to consideration, that few, if any roads will possess an equal value. Indeed, the great and increasing travel through this general avenue from east to west; the highly favorable formation of the country, not only for a cheap structure, but for an economical prosecution of business; and the rich and variegated scenery, of the valley through which it passes—all combine to render it morally certain that this will be one of the most lucrative as well as interesting public works in the Union.

In closing this report, I should do injustice to my own feelings, were I to omit a reference to the engineer corps in the employ of this company. Under the direction of Mr. Young, the chief of the department, aided by his valuable assistants, the road has been prosecuted in a manner highly creditable to their talents and enterprize, and with an economy unsurpassed on any public work. Indeed, the expenses of construction, notwithstanding its complex character, have not exceeded the estimates of Mr. Y. originally furnished to this board—a result as novel as it will prove gratifying to every stockholder. Excepting the purchase of additional grounds, the erection of fixtures, and the advances made to land owners for perpetuating division fences, not then contemplated, the early pledge which was given relative to the cost of this road will be fully redeemed, and its operations commenced under the most favorable auspices.

I am, gentlemen,
With great respect,
Your obt. servant,
G. M. DAVISON, Com'r.
U. & S. R. R. Co.
June 6, 1836.

[Concluded from our last.]

IMPROVED MODES OF PREPARING CHARCOAL.

AUTHORITY.—DUMAS' Chimic appliquee aux arts.

In consequence of the great waste of charcoal, in the usual mode of preparation, and the entire loss of the volatile matter, two modes have been contrived, in either of which the quantity of charcoal obtained may be almost as large as in iron cylinders, and the volatile matters may be collected.

The first of these is best suited to the hard woods which contain but little sesinous matter. This operation is performed in a kiln of the shape of a cylinder, or rather a truncated cone, whose larger base is uppermost. It may be built of sods or tenaceous earth above the natural surface of the soil, but may be more conveniently excavated to such a depth that the earth thrown out may serve to form the upper part of the enclosure. In the only instance in which we have seen it employed in this country, namely at the West Point Foundry, the excavation is lined with brick.

In order to admit air to the kiln, when made by excavation, for the purpose of maintaining the combustion. tubes of earthen ware or cast iron, are carried down from the surface of the ground to the bottom of the excavation; these lie behind the lining, and are either passed through it near the bottom, or enter small brick vaults, which communicate with the interior of the kiln. The kiln may be closed at top by a cover made of sheet iron, to support which when the lining is not of brick, a ring of bricks must be placed around the top of the excavation. The cover must extend on all sides three or four inches beyond the opening of the kiln, in order to have a sufficient support. In this cover there are several openings, one at the centre, the others near the circumfrence. Through each of these a short tube or flue of sheet iron passes, and the several tubes are furnished with stoppers of iron.

The size described by Dumas is 10 ft. (French) in diameter, and nine feet deep. The central tube is nine inches in diameter. The number of these at the circumfrence is four, each four inches in diameter.

That used at the West Point Foundry is 12 feet in diameter and 9 feet deep.

In order to condense the volatile matter, one opening is made in the lining near the top of the kiln to which a tube of cast iron or earthenware is applied. This tube communicates with a small chamber built of brick, about 18 inches long, a foot in width, and 15 inches high, entering about the middle of its height. From the top of this chamber, proceeds a pipe of sheet iron, which after rising vertically 4 or 5 feet assumes a horizontal direction for about 15 feet more; at this distance there is no fear of fire, and the rest of the pipe may be of wood. The extension of the pipe communicates with a condensing apparatus, on the principle of Woolf, but which may be formed of common barrels.

In charging the kiln with wood, a post whose height is equal to the depth of the excavation is set up in the middle, and supported in its place by a heap of fragments of charcoal. A number of the larger logs are chosen and laid on the bottom of the kiln in such a manner as to form radiating flues terminating at the places when the air tubes pass through the lining. Across these a horizontal layer of logs is laid. The radiating logs must neither touch the post or the lining of the kiln, the secondary layers extend from the one to the other Layers are then placed in succession in such manner as to leave as little empty space as possible, particularly near the circumfrence, until the kiln is filled. The kiln having been charged, the post is drawn out of the middle, the cover set in its place, and coated to the depth of not less than two inches with dry earth.

The stopers being withdrawn from the flues in the cover, lighted charcoal is pourd down through the middle tube; this falls through the space left by the post, to the heap of charcoal by which it was steadied, and sets it on fire. The central flue is then tightly closed, in order that the draught may be directed toward the outside of the mass of wood. In order to make the joint of the stopper tight, it is luted with plastic clay. The other flues begin to discharge smoke, which is surrounded by flame. As soon as the flame ceases to have a blue color, and becomes white and clouded, the flues have their stoppers loosely applied to them, and the openings of the descending air tubes are diminished. The draught will thus be directed to the condensing apparatus. But if the collection of the acid be not intended, the tubes in the cover are but partially closed. The combustion may be regulated within the kiln by the air tubes and those in the cover. Thus, too rapid an action in any one part may be checked by completely closing the several air tubes and the opposite flue; and if it be too slow, these must be opened as far as possible until the action be restored.

For a kiln 10 by 9 the operation occupies from 60 to 80 hours, and is known to be complete when the upper layer of wood appears to be incandescent; when this has taken place, the stoppers of all the openings except that of the central flue are removed for a short time, and a quantity of hydrogen will be expelled which if does not injure the quality of the charcoal, would render it less saleable. As soon as the peculiar flame of hydrogen ceases, all the openings, both of the air tubes, and flues, must be closed by shuting their stoppers with clay, and covering them with caps of sheet iron containing clay. The dry earth is removed from the cover, and it is plastered with earth mixed

with water. The charcoal thus shut up will take 60 or 80 hours to cool.

A plan and section of this description of kiln is represented in Fig. 1, 2, 3, 4 and 5.

Fig. 1 and 2. Being plan and section of one formed in an excavation, and

Fig. 3 and 4. Of one built above ground.

Fig. 5. Cover of sheet iron applicable to either.

A. Interior of kiln.

B. Wall or lining of earth.

C. Chamber in which the tar may be condensed.

d. Pipe leading to the condenser for pyrolignous acids.

e, e, e. Air-vaults.

f, f, f. Openings by which the external air is admitted.

At the Bennington Furnance, a kiln of similar form was constructed of brick, above the level of the ground and covered by a permanent dome of brick. In the wall a door was left for the introduction of the wood and this was subsequently bricked up. Vents were formed by leaving bricks loose in the wall and when the process was complete the fire was extinguished by means of water. An unexpected benefit was found to arise from the latter operation, for the coal becoming charged with aqueous vapour, was as fit for immediate use, as that which had been prepared for several months.

It is estimated that the product of kilns of this kind in France is about 25 per cent. more than in a coal pit. The experiment at the West Point Foundry was more advantageous, the product having 50 per cent. more than was obtained in the usual method. In France the main object was the pyrolignous acid, which at West Point was neglected, and this difference in the object will account for the difference in the results. The mode of placing the wood was also different, the French using that which has been described above while at West Point it was placed vertically.

In the pine forests of Sweden, an apparatus better suited to the collection of the turpentine that kind of wood furnishes, has been invented by Schwartz. This kiln is composed of a vault, built of brick or silicious stone laid in a mixture of clay and sand. Common mortar must not be used as it would not only be affected by the heat, but would be completely destroyed by the pyrolignous acid. The vault is closed at each end by a vertical wall of the same kind of masonry. The floor of the kiln is of earth, and has the figure of two planes slightly inclined, and meeting in a gutter in the middle of the longer sides of the vault. In each end wall are two fire places, and in one of them are four openings for introducing the wood and withdrawing the charcoal. The smoke and vapour are carried off by flues of cast iron at the level of the ground, and proceeding from the middle of the larger sides of the vault; these terminate in channels where the vapour is condensed and which convey the smoke to two vertical chimnies. A section of this kiln is represented in Fig. 6.

The advantage of this arrangement is, that no air can enter the kiln without passing through the fire places which are kept full of burning fuel; and that the fuel which is best suited for this purpose, (small branches and twigs,) is useless in making charcoal. In placing the wood, the pieces are laid parallel to the largest sides of the vault, and in such manner as to leave as little space as possible except in the neighbourhood of the flues, which must be kept free for the escape of the smoke and vapour. Two days are sufficient to convert the wood into charcoal, and the end of the process is known by the appearance of the blue flame of carburetted hydrogen at the chimnies. The whole of the openings are then closed and luted with clay.

At the end of two days, two holes left for the purpose in the arch of the vault, but which have during the process been carefully closed, are opened and water thrown in to cool the charcoal; these holes are then closed again. At the end of three or four days more, one of the doors in the end wall is opened and more water thrown in, but the charcoal will not be ready to be removed until all the external parts of the apparatus have become as cold as the surrounding air.

This kind of furnace has been much used in Europe, and the quantity of charcoal obtained is one third more than is obtained from coal pits. The turpentine and arcetic acid are also saved, which in other cases are lost. There can be no doubt that it might be introduced to advantage in those parts of our country where iron is manufactured by means of charcoal prepared from pine wood.

In using kilns of either description it becomes a matter of calculation whether it be cheaper to manufacture the charcoal in the woods in the usual manner, or to carry the wood to the kiln. The weight of the charcoal to be transported will be only 17 parts of that of the wood; while the charcoal obtained by the kilns will be certainly one third more than that procured from the pits. It must therefore appear that the value of the additional charcoal shall be at least equivalent to the cost of transporting the wood to the kiln. It is also to be remarked that charcoal prepared on the spot where it is to be used is better than that which has here been handled and carried over rough roads, and that all waste is avoided.

We hand the following article over to Mr. E. F. Johnson, as he is the proper person to answer them, and both able and willing to do so as far as we can judge.

From the New York American

SHIP CANALS.—From reading the notice in your valuable journal I was induced to examine the maps of the proposed New York Ship Canals; the one accompanied with a valuable memoir by Capt. W. G. Williams, of the U. S. Topographical Engineers, for a communication around Niagara Falls. It appears that Capt. Williams estimates one route which he recommends at \$4,744,982$\frac{38}{100}$, and another route of 7$\frac{1}{4}$ (or 7.73) miles in length, between Porter's store-house on the Niagara river, above the Falls and Lewiston, at \$3,610,596$\frac{27}{100}$, which is at the rate of \$46,708$\frac{37}{100}$ per mile.—These estimates were for a canal of the dimensions of 110 feet width of surface and 10 feet deep, and the lockage is stated at 319½ feet.

The *Ship* or *Steamboat* Canal surveyed by E. F. Johnson, Esq. between Utica and Oswego, is estimated for a canal of 90 feet width of surface and 8 feet deep and has 180½ feet of lockage; the distance is 92½ miles and the aggregate estimate is \$1,131,-989, which is at the rate of only \$12,237$\frac{71}{100}$ per mile. I wish to inquire whether there may not be some error in this estimate? and if it be possible to construct a ship canal of these dimensions at a less sum than \$12,-500 per mile? This estimate is but a little more than one half the cost of the construction of the Chenango Canal with wood locks, is less than half the cost of the construction of the Utica and Schenectady Railroad, and, if I am rightly informed, about one fourth of the cost of the Railroads that lead in three directions from the city of Boston. M.

We publish the remarks and queries of M, leaving the answer to those who have the requisite knowledge and disposition to give it.

We take pleasure in giving publicity to the following letter, from Mr. Beach, the Engineer who examined the route for the proposed Railroad from Morristown to Carpenter's Point:

(COPY.)

Catskill, May 20, 1836.

SAMUEL PRICE, Esq. Branchville, Sussex Co., N. J.

Dear Sir—At the request of the Board of Directors of the Morris and Essex Rail Road Company and a committee of the inhabitants of the county of Sussex, composed of yourself and others, I devoted Wednesday, Thursday and Friday of last week, in the examination of the proposed route for a railroad from Morristown through Sussex county, to Carpenter's Point, preparatory to making a survey of the same, which I shall probably be able to commence about the first of June next; but supposing that you would be glad to have my views of the subject previous to that survey, I embrace the first opportunity that I could possibly devote to that object, since I saw you, to communicate them.

On my way up, I passed through Rockaway, Berkshire Valley, thence on the east side of Hopatcong Lake, to Sparta, and thence via Lafayette to Branchville; from Branchville up the North Branch of Paulins Kill, through the gap of the Blue Mountain, called Culver's Gap, approaching the Delaware River a short distance above Milford, and along the same to Carpenter's Point. Returning, a more northerly route was persued. Leaving the Delaware at Carpenter's Point, ascending the slopes bounding the valleys of the Little and Big Flat Brooks, to Culver's Gap, from thence to Branchville, there is but one route. From Branchville, returning, two routes were examined, viz: via. Lafayette and Newton, passing at or near Andover Furnace, Stanhope, Dover, Rockaway, to Morristown; the route is, generally, a feasible one for the advantageous location and construction of a railroad. From Carpenter's Point, ascending to the summit of the Blue Ridge, in Culver's Gap, there are no difficulties to be encountered, and I am confident that, on that section, no grade need be adopted exceeding forty feet der mile, ascent, and if desirable may be

reduced below that. From the summit of the Blue Ridge at Culver's Gap, to Branchville, the grading will not be expensive, but a somewhat steeper grade must be adopted. From Branchville to Lafayette or Newton, and from thence to either Sparta or Andover, a level and cheap route can be obtained. Schooley's Mountain Ridge may be crossed from Sparta via the summit of the Morris Canal, on either side of Lake Hopatcong, to Dover; or from Andover Furnace, near Stanhope, to Dover, thence via Rockaway to Morristown, without encountering any objectionable steep grades, or very heavy expenditures in grading. Both the Blue Ridge and that of Schooley's Mountain and their vicinity, abounds with timber of an excellent quality for the superstructure of the road, which can be obtained at a reasonable or low rate. The country to be accommodated is rich in agricultural and mineral productions; it also abounds with water power, and has already numerous establishments for the manufacture of Iron in all its various forms.—There are also on the route several flouring mills, and other manufacturing establishments of various descriptions, all of which, with this road completed, will find upon it a cheap and expeditious transportation of their products to New-York market.

I am, respectfully, Your ob't. servant,
EPHRAIM BEACH, Civil Engineer.

We insert the following with pleasure. The information both as correcting erroneous statements and as furnishing details is worthy of notice. We most earnestly recommend to the attention of "speculative minds" the concluding warning of Mr. Hassler's letter.

From the Morning Courier & N. Y. Enquirer.

In your paper of May 26th, 1836, you have inserted an article entitled "*Zinc in New Jersey*," inviting to enterprise, in procuring the metal from the ore. The statements are not entirely correct. Allow me therefore, to furnish the public with better information to prevent mistaken speculations.

The pure zinc lately produced, has lain for centuries in the ore in Jersey, Pennsylvania, Maryland, (and most likely in many other parts of the country,) just as the finest marble statues are yet contained in the marble quarries of this country, needing only the artist to cut them out; but this cutting them out, enterprise and money alone will never effect; unless art also find its proper support to do it; and just as little will the speculation in money enterprise alone do it in zinc, without the necessary science of Metallurgy.

It will not only be interesting but instructive to give here the whole history of the production of the zinc in this country. As the whole was done *under my direction*, I may be allowed to be good authority in the matter.

Mr. John Hitz, Landamman, in the Grisons, (Switzerland,) a scientific miner, had many years ago produced the pure zinc from the Blende of Daros, which had never been done before, by a process entirely of his own invention, and different from all those practised in England, or on the continent of Europe. Soon his zinc sold at double price of the common material, and covered far around the roofs of the neighborhood. But the mine ran out, as it is termed, and about six years ago Mr. Hitz removed to this country with all his family. Passing with him through Philadelphia, about three years ago, Mr. Wetherhill showed us a specimen of Blende, from which he could not produce the metal. Mr. Hitz told me the procuring the pure zinc from it would be unquestionably successful.

In the last session of Congress, the construction of standard of weights and measures for the Custom Houses was ordered, and in continuance of my former operations of comparison, I was directed by the Secretary of the Treasury, to construct the same. Brass being the metal almost necessarily used for accurate Weights and Measures, it was a primary object to procure it of pure and good quality, for which the common spelter is not fit. It was therefore proper for me, to avail myself of the presence of Mr. Hitz, (then, and still occupied in the gold mines of Virginia,) to procure the pure zinc; this was done by his peculiar method, and by properly varying the process; with equal success upon the ores from the copper mines of Perkiomen (where the blende laid about as refuse,) from the ore (Franklinite,) of New Jersey, and from the High furnace near Frederic in Maryland. The "beautiful specimen obtained"!! from all three places together, are upwards of ten tons pure malleable metallic zinc, acknowledged far superior to the imported spelter, by all the importers and workmen in that line, who have seen it.

The amount already obtained being sufficient for the particular purpose of standards, the temporary furnace built for that purpose exists no more, as I needed the materials to build a brass casting furnace.

If any one should be willing to take up the subject in such a manner as to procure to the man who invented the process, and so successfully produced the results quoted, that reward of a solid establishment which is due to his knowledge and good character, I offer to serve as a means to obtain his co-operation; but I am in duty bound to warn mere speculators from engaging without that previous knowledge, which besides they will not find in any book, and trials will be ruinous, as proved by the previous failures. F. R. Hassler.

Washington City, May 28th, 1836.

AGRICULTURE, &c.

From the New-England Farmer.

INDIAN CORN MADE WITHOUT TILLAGE AFTER PLANTING.

By experiment, I have arrived at some conclusions in regard to the culture of Indian corn, which I think are of importance to planters in the Southern States. I communicate them for the use of the public with great hesitation, because they are directly at variance with the received opinions on the subject.

The early part of my life was spent in agricultural pursuits—and hence, if there were no other reason, I feel a deep interest in every thing relating to agriculture. I noticed, very early, the great difficulty in transplanting successfully the young corn plants. Whence comes this, but from breaking the roots in taking the plant up? How is it then that intelligent planters affirm the doctrine, that one chief object of ploughing corn, is to cut its roots? If breaking the roots of young corn in transplanting it, is really fatal to its future growth, must not breaking its roots with the plough, when it is older, and the season hotter be a serious injury to it? Any other conclusion seems to me to be at variance with the general economy of nature. It seems to me that there can be in truth, but two reasons for ploughing or hoeing corn—1st, to destroy grass and weeds; and 2d, to keep the soil loose, that the roots may penetrate easily, in search of their proper food. But in accomplishing these two purposes, great injury must be done to the corn, by breaking its roots. Can we not accomplish both these ends, and at the same time keep clear of the attendant mischief? I think we can.

Last spring I planted a small piece of poor ground—first breaking it up well. The rows were made three feet apart, and the stalks left about a foot apart in the drill. The ground had been very foul last year with crab grass, whose seed matured. The corn was not well up this spring before the grass began to appear. When the corn had about four or five blades, the young grass completely covered the ground, and the corn was turning yellow. I spread a small quantity of stable manure around the corn, and covered the whole ground three or four inches deep with leaves from the forest, taking care to do this, when the ground was wet, and the leaves also, that they might not be blown away, and to leave the tops of the young corn uncovered. In *ten days* there was not a particle of living grass to be found, and the corn had put on that deep bluish green which always betokens a healthful condition of the plant.

From the day the corn was planted until after the fodder was pulled, and the tops cut, nothing was done with it, and the result is a product at the rate of forty-two bushels to the acre—about one-third of the stalks having two ears on each of them.

I noted, in the course of the summer, the following facts:—

1st. The corn created thus, was always ahead of some planted along side of it, and treated in the usual way.

2d. It ripened at least ten days sooner than other corn, planted at the same time.

3d. During the hottest and dryest days the blades never twisted up, as did other corn in the neighborhood.

4th. In the dryest weather, on removing the leaves, the ground was found to be moist to the surface, and loose, as deep as it has been at first broken up.

5th. The heaviest rain had scarcely any effect in washing away the soil, or making it hard.

It certainly will require less labor to produce corn in this way, than in the usual mode. And even if it required more, we have the consolation to know, that while, by the old mode, every hour's work is an injury to the land, by this mode, every hour's work is making the land better; for few things can be better manure than the coating of leaves put on in summer, when ploughed in the winter and spring following.

I used leaves raked up in the forest, because of these there is an ample supply within the reach of almost every person, and the use there seems, from my observation, to be a strong antipathy between dead, and decaying forest leaves, and crab grass, that most harassing foe of agriculturists.

I make this communication, as I have already said, with hesitation, because the idea of raising corn without ploughing and hoeing, and at the same time improving the land, by protecting it against the influence of a scorching sun and washing rains, is so directly in the teeth of the universal practice for ages. The thing is, however, at least, worthy of further trial. It may lead to most important results.

Those who think the plan worth any attention, may easily make an experiment with an acre or two, and note carefullythe progress through the summer. If they are satisfied, after the trial, that there is any thing in it, to extend the operation will nor be a difficult matter.

If, on experiment, it should be found advisable to extend the operation, the proper way would be, I think, to collect the leaves in winter, and deposite them in heaps on the ground on which they are to be used, and the next spring during a wet season, after the corn is up, spread them, taking care to leave the tops of the young corn uncovered.

There is one very important result that must follow the success of this plan on a large scale—and it was with an eye chiefly to that result, that my experiment was undertaken. The constant excuse for not improving our land, is, that where cotton is grown, the time necessary, first to cultivate the growing crop properly—next to gather it, and then to prepare for a new crop, leaves the planter no time to collect manure. My plan will be to put an end to that excuse at once; for where leaves are to be had, half the time usually bestowed on working the corn crop in the usual way, spent in gathering leaves and putting them on the ground, instead of ploughing it, may in a short time accomplish every thing that can be desired in the way of manuring.

Why may not the same process answer in the cultivation of cotton? If it keeps the the ground soft and moist, and prevents the growth of grass and weeds in a corn crop, it will surely have the same effect with cotton—and be the means, further, of preserving the cotton, when the bolls open, from all the injury it sustains from the soil in wet seasons. This is, however, but speculation. Let it be tested by actual experiment.

JAMES CAMAK.

Athens, Ga. October 10, 1835.

From the Farmers' Register.

The season and state of crops.—From all the accounts before us, public and private, it is inferred that the wheat crop throughout Virginia, will fall short of half of an average crop—and that the whole wheat crop of the United States will be not much better than that of Virginia alone.—We subjoin in extracts from private letters, many of the facts that have reached us; but none of these, except the one from Halifax, Va., even refer to the latest and worst calamities, caused by the inundation of most of the rich and extensive river bottoms of Virginia and North Carolina. The great source of injury to the wheat, and which was anticipated as far back as last October, and expected then to be unusually destructive, was the Hessian fly. In addition to this, and to other minor evils, the very wet season latterly has done great damage, either by filling the soil with water, or entirely overflowing its surface. In the latter part of May, and first half of June, there were 21 days in succession, on which more or less rain fell—and some of these rains came in floods: and even since the close of this uninterrupted series, there has been an unusual quantity of rain. On high land, the usual estimates of crops expected, vary from one fourth to three fourths of an average. In some fewer cases, they are worse and better than these ordinary extremes, varying from nothing worth reaping, to nearly a fair product. Of the latter cases, very few have been heard of—and those not very lately. From the newspapers, we learn that in Buckingham and the nearest adjacent counties, the wheat was tolerably fair, and near Wheeling, still better; if so, these are the only parts of Virginia as much favored, of which we have heard. On our own farm, we cannot estimate the crop of wheat at more than the fourth of what the land could produce; and where the damage from the fly was the least, and the general growth the best, there the damage was the greatest from *scab*, or empty or dead parts of heads. The quality of the grain will be very bad.

But the rich bottom lands on our rivers have suffered most. These have all been covered by freshets, and to unusual depths. The Roanoke bottom lands have suffered most. The wheat there is almost entirely destroyed, as well as all other crops—and the soil itself, in many parts, has been carried off by the floods, so that the damage to the land is even of more amount than the entire loss of the year's crops.

Two more days (the 25th and 26th) have passed since the foregoing remarks were written, and on both rain has fallen profusely and heavily; the consequent increase of damage to the wheat will be necessarily great. Where ready for the scythe, it must be much beaten down and tangled by the heavy rain of last night; and where still green, there is danger of the rust coming to destroy much of the quantity and value of the small product previously expected.

June 27th.

RURAL SCENERY: THE THATCHED COTTAGE. BY JUNIUS.

There are but few objects in landscape scenery that form a more *rural* characteristic than the "thatched-cottage," by the side of a wood, which serves to protect it from the cold winter blast, and has the effect of a shady retreat for summer. To impart to the traveller pleasing ideas of the fertility and domestic comforts, blended with rural economy, of the country through which he passes, is, perhaps, one of the very best criterions of his opinion of the more rapid improvement and increase of the value of property; and the 'cot' spoken of is one of the sure features to attract his particular attention.

There is something about a thatched cottage which is always inviting, and reminds us of the comforts of life. I disagree with Dr. Johnson, who deems all things of a rustic nature, as the abode and choice of the unrefined; or, in plain words, expressive of rudeness in every degree.

I very much doubt if the greatest monarch is more intelligent, oftentimes, than those who dwell beneath a cottage of thatch; nor are his domestic comforts any more elevated or constant than the cottager, although fame extends his name to a more distant part, where rumor often falsifies his real charcter. The cottager rarely has any thing to fear on this subject, as his only object is to make *home* agreeable to himself and its inmates; and this effect being observable to the passer by, it engraves on his memory the *snug* appearance of the thatched cottage.

Snugness is not altogether the only feature displayed in such dwellings, but there is a character of retirement, blended with hospitality. By general observation, it will be seen that the sites of such dwellings are well chosen where the requisite comforts for domestic purposes are of easy access. Shelter and shade are the first consideration in this case, and are a grand feature, namely, the fine impression given on landscape scenery. The rustic construction of the cot is always pleasing when we can see natural materials in every way made useful, and not too much transposed into something, of which all recollection of its primitive state is lost, to appearance. The thatch, being of straw, reminds us of the utility it has been in another way—when the bearer of grain; and the rude unhewed post of the porch (on which twines the honeysuckle) of the use of forest trees The plan of the cot is mostly neat, and generally in the Gothic order, with the upper windows peeping out of the thatch. The approaches and appendages are always corresponding. The rustic arbor well covered with native grape vines that give a natural effect, and impart a luscious reward to the humble pruner. The approach is generally converted into neat and well kept flower-garden, which gives a healthy employment, or rather recreation, to an aged mother or some rosy cheeked prattling children, who are often seen strolling from their plot in quest of flowers to decorate the little parterre, transplanting them with care to their new habitations among, perhaps, some delicate exotics.

The vegetable garden, well filled with esculent vegetables and fruit, with a small orchard and meadow, are often appendages to the "thatched cottage." A running stream or brook in its vicinity gives a mellowness to the scene, and some rich verdant spots near the dwelling forms a part, of social effect, but seldom rivalled in landscape scenery.

Were I to choose a dwelling for retirement, when age wears off that activity and zeal from a life of bustle and business, it should be the cot above spoken of; not, gentle reader, that I would be conspicuous at that time of life, but because it would suit my desire. The wood would be a pleasing source for my researches of botanical specimens of native plants, and the trees and shrubs about my dwelling a fine retreat for the different kinds of birds which would visit my 'cot,' as their migrations suit their approach in the neighboring wood. The honeysuckle would impart, in the flowering season, a luscious repast to the little queen of birds—the humming-bird; and my flower-garden would serve to amuse my leisure hours in healthy employment. The fruit, raised by my care, would add to its flavor, and some to give to a friend, to friendship. A few choice books for my amusement, and to recall what had been seen and done in horticulture; and, at times, to read to relatives and friends, who should always find hospitality in my rustic manners, and the welcome repast of the wearied traveller, sums up my desire of a thatched cottage.

Junius.

New Jersey, April, 1836.

From the New York Farmer.

Question—Where you bound, stranger?

Answer—I am going to the Far West, sir.

Since my last which was written on my journey to Pittsburg, I passed some time in that flourishing city which approaches much nearer Burmingham in England, than you

would suppose any thing in this new country could; I descended the Ohio to Wheeling when I took the national road which is now completed to Columbus 74 miles from Wheeling. The country through which it passes until you reach Zanesville, is quite a hill and dale country, the farmers turning their attention to raising Tobacco, and some have large flocks of sheep, to the raising of which the soil appears peculiarly well adapted, that animal thriving much better on high and dry lands. After passing Zanesville, the country is more level and alluvial, the canal connecting the Ohio and Lake Erie, 300 miles in length, is very productive and the lands bordering have risen much in value, large entries of State and United States lands have been made in Ohio the past year, and the wealth of this State is increasing probably faster than any State in the union. Columbus the seat of government, is beautifully situated lying on very high land, the public buildings are numerous and what is particularly gratifying to the traveller, the public accommodations good particularly Noble's Hotel. As many of your readers are emigrating West, and as they generally prefer stopping short of "*the far West*" prefering Farms partly brought to a state of cultivation to those which are at less price and untouched, I will close this with statistical information of Ohio, and in my next give you that of the adjoining State of Indiana, hoping it will prove acceptable to your readers.

Ohio was organized as a State in 1802, though the first settlement was commenced at Marietta in 1788 by Gen. Putnam, and 46 six other hardy and enterprising individuals from Massachusetts, Connecticut and Rhode Island.

The river Ohio gave name to the State, although Historians do not agree as to whether Ohio means Beautiful River, and taken from the French explorers or Bloody River as the Indians designated it, at any rate it is a beautiful name for River or State.

Ohio contains an area about 200 miles square, being about 200 miles in extent from North to South and from East to West, being bounded north by Michigan and the Lake, west by the State of Indiana, and east and south by Pennsylvania and the Ohio river. The population may be safely set down as one half million of souls.

Literature is very flourishing. There are eight Colleges in this State besides many Academies and Literary Societies, Lyceums, &c.

Also a Deaf and Dumb Asylum, Medical College, &c. There are also upwards of one hundred newspapers printed in this State, a large proportion are published semi-weekly.

Canals and Railroads are constructing in various directions, as a very liberal policy seems to have been entertained towards works of this sort for some years.

There are also upwards of twenty Banking Institutions that are as well managed as Banks can be, and whose notes pass currently in all the adjoining States.

It is stated by an intelligent gentleman conversant with the fact, that Ohio enjoys one hundred and ninety miles of ship and steam boat navigation on the Lake, and four hundred thirty six miles steam boat navigation on the Ohio. These great local advantages, united with a soil abounding in every production and luxury of life, must inevitably give Ohio at no distant day, if not the first, at least the second rank in the United States. The climate is warm and solubrious. The people remarkable for their observance of the Laws, and particularly for the spirit of industry that seems to exist in every section of the state.

Yours truly,

B. P.

From the New-York Farmer.

HAY AND HAY MAKING—BY H. C.

The season of hay cutting is just at hand. An operation so simple as that of cutting and curing hay every farmer feels that he understands, and would disdain on this subject any attempt to advise or instruct him. Be it so; the wise are glad to examine any subject, on which it is possible discussion or inquiry may throw some light; correct prejudices, or suggest new and better means of management; the wise in respect to any and every subject are never too wise to learn; and though our own observations or suggestions on any subject may have no just foundation, no reasonableness, and no pertinency, they may be useful if they excite the inquiries and elicit the observations of wiser or more experienced minds.

Hay making must be set down as one of the most important operations in husbandry. Hay with us is the great means of supporting our live stock. Our straw is principally used for litter or the subsistence of our young cattle. Grain and meal are always given with reluctance, excepting to fatting cattle; and comparatively no succulent vegetables are grown for the winter keeping of our stock. It is hoped in this latter case there may be a speedy alteration in the habits of our farmers; and that it will become as much matter of custom among our farmers to raise large crops of vegetables, with which to store their cellars as large crops of hay with which to fill their barns. Common white turnips, though very little in favor with us are a valuable crop both for sheep and neet cattle. The yellow varieties are still better, as they are more solid and retain their good qualities much longer. The ruta baga is a most excellent vegetable for sheep, cattle and horses. Potatoes, carrots, mangel wurtzel are all excellent. An agricultural friend well qualified to judge informs me that he prefers to all others the common blood beet. He asserts that according to his own experience, it is as sure a crop as any other; that it yields as much to the acre as any other; none will make more milk or put on more flesh; none if properly taken care of will last longer; and none of equal value is raised with more ease or at less expense. My own experience in their cultivation and use disposes me to give almost entire credit to all these statements.

It would seem to be most important to the health of our animals, especially considering the length of our winters and the time during which they are confined to the stall, that they should have green and succulent food to mix with their dry; and that dry especially not of the best quality. Certainly very much of our hay is spoiled in the getting—It is cut not at the right time. It is made either too much or too little; so much as to become too huskey and dry or so little as to be heated and mouldy; in either case much of its nutritive power is lost; and though it may sustain life, cattle by the use of it lose their condition and become diseased; poor, hide-bound, costive and consumptive.

The time when hay should be cut is a matter not well settled and in which farmers in different places differ with each other. Different grasses ripen at different periods; and with some the season of flowering continues much longer than with others. It is ascertained likewise by chemical analysis that grasses at different periods of their growth yield more nutriment than all others. What in some parts of the country is called the English Bent, a fine and delicate grass must be cut very early or it becomes hard and wiry. Herds grass or Timothy in order according to the experiments of Sinclair, must be allowed to reach an extreme ripeness in order to yield the greatest amount of nutritive matter. We have some incredulity in regard to the statements respecting this latter grass and some hesitation whether these experiments, though highly exact and instructive, are to be considered conclusive as to the actual value of these grasses for feeding; and should deem some exact experiments with the cattle themselves made under favorable circumstances and by skilful and careful observers, much more decisive.

The time of cutting for most grasses is when they are in flower. If cut before this they waste greatly and have little substance; and if suffered to stand long after this they lose their succulence. It is advisable in this matter to be early rather than late; and to cut before the plant is exhausted by flowering or by forming seeds. It is then in the highest perfection. The time for cutting clover is longer than of other grasses as it continues longer sending out a succession of flowers; but I am decidedly of an opinion that the sooner this grass is cut after it comes into flower, the better, as it is so apt to lodge and to become mouldy at bottom.

On the subject of the time of cutting grass I am happy to quote the opinions of a very able writer. "This rule of cutting grass, when it first comes into flower applies to every species of herbage, which is to be dried for winter food; but to coarse hay the produce of wet or marshy grounds, it is strongly applicable; for most of the plants, which grow in these situations, when they are in full vigor are as tender, and contain perhaps as great a proportion of nourishing juices as any other description of hay; and when cut at that stage and properly managed afterwards, form a valuable article of food both for sheep and cattle; but when the cutting is delayed, as indeed it very often is, till an advanced period of the season, when the plants have not only reached their ultimate growth, but begin to decay, this description of herbage becomes at once the coarsest and least nourishing of all food. This opinion does not proceed upon theory; but upon the solid grounds of experiments carefully made upon different kinds of herbage, at different

periods of their growth, the result of which establishes a fact which cannot be too generally known, viz: that plants of all sorts, if they are cut when in full vigor, and afterwards carefully dried, without any waste of their natural juices either by bleaching with rain or exhalation, contain weight for weight, a quantity of nourishing matter nearly double what they do, when allowed to attain their full growth; and make some progress towards decay.' These opinions are stated with great confidence; and are entitled to much consideration; and so far as they apply to our wet meadows deserve particular attention, since the cutting and curing of these grasses receive very little care; they are left standing generally until very late in the season; and the hay from them commonly is almost worthless, excepting for litter.

"In the survey of Perthshire, Eng. it is stated that as the great object of making hay is that of preserving as much of the natural sap as possible, the proper time for cutting it is when the crop of grass has attained its highest degree of perfection; when the plants are in full blow, and before their flowers begin to fade. If cut too green the hay shrivels and losses much of its bulk; if allowed to stand till the seeds are ripe, the steam becomes hard and wiry; the roots loose much of their natural sap; the aftermath is less abundant; and the principal part of the hay is in danger of crumbling away into short stumps, under the various operations which it must undergo. Better to be too soon than too late, especially if the crop be heavy and in danger of lodging."

"With clover the best time for cutting it is when the flowers are all fully blown and the earliest begin to turn brown. If allowed to stand longer, the roots of the stalks lose their leaves, and become hard and sticky; and the plant is so much exhausted that it takes a long time before it sends up new shoots."

With respect to curing hay it is important to put it into the barn in as green a state as will possibly do and avoid its heating and becoming mouldy. In this way it best retains its succulence and flavor; and the nearer in both these respects it approaches to grass in its green state, so much better is it relished by all kinds of stock, and so much the more nutritious it undoubtedly is. The best farmers, on the Connecticut river, and where they extensively engaged in the feeding of cattle, have within a few years been accustomed to put their hay in the barn in a very green state and after a slight making. They deem it of the first importance that it should have no foreign dampness adhering to it either of dew or rain; but they do not object to its heating slightly in the mow from the fermentation of its natural juices. They are of an opinion that this even renders it the more palatable for the cattle; but wetness either of dew or rain is altogether injurious to its quality: produces sourness, and mould, and renders it innutritious, unfit for the use of cattle; and extremely pernicious to horses. The English farmers think their hay is better for a slight heat in the stack.

Two things in the curing of hay are to be particularly attended to. The first is to secure it from wet. The effect of wet upon hay is like the effect of water upon tea to extract all its strength and flavor. For this reason the practice of some farmers of mowing in the rain by way of saving time, and suffering the hay to remain wet and entirely saturated with water in the swath, under the impression that it would suffer no injury though it should remain so twenty four hours, proceeds very erroneous opinions; and is to be strongly condemned.—The practice likewise of cutting grass when a heavy dew is upon it, is, on the same grounds to be disapproved, excepting that in this case that it is very soon stirred and shaken. We should prefer, excepting that we might sometimes find that it compelled us to the loss of too much time, never to have a swath mowed but when the grass and ground are perfectly dry. The grass is not mowed so easily when dry as when wet. It requires more strength and the edge of the scythe suffers more; but the grass, which is cut when perfectly dry and the ground under it likewise being perfectly dry and warm, is made with so much more quickness and ease, that this consideration, which will go far to balance the supposed or actual advantages in the other case.

The second important point is to avoid getting the hay too dry and stirring it so much as to shake off the leaves. These constitute the most palatable and nutritious part of the hay; and this is particularly likely to happen in respect to clover, which if very much dried and shaken becomes little better than so many sticks. Clover can be well cured in cocks, without any turning, but that of reversing the heaps.—This method has been often tried and with entire success. Salt is always to be applied in these cases at the rate of a peck to a load; and to all English hay the addition of salt to the amount at least of four quarts to the load is always to be recommended.

Spreading out, as it is termed, is an operation that should be done by a most careful hand. Clover hardly admits of this when green, and, if attempted when dry, the best parts of the hay are sure to be shaken off. Other kinds of hay however, cannot after mowing, be too carefully opened and too evenly spread; not a matted handful should be left that is not thoroughly separated and shook out. Hay at night, if it can be done, should never be left in swath or in windrow; but put up at first in small cocks and afterwards made with no more shaking about and spreading than is absolutely necessary to dry it. We have already extended this article beyond our intentions and yet have not exhausted it.—We commend it to our brother farmers, not presuming that we can instruct them; but hoping that we may at least draw their attention to a subject of great importance in husbandry; but which we think has by no means as yet received sufficient consideration and care.

—

Mode of weaning and rearing calves by a Norfolk farmer, Eng.—Mr. Whitley of Wallington did, between the first of December, 1776, and April, 1777, wean and rear on his farm ten cow calves and thirteen bull calves, by the method following: At three days old they were taken from the cows, put into a shed and fed with fle (skimmed milk) allowing three quarts to each calf morning and evening. When a month old, they were fed with a like quantity of milk and water, morning and evening, with hay to feed on in the day time; and at noon they were fed with oats and bran equally mixed, allowing half a peck to one dozen calves. At two months old they were fed only in the morning with milk and water; they had hay to feed on in the day time, and at evening instead of noon, had the same quantity of bran and oats with water to drink. They were fed in this manner until the middle of April, when they were turned out to grass all day; and taken into a shed at evening; and fed with hay until there was plenty of grass and the weather grew warm. Such of the calves as were weaned in March were continued to be fed with milk and water, every morning until midsummer. All the said calves are in good health and condition; and the Society allowed the premium offered on that head the preceding year.—[Bath Soc. Papers.]

Rearing Calves, 1789.—In the year 1787, I weaned seventeen calves—in 1788, twenty—and in 1789, fifteen, do. I bought in 1787 three sacks of linseed. I put one quart of seed to six quarts of water, which by boiling ten minutes, became a good jelly; this jelly is mixed with a small quantity of the best hay steeped in boiling water.—Having my calves drop at different times, I did not make an exact calculation of the expense of this hay tea; but of my sacks of seed I had better than two bushels left at last, I gave them the jelly and the hay tea, three times a day; to the boy who looked after them 6d a day; the price of the linseed was 4*s*. 6*d*. stg. per bushel; the whole three years seed 2*l* 5*s*. My calves are kept in good growing state; and are much better at this time than my neighbors, who are reared with milk; they do not fall off so much, when they come to grass.—[Bath Soc. papers.]

From the American Gardner's Magazine.

Observations on the Culture of the Plum, with Remarks upon the Insects infesting that Tree. By Messrs. C. and A. J. Downing, Botanic Garden and Nursey, Newburgh, N. Y.

The *plum* in some of its species, as the beach plum, (Prunus littoralis) and the Chicasaw plum (*P.* chicasa) is indigenous to many parts of the United States, but the fine cultivated varieties, now so abundant in our gardens, have been produced from an eastern species (Prunus domestica,) probably first introduced into Europe from Syria.

The cultivation of the plum in the Middle and Eastern States is exceedingly easy. The soil best adapted to that purpose is a moderately strong, light and dry loam; moist soils predisposing the tree to disease, and rendering it unfruitful. Gravelly and stony soils, though generally considered rather unsuitable, will be found excellent if the trees are planted in orchards, and receive that care in cultivation, peculiarly proper for such situations.

The plum not requiring walls in this climate, but growing with great luxuriance as an open standard tree, needs but little skill in pruning; the head of the tree should by no means, however, be permitted to become crowded with branches, but by judicious trimming, be kept open to the genial influence of the sun and air. Pruning, in the plum, as in all other stone fruits, should be performed while the branches are small, as the exudation of gum is induced by lopping large limbs, and the wounds heal with difficulty. To those persons who feel lost in the labyrinth of a modern catalogue of fruits, the following selection of plums, of first rate ex-

cellence, for a small garden, may not be unacceptable.

Yellow fruited.	Green fruited.
Washington,	Green Gage,
Coe's Golden drop,	Imperial do.
Drap d'or,	Flushing, do.
Yellow Gage.	Luscomb's Nonsuch.

Blue or Purple fruited.

Reine Claude Violette, or	Purple Gage,
Blue Imperiatrice,	Nectraine,
Kirk's,	Red Gage.
Imperial Diadem,	

The Reine Claude Violette, or purple gage, is one of the most delicious of plums. The Blue Imperiatrice is excellent, and keeps a long time after ripening. Coe's Golden drop and the Washington are very large and luscious fruit; and the Nectreine and Kirk's plum, are very beautiful, of large size, and fine flavored. The Azure Hative may, in addition to the above, be recommended as a very early variety, and the White Magnum Bonum, or egg plum, as being suitable for preserving.

Diseases of the Plum.—The plum tree is subject in this country, in many districts, to the attacks of two or three insects which commit great havoc in their respective methods, and which, owing to the culpable ignorance or negligence of cultivators, are permitted to increase and disseminate themselves, *ad libitum.* The first and most troublesome of these visitors, is the *Curculio nenuphar* of Herbot.* It is a small winged insect, scarcely a fourth of an inch in length, furnished with a sharp rostrum or bill, with which it pierces the embryo fruit as soon as it is formed in the expanded blossom. Though the insect itself is too inconspicuous to attract the eye of a careless observer, amidst the countless myriads of ephemeral winged creations of a spring day, yet the watchful horticulturist may discover it in great numbers flitting about in the trees, while yet laden with blossoms, and puncturing the newly formed fruit to deposit the egg which is to continue its race. These punctures may first be discovered when the fruit begins to swell, and when it has attained half or a fourth of its size; they are very distinct to the eye, remaining in the form of a crescent-shaped scar, upon the surface of the green fruit. The egg in the mean time hatches, and the larvæ silently works its way towards the stem of the fruit, which, as soon as it has reached that point, falls from the tree. The whole crop is in many cases where the careless cultivator has suffered the annual increase of the *curculio*, drops in this manner prematurely from the tree, to the great mortification and astonishment of those persons unfamiliar with the habits of the insect race, who can see no cause of such a destruction of fruit. When the fruit has fallen to the ground, the grub or larvæ, obeying the instinct of nature, after a short time, leaves the now useless and decayed plum, and finding its way into the soil, remains there at some depth below the surface, to come forth in the succeeding spring, in its winged state, to go through its little round of existence again.

*Ryncahænusrec asi Peck.

Countless remedies have been proposed for the mitigation of the evil, caused by the *curculio*, which are directed to the destruction of the insect in a winged state, when engaged in perpetrating the mischief, whilst the tree is yet in bloom: but there is but one easy, certain, and efficacious method of putting a stop to its ravages, viz., by destroying it in the larvæ or grub state after it has fallen from the tree, and before it has left the fruit. In plum *orchards* nothing can be more easily accomplished.—The cultivator has only to turn in his *swine*, and allow them to *devour the fruit daily as it falls from the tree. and every insect will perish.* This has been tested repeatedly, and with uniform success. The *curculio*, though a winged insect, is scarcely a migratory one, seldom leaving the neighborhood of the tree under which it emerged from the soil, and it has been found that, of two trees standing in adjoining gardens, one of them was attacked, and the fruit destroyed, whilst the neighboring one, when pains had been taken to destroy the insects, remained laden with a beautiful crop. In small, gardens, therefore, when the number of trees is limited, it would well repay the trouble of gathering up and destroying the green fruit, as in a short time, the whole brood would be exterminated. It should be observed that when the soil has been trodden hard, when it has been paved underneath the branches, or in situations where the tree has inclined over a sheet of water, the larvæ of the *curculio*, not being able to find its way readily into the soil, perishes, and the trees bear abundantly. This is obviously the reason why the trees in the hard trodden or paved yards of cities, often yield such surprising crops—and the amateur horticulturist may draw a useful lesson from this fact.

Another most troublesome malady to which the plum is liable in some parts of the country, is commonly known by the name of the *knots*. It exhibits itself in the form of rough black *excrescences* upon the branches, of various sizes, from the scarcely perceptible swelling, to bunches of the size of the fist. If permitted to extend itself, it soon covers the whole tree, apparently disseminating its poisonous influence by the medium of the sap through the entire individual. On dissecting an infected branch, the wood and bark, in the discarded part, is found black and dry, and the whole vegetable substance is changed in appearance; if long diseased, the conducting vessels are dead and dried up, and this malignant influence may be seen extending itself upwards, first visible in the pith, and afterwards in the heart-wood, until the whole branch is destroyed. Upon opening these protuberances carefully, at a certain season of the year, the close observer will detect the larvæ of an insect of the weevil family, and which Professor Peck believes to be the same insect (the *curculio*) *Rynchœnus cerasi*, which attacks the fruit—he having reared it from the grub that inhabits the excrescences of the cherry tree.—But we are inclined to believe this insect another and a totally distinct species, and shall endeavor, the present season, by rearing and placing it in the hands of some skilful entomologist, to set the matter at rest. Practically, however, this knowledge is, perhaps, of no great consequence, as it is known that the larvœ leave the diseased branches in July, and a knowledge of this single fact should be sufficient to impress upon the horticulturist the necessity of cutting off and extirpating (burning is the best method), entirely, all those branches which show the least symptoms of disease, before that month commences. In this way the insect may be wonderfully diminished in numbers, and probably entirely subdued.—The branches of some kinds of plum (fortunately the least valuable, as the horse plum and the damson) seem to be sought in preference, by the insect, when depositing its egg; but if its ravages are permitted to extend unchecked, the other and more precious varieties will also fall a prey. To so great an extent did the damage caused by this single insect spread, about thirty years since, in some parts of the State of New-York, that scarcely a plum tree survived the disease, owing to the ignorance of its habits prevalent among the cultivators at that time.

There is but one more insect which is generally destructive to the plum tree in America—the *borer* (*Ægeria exitiosa*, Say), which attacks also the peach tree, and other stone fruits, just below the surface of the ground. The eggs of this insect are deposited in the bark of the tree, close to the earth, and the grub, upon hatching, penetrates further down, and *bores* its way around the trunk, and if undisturbed, completely destroys the albumen, or young wood, and ultimately causing the death of the tree. As these larvæ are always found in a particular place, technically called the *neck* of the tree, just below the surface of the soil, the proprietors of extensive peach orchards have found it the most effective and speedy method of extermination, to examine their trees every fall, removing the earth two or three inches deep, and upon the appearance of gum (a sure symptom), searching out and destroying the larvæ, with a knife for that purpose. A laborer, with trifling practice, will examine a great number of trees in a day, and with this slight annual care, whole orchards are, so far as the *borer* is concerned, preserved in most vigorous health. From successful practice, we cannot but think this the most unfailing method with the plum also.—Boiling hot water, poured around the trunk of the tree, will, without any injury, in many cases, destroy the larvœ; and soap-suds have been recommended for the same purpose. The public prints abound, lately, with accounts of the efficacy of a deposit of coal ashes around the trunk and roots of the tree, but we need some further proofs of the value of this remedy, before placing much reliance in its virtue.

Yours,

C. & A. J. Downing.

Newburgh, N. Y., April, 1836.

From the New-York Farmer.

"Burlington, N. J., Weeding Hoe."—We are indebted to Mr. Thomas Collins, of Burlington, N. J., for specimens of the

above named hoe. To us they appear well calculated to answer their purpose; and we shall be pleased to exhibit them at all times to those who may desire to provide themselves with similar utensils of the very best kind.

We give the description in his own language.

Mr. T. Collins, takes the libery of presenting to Mr. D. K. Minor, a set of "Burlington Weeding Hoes," and recommends the kind, from several years experience, as the best he has seen. Their principal use is for destroying weeds while small: in the hands of an experienced gardner, they make great despatch. Narrow sawblades, of the best quality as to temper, should be used; and the holes for rivets should be punched through the sawplate *without heating*, in order that the temper may not be injured.—The thinnest sawbaldes are to be preferred, as they can never be very dull, and may the sooner be sharpened. Half worn "*bucksaws*" will answer for this purpose.

Burlington, July 4th, 1836.

Extract of a letter dated Columbia Pa. 18th June 1836.

As to the crops, you have probably received accounts from different parts of the country. In this county (Lancaster Pa.) we shall not harvest one eighth of a crop of wheat throughout the county, by the Fly attacking it in the fall, and at two different times this spring. We have not had so poor a prospect within the recollection of the oldest inhabitants. Some thirty years back, they say the Fly was bad in some fields, but this spring it is much more general. Rye has been injured very much by the long continued spell of wet weather, being in flower and much of it lodged and now rotted; corn much cut off by the cutworm and planted twice, and some the third time not all up yet, which will probably not ripen, many fields however, have escaped and look well. Oats, Barley and Grass, look very favorable.

Respectfully yours, &c.

J. B.

From the New-York Farmer.

The Elms, Throgs Neck, June, 1836.

To the Editor of the New York Farmer.

SIR—If you think the following statement of the produce of a Cow worth inserting in your valuable Magazine, you can do it.

The cow is of the short horn Durham breed, a twin, her dam having had twins three times in four years, she is a bay, her sister pure white, now in possession of my neighbor Mrs. Post. My cow calved on the 16th March, her calf remained from her 19 days, raised on the skim milk, until my other cow came in on the 20th April. The produce of butter was in that time, say 35 days, 54½ lbs., and two butchers, although not sold to kill, pronounced her the best and heaviest calf they had seen that season. I will only observe, I keep but two cows and they are kept and feed in the yard.

Yours respectfully,

THOS. ASH.

The above remarkable account of the produce of a short horn cow is furnished us by Mr. Ash of Westchester county. There are few such, either as a breeder or a milker.

CASHMERE GOATS.—We copy from the cover of the May number of the Farmer, the short notice in relation to this beautiful animal. We expected to have had an engraving and more full account of the animal for this number.

From the May No. of the New-York Farmer.

CASHMERE GOATS.—We were invited, a few days since, by Mr. J. DONALDSON KINNEAR, of Albany, to view a Cashmere Goat. Mr. Kinnear, through the aid of relatives in France, purchased a pair of these beautiful and rare animals, from a gentleman who owns the only flock in France; and they were brought from Paris to Havre in the Diligence, and there put on board of one of the packets, but from some cause, the voyage was too much for the buck, which died, as well as the young kid, which was added to the family on the voyage. The doe, however, survived; and although very lean, is a beautiful animal; being, as we were informed, the *first ever imported into this country*, will, we hope, be the first of *numerous flocks* which shall in a few years cover our hills; and we trust that Mr. Kinnear may soon replace his loss, and be successful, in rearing a flock which may be profitable. Why may we not, in a few years, manufacture Cashmere shawls, as well as silk? We MAY—and shall do it—and compete with the foreign manufacture in this as in every thing else we undertake.

From the Maine Farmer.

BUTTER.

MR. HOLMES:—As great improvements may be made in the quality as well as quantity of butter from the same milk, by some variation from the common mode of managing the milk—I have therefore made some extracts from a valuable English publication in my possession, entitled a Complete History of Modern Agriculture, by R. W. Dickson M. D.

1st. *Exp.* Several large tea cups exactly similar in size and shape were filled at regular intervals, the last being filled with the dregs of the milk. From some cows the quantity of cream obtained from the last drawn cup, exceeded that from the first in the proportion of 16 to 1.

2d. The difference in quality was greater than the difference in quantity. In the first cup the cream was a thin tough film, and very white, but in the last of a thick buteraceous consistence, and of a glowing richness of color, that no other kind of cream is found to possess.

3d. The difference in the quality of the milk was perhaps still greater than either. in respect to the quantity or the quality of the cream. In the first cup it was a thin bluish liquid, as if a large portion of water had been mixed with ordinary milk; while in the last cup it was of a thick consistence and yellow color, more resembling cream than milk both in taste and appearance.

4th. The cream which first rises is richer in quality and greater in quantity than what rises in a second equal portion of time, and the like difference in a third space of time and so on.

5th. Thick milk always throws up a smaller proportion of the cream it actually contains to the surface, than milk which is thinner, but the cream is a richer quality; and if water is added to that thick milk, it will afford a considerably greater quantity of cream than it would have done if allowed to remain pure; but the quality at the same time is greatly debased.

6th. Milk which is put into a pail or any other vessel and carried in it at any distance so as to be agitated and in part cooled before it is put into the milk pans to settle for cream, never throws up so much nor so rich cream as if the same milk had been put into the milk pans directly after it was milked.

From the above it follows,

1st. That cows should be milked as near the Dairy as possible, and in addition to its preventing the agitation and cooling of the milk, if pastures are near the Dairy the cows are not heated by driving.

2d. It is highly injurious to put the milk in large Dairies into one vessel as it is milked, to remain there until all the cows are milked before it is put into milk pans, and for an additional reason to the agitation and cooling, that it mixes the bad with the good milk.

3d. The first drawn milk should be kept separate from the last drawn as the *quality* of the butter will be improved in proportion to the smallness of the proportion of the last drawn milk that is retained.

4th, If the quality is only alluded to, it is not only necessary to separate the first from the last drawn milk, but also to take nothing but the cream that is *first* separated from the best milk. The remainder of the milk, may be either employed in making sweet milk cheeses, or it may be allowed to stand to throw up cream for making butter of an inferior quality.

5th. According to the preceeding, the *best* butter could only be made with economy in those dairies where the manufacture of cheese is the principal object. In such dairies a small portion of the last drawn milk should be set apart for butter, all the rest may be made into cheese while it is yet warm from the cow and perfectly sweet, and if only that portion of cream which rises during the three or four hours after milking is to be reserved for butter, the rich milk which is left, after the cream is separated, being still perfectly sweet, may be converted into cheese with as great advantage nearly as the newly-milked milk itself.

6th. As purchasers would not be found wanting to buy the fresh butter made in the manner above pointed out, at the price that would indemnify the farmer for his trouble in making it. These hints are thrown up merely to satisfy the curious in what way butter possessing this superior degree of excellence may be obtained, but for the ordinary market, the writer is satisfied, from experience and attentive observation, that if in general about the first drawn half of the milk be separated at each milking, and the remainder only set up for producing cream, and if that milk be allowed to stand to throw up the whole of its cream, even till it begins sensibly to taste sourish, and if that cream is afterwards carefully managed, the butter thus obtained will be of a quality greatly superior to what can usually be obtained at market, and its quantity not considerably less than if the whole of the milk had been treated alike. This therefore is the practice that is thought most likely to suit the frugal farmer, as his butter though of a superior quality, could be offered at a

price that would always insure it a rapid sale.

From the preceding the following course is recommended to farmers, particularly those who have small dairies. Let a quantity of milk from the first drawing, sufficient for family use, including the supply of cream be taken from the cows on a farm, and set the remainder for cream to make butter for the market. It will take less time to convert such cream into butter, and the butter from such cream will be of a superior quality.

To satisfy myself of the difference in the milk in the first and last drawn from the same cow, I had a tumbler nearly filled with first drawn milk, taking about an equal quantity from each teat—a second tumbler was then filled with about an equal quantity, if any thing a little of the last drawing, taking about an equal quantity from each teat. The result was scarcely any cream from the first, and it could not be well sepprated from the milk. The *cream* did not exceed in weight 30 grains, and hardly any yellow particles in the cream—from the last drawing, there was 339 grains of cream, yellow and thick. The milk stood in the tumblers about 10 hours. C. V.

Hatlowell, June 17, 1836.

We take the following letter in relation to the Sugar Beet from the New England Farmer. It relates to a subject which is becoming of much interest in France, and will we doubt not attract attention, and become a profitable business in this country.

SUGAR BEET SEED.

Washington, June 27, 1836.

Thomas G. Fessenden, Esq.

Dear Sir—I have precured a small quantity of the seed of Sugar Beet, which I shall send to you to-day by Mr. William W. Stone, who will be in Boston on Friday or Saturday of this week. The cultivation of this vegetable, and the manufacture of sugar from it in France has become of great consequence in that country, and is, I think, attracting much attention on this side the Atlantic. It appears to me the cultivation of the Beet in some of the Western States can be carried forward with great success. I do not know whether it can be made profitable in New England, but will thank you to distribute the seed I now send to you among our agricultural friends,—and to accept the assurances with which I remain, dear sir,

Your faithful and ob't serv't.

ABBOTT LAWRENCE.

By the Editor.—The above with the parcels of Sugar Beet seed therein alluded to, have laid us under renewed obligations to the Hon. writer, whose patriotic efforts promote the most important interests of his country, deserve the gratitude of every friend to mankind. We shall distribute the seeds in small portions among cultivators who will be likely to make the most of them. As the season is far advanced, it will, we think, be advisable to soak the seeds in warm water at least 48 hours before planting, which will much accelerate their germination.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILWAY IRON.

95	tons of 1 inch	by ½	inch.		
200	do	1¼	do	½	do
40	do	1½	do	½	do
800	do	2	do	½	do
800	do	2½	do	½	do

soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2½, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whittemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches. manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300	dozens	Ames' superior back-strap Shovels			
150	do	do	do	plain	do
150	do	do	do	caststeel Shovels & Spades	
150	do	do	Gold-mining Shovels		
100	do	do	plated Spades		
50	do	do	socket Shovels and Spades.		

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

MILL-DAM FOUNDRY.

TO BE SOLD OR LEASED the above well known establishment, situated one mile from Boston. The improvements consist of,

No. 1. *Boiler House*, 50 feet by 30 feet, containing all the necessary machinery for making boilers for *Locomotive* and other steam Engines.

No. 2. *Blacksmith's Shop*, 50 feet by 20, fitted with cranes for heavy work.

No. 3. *Locomtive House*, 54 feet by 25, used for putting together Locomotive Engines. Several of the best Engines in use in the United States have been put in this establishment.

No. 4. A three story brick building, covered with slate, 120 feet by 46, containing two water-wheels, equal to 40 horse power; Machine Shop, filled with lathes, &c.; Pattern Shop; Rolling Mill and Furnaces, capable of rolling 4 tons of iron per diem, exclusive of other work; three Trip Hammers, one of which is very large; engine for blowing Cupola Furnaces, moved by water-wheel; one very superior 12 horse Steam Engine, which could be dispensed with; and a variety of other machinery.

No. 5. An Iron Foundry, 80 feet by 45, with a superior air Furnace, and two Cupolas. Core oven, Cranes, &c. fitted for the largest work. Attached to the Foundry is a large ware-house, containing Patterns for the Castings of Hydraulic Presses, Locomotive and other Steam Engines, Lead Mill Rolls, Geering, Shafts, Stoves, Grates, &c. These were made of the most durable materials, under the direction of a very scientific and practical Engineer, and are supposed to be of great value.

No. 6. A building, 65 feet by 36, containing a large stack of chimneys, and furnaces, for making Cast Steel. This building has been used as a boarding-house, and can accommodate a large number of men.

No, 7. A range of buildings, 200 feet long by 30, containing counting room, several store rooms, a Brass Foundry, room for cleaning castings, a large loft for storing patterns, stable for two horses, &c. &c.

The above establishment being on tide water, presents greater advantages for some kinds of business than any other in the United States. Coal and Iron can be carried from vessels in the harbors of Boston, to the wharf in front of the Factory, at 25 to 30 cents per ton. Some of the largest jobs of iron work have been completed at this establishment; among others, the great chain and lift pumps for freeing the Dry Dock at the Navy Yard, Charleston.

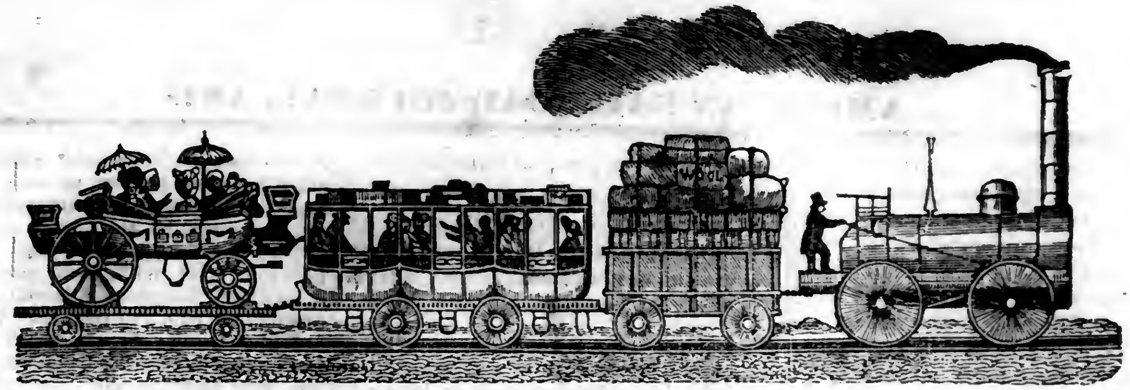
The situation for Railroad work is excellent, being in the angle formed by the crossing of the Providence and Worcester Railroads. The Locomotive "Yankee," now running on the latter road, and the "Boston," purchased by the State of Pennsylvania, were built at these works. With the Patterns and Machinery now in the premises, 20 Locomotives, and as many tenders, besides a great quantity of cars and wagons, could be made per annum.

For terms, apply to
THOS. J. ECKLEY, Boston,
or to ROBERT RALSTON, Jr. Phila.

Boston, April 21, 1835. j25—4t

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner. and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JULY 23, 1836. [VOLUME V.—No. 29.

CONTENTS:

It is with most sincere pleasure that we announce to our readers that we have witnessed the ascent of a locomotive, made by Mr. Wm. Norris of Philadelphia, on the Schuylkill inclined plane, the grade being 369 feet per mile, and drawing after it a weight of over 15 tons. We shall in our next give the particulars of this very interesting experiment.

We shall also give a comparative statement of the performances of locomotives up to the present time. The next number will also contain other information on this subject, accompanied by an engraving of a new and powerful locomotive designed by H. R. Campbell, of Philadelphia.

A communication from C. R. W. will appear in our next No.

In answer to numerous applications respecting the cost, durability, and comfort of wooden pavements as ascertained in the New-York experiment, we are preparing an article containing all the information that can be found on this subject.

From the New York American.

SHIP CANALS.

Your paper of the 12th has just reached me. In it I find a writer with the signature of "M," who, after having examined the maps of the proposed "*New York Ship Canals*," makes the inquiry, "if there is not some error in the estimates of E. F. Johnson, Esq., of the Ship or Steamboat Canal from Oswego to Utica, calculated to cost $1,131,989, for a distance of 92½ miles." If Captain Williams is to be believed in his estimates for the great *national work* around the Falls of Niagara, that canal, with 319½ feet of lockage, calculated for a *double* set of locks, 300 feet long, 50 wide, and 10 feet lift, will cost, by the *longest* route (15 miles,) $4,744,982; the *shortest* (7 3-4 miles,) $3,610,596; but with *single* locks, $2,658,899—all that will be required for a long period.

This important variation in cost of single locks, $1,041,696, "M," with some *peculiarity*, omits to notice, when he compares the cost of Capt. Williams' Ship Canal, 110 feet wide, 10 feet deep, with Mr. Johnson's estimates for a canal from Oswego to Utica with *single* locks, 130 by 30 feet, cross section 90 by 8 feet. The answers to "M's" queries are simple, and can readily be given by Mr. Johnson, Capt. Williams, or any one who has read the able reports of these engineers.

It is really surprising that "M" should have made his queries after examining, as it is presumed he has done, Mr. Johnson's maps and *profile* of the canal in question, now on the walls of the Merchant's Exchange, in this city. Had "M" referred to the Assembly documents of the last year, No. 185, or to the Railroad Journal, Vol. 4, Nos. 10, 11, 12 and 40, he would have found that 57 1-2 of the 92 1-2 miles from Oswego to Utica, are *natural waters*, easily improved, viz: Oswego river, Oneida river, and Lake. That from Fish Creek, at the head of Lake Oneida, to Rome, the distance of *new* canal, principally through sand and loam, is only 10 miles; that from Rome to Utica, is 15 miles,—easy digging, for either a new canal, which would be the cheapest—or, as Mr. Johnson's calculation was, to enlarge the Erie Canal, this short distance, by raising the level and embankments.

As "M" quotes the cost of this canal from Mr. J's report, correctly, and gives its width 90 feet, depth 8 feet, and lockage 180 1-2 feet, (*a little more than half the Niagara lockage*,) is it not singular that "M" omits to compare the *size* of the locks of Mr. Johnson with those of Capt. Williams, calculated for the national work, to transfer the trade from one lake to another, and even the *hull* of a frigate, and the largest steamboat that floats on the lakes. Capt. Williams' locks are 200 feet long, 50 wide, 10 feet lift, of *cut stone*—whilst the canal itself is two feet deeper than Mr. Johnson's, and 20 feet wider,—*principally cut through a limestone rock*, with a magnificent basin at Lewiston of 100 acres, 100 feet above the Niagara river. These facts will account for the difference in the estimate per mile!! of the two works, and I trust will be considered an answer to "M's" inquiries—particularly after I state, that Mr. Johnson's able report, had to undergo the ordeal of a kicking and cuffing, by three of the State Engineers, after it was presented to the Legislature. See R. R. Journal,

No. 44—as it interfered with the favorite project of the day, *the enlargement of the Erie Canal.* Yet these gentlemeu did not dispute the liberal scale on which the estimates were based; and it is, therefore, to be presumed, that they are as correct, as their estimate (for the enlargement) made, as they all confess in a *hasty manner*—in the limited time of only three months' field work for 363 miles of canal!!—to cost 12 millions, without any allowance for damages to the cities and villages they pass through.

It is true, the Engineers, in the employ of the Canal Board, abuse in their report, the *name* of the *Ship* Canal—the use of *steam*—the *size*, the difficulty of making *bridges* over it. Yet, in less than a year, two of the three Engineers, Messrs. Jervis and Mills, enter a species of protest, to the Canal board, as to the propriety of the Board adopting a less size than 8 feet by 80 feet, for the *projected* enlargement, to answer the increasing trade of the west. See this singular doc., No. 99, of the last winter, page 281. Of the fairness of "M's queries," or his ignorance, I leave the public to judge. Can he be one of these Engineers? There has been much published on the subject of *ship* or *large* canals,—a name with Engineers in contra-distinction—to boat, or *small* canals—so that "M" can not be ignorant, that the friends of the Ship Canal, from the Hudson to Lake Erie, have long contended, and have *challenged contradiction*, that a separate, *better* and *larger* Canal, *via* Lake Ontario and Niagara Falls, can be constructed in less than half the time, and certainly for *half the money*, than the proposed enlargement of the Erie Canal, in 12 years!! The reason is obvious, to the most common mind. The distance to enlarge, in *winter* and summer, with interference to trade, is 363 miles from Albany to Buffalo. The total extent of artificial Ship Canal required for the same distance, via Lakes Oneida and Ontario, is only 150 miles; and this, too, without using the Mohawk River, as some propose—making a difference of 213 miles of canal.

"By adopting this course," to use the language of an able writer, in a pamphlet, addressed to the last Legislature, with the signature of Oswego, [reported to be from Mr. E. F. Johnson, principal and resident Engineer on the Erie R. R.,] on the subject of the enlargement, he says, "we shall obtain the benefit of a much *larger* navigation—in about two thirds less time, at an expense, not exceeding one half of what it must cost, to make the proposed enlargement, from Albany to Buffalo. The obstruction to the navigation so much dreaded, will be avoided, as the masonry will be built, and embankments formed, under the most favorable circumstances, and when done, the State instead of having but *one* canal at a cost of nearly 27 millions of dollars, will have *two* canals, the combined cost of which will not vary much from twenty (20) millions."

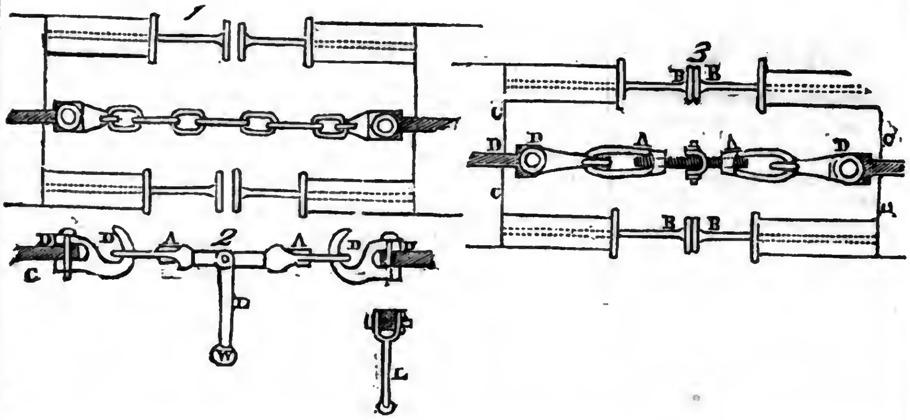
* * * * * * *

Any *fair* queries made by M, with a desire of knowledge, will be promptly answered by Mr. Johnson, or the friends of a *Ship Canal*, from the Hudson to Lake Erie. J. E. B.

From the London Repertory of Patent Inventions.

SPECIFICATION OF THE PATENT GRANTED TO HENRY BOOTH, OF LIVERPOOL, FOR CERTAIN IMPROVEMENTS IN LOCOMOTIVE ENGINES AND RAILWAY CARRIAGES. SEALED JANUARY 23, 1836.

My improvement applicable to railway carriages I declare to be a new mode of connecting the carriages together, by which is effected an increased steadiness and smoothness of motion at high velocities, and which consists in an improved connecting apparatus, by the action of which the buffers of the separate carriages of a train held in contact with each other, so as to prevent that independent lateral and serpentine motion, which railway carriages moving at high velocities assume when they are attached together in the usual way by a simple draw chain.



Description of the Drawing.—Fig. 1, shows the mode in which railway carriages have usually been attached to each other by a simple chain, the buffers of one carriage not coming in contact with those of another, but each carriage being allowed, when moving onwards, a lateral oscillating motion.

Figs. 2 and 3, show the improved mode of connection for which I claim my patent. A, is the connecting chain attached to the draw bar of each carriage, and consists of a double working screw (working within two long links or shackles,) the sockets of which are spirally threaded to receive the screw bolts which are fastened together by a pin and cotter—so that by turning the arm or lever, Z, of the said screws, the connecting apparatus is lengthened or shortened at pleasure, to the extent of the long links or shackles above alluded to, in which they work. This screw chain being placed on the hooks, or turned up ends of the carriage draw bars (D), the buffers (B) of each adjoining carriage being first brought close or nearly close together, the lever (Z) is turned round a few times till the draw bars (D) are drawn an inch or two beyond their shoulders, on the face of the carriage frame (C), stretching the draw springs (to which the draw bars are attached), to the extent of a fourth or fifth part of their whole elasticity; and by that degree of force attaching the buffers of the adjoining carriages together, and giving by this means, to a train of carriages, a combined steadiness and smoothness of motion at rapid speeds, which they have not, when the buffers of each carriage are separate from those of the adjoining carriage. W, is a weight to keep the lever in a vertical position and prevent the unscrewing of the chain when in action.

Now I do not claim as new the separate parts before described of the buffers, screw chain, or draw-bars, attached to a draw spring, but I claim the combination and joint action of those parts as described, and the consequent close, but elastic attachment of the carriages to each other, which constitutes my improvement applicable to railway carriages.

And my improvement applicable to the locomotive engines which draw the railway carriages, I declare to be a new mode of checking the speed of the engine, or stopping it altogether, which is effected by introducing a throttle valve, slide, or damper, into the exhausting steam pipe of the engine, commonly called the blast pipe, which is usually placed in the chimney, in front of the engine; and which throttle valve may be most conveniently introduced where the two exhausting pipes are united into one, below the place where the pipe is contracted in area for the purpose of producing a blast to the furnace. From the throttle valve must proceed a rod or long handle extending through the chimney to the back part of the boiler, so as to lie within convenient reach of the engine-man, who by moving the said handle, can close the slide or throttle valve, either partially or altogether as may be required. And the throttle valve need not be altogether steam tight, but should be made to work freely in its place. The engine-man when he wishes to stop or slacken the speed of his engine, closes or contracts his throttle valve without shutting off the steam in its passage from the boiler to the engine. The pistons, by that means, are speedily, but not suddenly or violently checked, and the driving wheels of the engine no longer revolving, or revolving very slowly, the engine is soon brought to a stand. Now I do not claim as new, any particular kind of throttle valve, which may be left to the judgment of the engineer, provided it be so constructed that when open the steam way be not contracted, but may allow the steam to escape freely as if no valve or damper were introduced. But I claim the introduction of a throttle valve, or damper, into the exhausting steam-pipe of a locomotive engine, by closing or contracting which the engine-man can check or stop his engine at pleasure. In witness whereof, &c.

Enrolled March 21, 1836.

STEAM CONVEYANCE BETWEEN PADDINGTON AND THE CITY FOR HIRE.

Mr. W. Hancock, whose perseverance certainly deserves success, commenced running his steam carriages, the "Enterprise" and "Erin," on Wednesday morning last, at nine o'clock, from the station in the City-road to London Wall; from thence he proceeded to Paddington, and returned to the city. On the first day he performed three of these journeys, on the second, four, and on the third (yesterday,) two, before noon. The average time of travelling over the above ground has been 1 hour and 10 minutes, including stoppages to take in passengers, water, and coke. This is just half the time the horse-omnibusses take in going over the same ground. In the nine journeys performed, the number of passengers carried was 220, averaging about 12 persons each single trip. Mr. Hancock intends to run his carriages regularly the same number of journeys daily, for the present, and very shortly to increase the number.

Lond. Mec. Mag.

IMPROVED PORTABLE FIRE-LADDERS.

Sir,—Mr. Merryweather having just completed a third set of his improved portable fire-ladders for the Fire-Association of the South-Western District of St. Pancras, the opportunity was taken of making some experiments, particularly with a view to ascertain the effect of my invention of an upper carriage, described at p. 184 of your 22d volume. In the first instance, a simple roller the width of the ladder was attached on the under side, and the relief which was thus afforded in raising the ladders was most surprising.

A pair of small wheels were subsequently applied, when all the irregularities of the brick-work, ridges, window-sills, &c. were surmounted with the greatest ease, and with a rapidity altogether unprecedented.

Thus equipped, three young men joined and raised *seven lengths of these ladders*, reaching upwards of 40 feet, *in half a minute!*

I was previously told that this feat had been repeatedly done on the day previous, but must confess I could not give credit to the statement; my scepticism was, however, completely removed on seeing the experiment performed.

There is one great advantage in employing wheels *permanently fixed* to the first joint of all such ladders as are *stationed in sets*, not yet adverted to, viz: that when the six ladders are strapped together, and standing upright against a wall, &c., with the wheels downwards, they serve to carry the ladders; and thus equipped, one man (supposing it possible a case may occur where no more assistance is at hand) can run off with them to the fire without the least difficulty.

Another addition is about being made to these ladders, for the purpose of assisting such persons as, from fear or infirmity, are unable to avail themselves of the ladders as a mode of escape. A small metal pulley is to be fastened to the wheel-axle at the top of the ladder, a rope passed through which, enables a cradle to be raised to any window of a dwelling, for the rescue of invalids, females, children, &c.

It is with the most unfeigned pleasure, that I notice the attention which this subject has recently received; fire-escapes and improved fire-ladders have been stationed in numerous convenient, situations in many parts of the metropolis, and great exertions are every where making to lessen the number of those calamities, which, in spite of all human efforts, will sometimes occur.

I remain, Sir, yours respectfully,

WM. BADDELEY.

London, April 23, 1836.

[*London Mechanics' Magazine.*]

From the London Mechanics' Magazine.

LONDON GRAND JUNCTION RAILWAY.

From Report of the House of Commons Committee, on the Bill for this Railway.

By an Act passed in the third year of his present Majesty's reign, a Company was empowered to make a railway from Birmingham to London, terminating on the north side of the Regent's Canal, Camden Town. In the last session an Act was passed for making a branch from that point to Euston-grove, in the parish of St. Pancras, for the conveyance of passengers and light parcels only, but not of merchandise and goods. There are at present, therefore no means for the conveyance of the present number of passengers proceeding from Camden Town to the City, or for those who will be brought by the Birmingham Railway, except the ordinary vehicles plying in the streets. The only present means for the conveyance of goods from Camden Town is the canal, but as that is at no point nearer the City than the New-road, it could not be available for that purpose. Evidence was adduced to show that it would be a great advantage to trade and commerce to have a railway communication for goods and passengers extended to the City.

The amount of income expected to arise from the conveyance of passengers and goods is 113,559*l.*, of which 90,818*l.* is expected from the conveyance of passengers, and 22,741*l.* from the conveyance of goods which are the manufactured articles of Birmingham, Manchester, and other manufacturing towns, and live and dead cattle to Smithfield, Newgate, and Farringdon markets.

The proposed railway is the extension and completion of the Birmingham Railway, and is an integral line between its respective termini.

The only line which can be considered as a competing one is an inclined plane, now in progress, from the Birmingham Railway at Camden Town to Euston-grove, a distance of nearly a mile; but that is only enabled to convey passengers and light parcels. The proposed railway has the advantage of conveying passengers to the centre of the metropolis, about three times that distance, yet at one-fourth less charge. It is also to be adapted for the conveyance of goods, which would otherwise have to be carted from Camden Town.

The whole line will be worked by locomotive engines, without any assistant or stationary power.

There seems to be no peculiar engineering difficulties in the proposed line.

There are no tunnels.

The steepest gradient is 1 in 273, or 19 feet in a mile. The smallest radius of a curve is half a mile.

The length of the line of railroad is two miles and fifty chains. There are no branches.

The plan seems, in an engineering point of view, well fitted for the objects intended.

No turnpike road will be crossed by the proposed railway on a level.

The estimated cost of the whole work, including the cost of property, is 600,000*l.* This estimate was proved by George Rennie, Esq., and supported by the evidence of Colonel Landmann, the engineer of the Greenwich Railway, as respects the engineering department; and by George Smith, Esq., and William Barnes, Esq., surveyors, in the city of London, as to the valuation of the property to be purchased. Your Committee, therefore, see no reason to apprehend it will be insufficient.

The estimated annual charge for the railroad, when completed, including all incidental expenses, is 40,000*l.*, which was founded on the charges of similar works now completed.

The evidence fully satisfied your Committee that the return would be sufficient to support all the annual charges and maintenance of the railroad, and leave an adequate profit for the shareholders.

Your Committee think it desirable the House should be informed that, as this railroad follows the course of the River Fleet, a considerable portion of the ground is not built upon; so that, in fact, the arches under the railway will form as many dwellings as the railway will displace.

A great part of the houses that will be taken down in and about Hatton garden and Saffron-hill are in a dilapadated and dangerous condition. Several parochial officers gave evidence as to the state of the neighborhood, and the advantage it would be to have an opening made through that confined and unhealthy part of London.

From the Geneva Gazette.

TIOGA RAILROAD.—This important channel of communication is now in rapid progress, and is expected to be completed in little more than a year. Its importance to this and the neighbouring villages, and, in fact, to all of western New York, we apprehend is not justly appreciated. The strong argument used in favour of building the Chemung canal, was, that it would be approaching the coal beds of Tioga county, Pa.; but a distance of about 40 miles of bad wagon road from the head of the Chemung canal at Painted Post, to the coal beds, has prevented the introduction of this superior coal into the towns of the western part of the state, where it is much wanted to supply the place of wood for fuel. This distance is now about to be overcome by the construction of a railroad, 27 miles of which will be in Pennsylvania, and is constructing by a company incorporated by that state; 13 miles thereof is in this state, and is constructing by its citizens, several of whom reside in this village. The supply of coal in the neighbourhood of the railroad is inexhaustible, and the quality equal if not superior to any bituminous coal in America, and upon the completion of the railroad will be afforded along our lakes and canals at a very moderate price. This railroad is also very important in other points of view. It will afford the means of an easy transit for the salt, plaster, and manufactures of this part of the state to the interior of Pennsylvania.

We understand that it is to be continued to the canal along the west branch of the Susquehannah, when a direct line of communication by steamboat, railroad, and canal, will be formed from this village to Philadelphia, Baltimore and Washington, with the exception of about twenty miles be-

ɟween the head of the lake and the northern termination of the Tioga railroad.

Among the numerous improvements in progress and in contemplation, we know of none more important, or calculated to benefit a greater extent of country, according to its length, than the "Tioga railroad" from Painted Post to Blossburgh.

ENLARGEMENT OF THE ERIE CANAL.

Messrs. Editors.—A writer over the signature of "Truth," in your paper of the 30th ult. has charged "Oswego" with misrepresentations, on the all absorbing subject at the head of this article, and closes his remarks with the hope "that your correspondent, before he presents any farther account of their doings, (the Canal Board) will examine their proceedings, and give the public a correct account of their doings."

We have no wish to enter into a paper warfare with "Truth," whoever he may be, nor was our article an attack on the Canal Board. Had we designed to convey the idea, which "Truth" intimates—as our charge, viz. *that the whole mason work was to be done in the winter*, we certainly should not have referred to Doc. 99, pages 8 and 10, of the State Engineers' report to the last Legislature, and "Truth" must have known it. The article in your paper of the 21st ult. speaks for itself, and how far it has been answered, we leave the public to judge. It is true that we have called on the Canal Board, through their engineers, "to place before the public the *Modus operandi* of executing this important work, *without interrupting the trade upon it*," and say—"that up to this time, the engineers in the employ of the state stand uncommitted, and that the public should not be kept in the dark on this subject,"—farther—"that the public require that there should be a responsibility resting somewhere, in the event of a failure," and that we have good reason to suspect a failure, was attempted to be shown, and stands uncontradicted by "Truth," to wit—"that the Erie Canal has been gradually filling up by deposits, since its construction, and that if the active agents of the Canal Commissioners *have not time to clear it out*, the plan of enlarging it must be visionary." This is what we have said, and it is a plain proposition that appeals to the good sense of every one. When "Truth" will tell the public (and I suspect him to be an engineer from his style of writing, and can no doubt answer the question)—how he will get rid of the dirt on the berme or heel-path side, and work dry? and also, how he will convey it across the Canal, whilst the boats are constantly passing, and get rid of the rain water and springs, particularly along he steep hills, on the sides of which the Erie Canal is constructed, to a great extent? (except at an expenditure that is not warranted by a prudent engineer—nor is it a class of work, from its many contingencies, that would be undertaken by responsible contractors) we may then make other queries. We have been familiar with the reports of the Engineers for several years, and have not discovered, with our spectacles, the mode o enlargement, in the *summer time, withou interruption to the trade upon it*. It is very rue, that the Canal Board and Commissioners, in their reports, say that this idea must not be entertained for a moment, but we 'have some fear of interruption, when we find in the document referred to pages 185, 186 and 187. That in Mr. Hutchinson's part of the report, speaking of the difficulties of *depressing* the bottom of the Canal, from Lake Erie and passing to Lockport, 31 miles—dredging out with mudlines the Tonewanda Creek—he says, "The excavation of this rock, will form a large item in the expense of improving the Canal, and will take several years to accomplish it, and it appears to be indispensable for the passage of the necessary supply of water."—He then proposes "a new location for the south Locks at Lockport," and adds:—

"*But possibly it may be deemed advisable to construct an inclined plane* (!!) temporarily, similar to those on the Morris Canal, to pass loaded boats on a similar plan, with *cars* to facilitate the transportation of their cargoes (!!!) On pages 190 and 191, Doc. 99, it is stated "that west of "Lockport the earth has so washed in, that "in parts, that there are not more than 3 ½ "feet in depth by 24 feet wide—that these "obstacles have only been removed par-"tially, by under water excavaters, in "summer—or in the frosts of winter at "*great expense*—this channel is yet so con-"tracted, that in passing 6000 feet in Au-"gust and September, a descent was form-"ed in 7 miles, on the surface of the Ca-"nal of about two feet!!"

"Truth" trumpets the report alluded to of the State Engineers, presented to the Legislature on the 26th January last, of near 300 pages, principally calculations and figures, made out as they confess hastily, of "at least some evidence of the publicity of the doings of the Board on this subject." (the enlargement.) Let this document speak for itself. We find four engineers walk over 363 miles of canal in about two months, and then, in this time, viz.—from 20th July, (the day the Canal Board met to determine the size of the Canal) to 17th October, the date of their report, they gravely set down, discuss, and within three months of field and closet work, make *two* estimates of the cost of enlargement of 363 miles of Canal, to 6 feet by 60, and 7 feet by 70, at the expense of above twelve millions of dollars, leaving out of view as they do, any allowances for damages, for lands, &c. for widening the Canal through the flourishing cities and villages of the west.

We have no desire to run a tilt against the Canal Board—we respect a l its members individually. There is a high order of integrity and intelligence in the officers of our State governments, who constitute a part of the Canal Board, which office they hold, if we may use the term ex-officio, but without *pay* or *emolument*. Their salaries, in relation to the duties they have to perform, and responsibility cast on them by the Legislature, have no proportion to their merits. They very naturally *avoid taking any unnecessary responsibility*, merely execute any laws in relation to the Canals that the Legislature may pass. We presume the engineers will excuse themselves, for not making the comparative estimate, for an entire *new Canal*, (and set a cheaper rate of taking damages into consideration) as we have heard more than one do, by saying, that "*they had no orders*," and there was no law on the subject.

Our internal improvements in this State are continuing to increase daily, and assume importance with other States, when it is considered, that we hold the only *great water passes*, from the west to the ocean.—Good sense should prompt us, to organize a *Board of Internal Improvements*, who will not consider themselves wedded to Canals, or Railroads, this or that particular interest.

OSWEGO.

"Truth" has only got half of the story, "of building a house over the entire length of the Canal," this idea is original with a distinguished Senator, who, from his place after the report in question came out, factiously proposed, that a Tunnel should be made from the Hudson to Buffalo, "to be filled with steam, and then the navigation could be kept over the whole winter."

O.

REPORT.

Pensacola, Florida,
Feb. 6, 1836.

TO THE PRESIDENT AND DIRECTORS OF THE ALABAMA, GEORGIA, AND FLORIDA RAILROAD COMPANY.

Gentlemen:—Having just completed the examinations of the country between this place and Columbus in Georgia, in obedience to the instructions of the Topographical Bureau, dated October 1st, 1835, with a view to ascertain the facilities afforded for, and the advantages that would result from, a railroad communication between those two points, I have now the honor to submit to you the following report upon the subject:

The object of the contemplated work, is to effect a communication, long since demanded by the interests of the General Government, and more recently by the rapidly increasing population inhabiting the section of country included between the Appalachicola and Chattahoochee rivers upon the east, and the Alabama river upon the west; the parallel of latitude passing through Columbus, in Georgia, and the vicinity of Wetumpkee (the head of navigation on the Alabama river) on the north, and the coast of West Florida on the south.

The counties in Georgia and Alabama, bounded by the waters of the Coosa upon the north, which send their products to Columbus for shipment to the seaports, might also be justly included as interested in the construction of the contemplated railroad. The section of country in Alabama and Florida, previously described, however, embraces of itself an extent of 150 miles from north to south, by an average breadth of 140 miles from east to west, and contains an area of 21,000 square miles, or 13,440,000 square acres. A large ortionp

of it has very recently been obtained by treaty from the Creek Indians, is generally of a rich soil, and admirably adapted to the cultivation of cotton. It is already eagerly sought by an enterprising and industrious population from the northern, middle, and neighboring States. Although well watered in an agricultural point of view, and affording at many points water power that might be advantageously applied to machinery of various kinds, this section of country is, for the most part, denied those facilities of internal navigation which are enjoyed by many parts of our country, and have been so successfully applied to the developement of their agricultural and commercial resources.

With the exception of the two large water courses mentioned as forming here our east and west boundaries, the Escambia, the Conecuh, and the Choctawhatchee, are the only streams upon which navigation can be said to exist at all, and this is so limited in distance, and is of such short duration, as to afford but little of what is requisite to satisfy the demands even of the inhabitants residing in the immediate vicinity of those streams.

The Apalachicola and Chattahoochee afford a steamboat navigation from the gulf, as high up as the falls of the latter river, (which is the seat of the flourishing town of Columbus, Georgia, containing already a population of nearly 4000) for about five months in the year, namely, from the 1st of December to the 1st of May. It is true, the period of navigation is sometimes greater than here mentioned, but it is also sometimes shorter. During the remaining seven months, the navigation for this class of vessels is either entirely suspended, or is so much obstructed as scarcely to afford any of the facilities for transportation required by the country bordering upon those rivers.

The same remarks appear to be equally applicable to the Alabama river as high up as Montgomery and Weetumpkee, which is near the head of navigation upon this river. This is also a very crooked stream, and the distance from Mobile to Montgomery, although only 180 miles by land, is about 500 miles by the course of the river, and requires usually two to four days for the passage of steam-boats in descending, and three to six days in ascending.

The period of suspended navigation upon these waters, now almost wholly resorted to by the planters who reside near enough to them in seeking a market for the produce of their lands, embraces a considerable portion of that important season of the year when cotton, the staple of the country, should be gathered and sent to market, and when return supplies of every description, such as dry goods, groceries, salt, provisions of certain kinds, bagging, &c. are required by the country merchant and by the planter.

From information obtained from many sources in the course of my examinations through the country, I am satisfied that two months are sometimes lost by the planters for the want of the necessary facilities of transportation, before they can convey their crops to market, after they are fit to be gathered, or obtain the supplies which they require for domestic consumption.

But these disadvantages which apply to the section of country bordering upon these rivers, are felt in a much greater degree by the mass of population residing in the interior, who must at all seasons of the year, whether of successful or suspended navigation, resort to the more expensive and tardy expedient of wagoning, in order to approach these distant waters in a lateral direction, or by the same means to reach a market upon the distant seaboard.

It needs but a glance at the map herewith submitted, to show that a railroad judiciously located between Columbus and Pensacola, and provided with the lateral branches authorised by the charter already obtained by the citizens who advocate this enterprize, would not only obviate all the difficulties which now create delay and uncertainty, and augment the expense of conveyance, but that it would greatly increase the tide of emigration to this extensive and rapidly improving country, a considerable portion of which has been but recently opened to cultivation, and is blessed with a climate scarcely equalled in salubrity by any portion of our cotton growing districts.

It would also open an avenue by which the products of this new and rising country, might always be conveyed at a cheap and rapid rate, to a sea port equalled by but few in the United States, and by no other south of the Chesapeake bay, for all the purposes of commerce, or for maritime defence; a sea port which, since the acquisition of the Floridas by the United States, has only required a communication to be opened with the interior, to bring into requisition and extensive operation all those peculiar advantages which it has long been known to possess.

For full information respecting the character of the harbor at Pensacola, I would here refer to the hydrographical chart of Lieutenant Colonel James Kearney, of the United States Topographical Engineers, executed by order of the War Department, soon after the cession of the Floridas to the United States, and now deposited in the Topographical Bureau at Washington. It will there be seen that the width and depth of the channel over the bar, which is easily approached from the sea, readily admits vessels at low water drawing not more than 21½ feet, or 24 feet at the usual high tides. This channel is three-fourths of a mile wide, is very direct, and admits the passage of frigates through it.* Sloops of war of the largest class in our navy have frequently of late beat through this channel with a head wind, thus affording a practical illustration of its character in accordance with the chart above alluded to.

After passing the bar, which is narrow, and getting within Santa Rosa point, the harbor is perfectly land-locked, and its great capacity, excellent anchorage, and the depth of water extending quite up to the town of Pensacola, and indeed as far as the Bayou Texar, afford accommodation and security for the most extensive commerce.

Were it necessary to dilate upon the importance of the harbor of Pensacola in a national point of view, whether regarded as the rendezvous for our West India squadron, engaged in the protection of our commerce in time of peace, or as a great depot for our navy, operating for the defences of the whole sea coast of the Gulf of Mexico, in time of war, the report of the Board of United States Engineers, of the Board of Navy Commissioners, and of the several naval commanders† who have served upon this station at various periods since the establishment of the navy yard here, might be adduced as furnishing the most satisfactory and conclusive evidence upon the subject.

Heretofore Pensacola has only been made a limited depot for supplying our ships of war belonging to the West India squadron, &c. with provisions and water, and such rigging, spars, and small arms, as might occasionally be required. But the necessity of an establishment upon the Gulf of Mexico for the construction and outfit, and for all the important repairs of our ships of war employed upon our great southern station, has long since been felt, and must increase with the growing commerce of the vast southern and western regions of our country, whose agricultura and mineral resources have, as yet, been but half developed, and the greater portion of whose products will be conveyed to the sea ports of the Gulf for exportation or shipment to other parts of the Union. Pensacola has already been selected by those officers charged by the Executive with making the necessary investigations upon this subject, and recommended as the most suitable position upon the Gulf of Mexico for the erection of such an establishment. The contemplated railroad would certainly tend very much to the advantage of a public establishment of this kind; for it will traverse a country abounding in many of the most valuable materials that would be required for the construction as well as repairs of vessels, whose transportation would always be ensured at a cheap rate. It would also in time of war add to the security of Pensacola as a military position, by the facilities it would afford for transporting from the interior, upon any sudden emergency, the troops, arms, and munitions of war required for its defence.

This railroad will form an important link of at least two hundred and ten miles in the great line of travel and mail transportation from our northern cities to New Orleans. Columbus, in Georgia, is a point in this line as already established, and by a steamboat communication between Pensacola and New Orleans, connected with the proposed railroad, it is believed that the whole route between Columbus and New Orleans could be performed in less time and at a cheaper rate, than by any other route, that could be adopted between those two points.

The value of the public lands and of real estate generally, in the vicinity of the route pursued by the road, will no doubt be ...

* The United States frigates Brandywine and Constellation, have both passed over this bar, and been safely moored within the harbor, with their armaments, &c. on board.

† See the reports to the Navy Department upon the subject from Commodores Ridgely, Woolsey, Dallas, and Bolton, whilst in command of this station.

creased immediately upon its completion, for now large portions of those lands are depreciated in value solely from the difficulties which attend the conveyance of their products to market.

Having thus briefly detailed some of the advantages, public as well as local, which, it appears to me, would result from the accomplishment of the proposed railroad, I will now proceed to describe the character of the country, the natural facilities afforded by it for such a work, and the route which it appears to me from a careful examination of the country, most advantageous to be pursued.

Route of the Railroad.

Commencing at a point opposite or near the town of Columbus, in Georgia, the most eligible route for the railroad will be to pursue the valley of the Chattahochee until near enough to the Oochee to attain its valley, without admitting at any point an inclination of more than twenty-five or thirty feet rise or fall per mile. The route thus far will be chiefly over a smooth alluvial bottom of rich soil, abounding in excellent timber for the construction of the road, such as white and black oak, hickory, ash, black and sweet gum, and an abundance of yellow pine upon the adjacent ridges and high grounds. Profile of the route will present inclinations nowhere greater than ten or fifteen feet rise or fall per mile, except in avoiding the circuit of the valley of the Chattahoochee just before it receives the Oochee. In order to gain the valley of the latter stream by a shorter route, the trace of the road will be rendered more straight, but it may be necessary to admit one or two short inclinations not exceeding thirty feet per mile. Distance from Columbus, twelve miles.

The valley of the Oochee now offers great facilities for the location of the road, enabling us at a very moderate expense to gain the dividing ridge between the waters of the Chattahoochee and those of the Tallapoosa, a tributary of the Alabama river. This may be accomplished by pursuing this valley nearly in a west direction and along an alluvial bottom, one-fourth to one-half, and sometimes three-fourths of a mile wide, for a distance of sixteen or seventeen miles, until it interlocks with one of the head branches of the Openthloco,* and thence occupy the dividing ridge above-mentioned: or we may leave the valley of the Oochee below the point where it is now crossed by the Federal road, and connect with the valleys of the Hatchechubby and Cowcakee, and thence attain the same ridge a few miles farther to the westward. Both these routes are perfectly practicable, and will present very slight inclinations in the grading, except immediately upon leaving the valleys to surmount the ridge, where we may find it necessary to admit a rise of thirty-five feet per mile for a very short distance, in order to avoid the expense of deep cutting. This inclination will, however, be easily surmounted by locomotive engines with their full loads, and is only mentioned here as standing in strong contrast with the more favorable character of the route, almost throughout.

It will be perceived by an inspection of the accompanying map (sheet 1,) that the ridge above alluded to, after passing the head waters of the Cowakee, continues to divide the waters which flow into the Chocktawhatchee and Yellow water bays, upon the left, from the main stem of the Conecuh flowing upon the right into Pensacola bay. It is composed of a light sandy soil, combined with vegetable loam, and supports chiefly a growth of the tall yellow or long-leafed pine, interspersed occasionally with white and black oak, hickory, ash, &c. It is well drained on both sides by valleys, whose sources approach frequently very near one another, but run in opposite directions into the Conecuh upon the right, and into the Pea rivers, the Yellow Water, Black Water, and Clear Water rivers upon the left. These lateral streams frequently drain lands of a rich soil, where we find shells and a species of decomposing limestone appearing at the surface, with a growth of hickory, ash, oak, gum, &c. indicating their adaptation, the cultivation of cotton, Indian corn, &c.

From Old Fort Bainbridge, this ridge pursues a course nearly W. S. W. remarkably straight for eight miles, and over ground almost level, requiring scarcely any other labor in grading and preparing the road-bed for the reception of the railway, than to clear away the timber, which would be used for sleepers, stringers, &c. in the construction. After this the ridge becomes comparatively undulating and broken, for a distance of five miles, reaching a little beyond Doctor's Hill;* but by deflecting a little to the westward of the direct course, and heading the middle fork of the Cowakee, the valley of the Conecuh may be gained advantageously, and without any where admitting a greater inclination in the road, than the maximum already mentioned. This valley will afford an easy passage for the road, until we reach the vicinity of Monticello, distant seventy-five miles from Columbus, by the route here described, and then the ridge may be again occupied and pursued over a surface presenting very slight undulations, and crossing but few ravines, until we reach the vicinity of Montezuma, in Covington county, distant fifty-six miles from Monticello. The west side of the valley of the Conecuh also presents a favorable route for this section of the road, and the surveys of location will afford the only correct data for determining which of these two routes will be entitled to the preference. No obstacles of moment are presented by either of them.

Near Montezuma, the Falls of the Conecuh are situated, which might easily be made to furnish a valuable water power for any kind of machinery which the future improvements of the country may require.

From the vicinity of Montezuma, the road may be located on the east side of the Conecuh, keeping upon the dividing ridge or plane before mentioned, which now assumes so level, smooth, and broad a surface, as scarcely to offer an obstacle worthy of note, until we reach the mouth of the Escambia. Within this distance of seventy-six miles, a few moderate embankments or short bridges, will be required to keep the road nearly upon a level in passing some ravines; but, with these exceptions, so flat is the surface of the country, and elevated entirely above the reach of freshets from the neighboring streams, that the chief work in grading will consist in cutting down the lofty yellow pine timber, which overspreads this plane, and will be used in forming the wooden portion of the railway.

Should it be desired by those who are most interested in the improvement, to keep the road upon the west side of the Conecuh, between Montezuma and the mouth of Murder creek, so as the more conveniently to receive the products of the country watered by the West Branch or Patsaliga, the Pigeon creek, the Sepulga, and Murder creek, which are boatable at certain seasons of the year, a personal examination of the country upon that side enables me to state that it will be practicable to do so at a very moderate expense. Three additional bridges would be necessary for this purpose, which would vary from two hundred to four hundred feet in length, and would be constructed of the timber growing immediately in the vicinity. In this case, the road, after recrossing the Conecuh above the mouth of Murder creek, would occupy the trace previously described on the east side of that river, until it should reach the mouth of the Escambia some where in the vicinity of the town of Florida.

Whether the Escambia should be crossed by a single short bridge above Brosenham's island, or by two bridges connected by running the road across that island, or by a long bridge traversing the wide expanse of water which occurs immediately below that island, is simply a question of economy, which will easily be solved by the minute surveys which will attend the tracing out the route of the road prepatory to construction.

It will be sufficient here to state, that no difficulty is apprehended in either case, which may not be surmounted at a reasonable cost. The depth across the head of the bay opposite the town of Florida, is generally from three to six feet, except in the channel, where there is a depth not exceeding twelve or fourteen feet, for a width of one hundred to one hundred and fifty yards. The flow of the tide is only two and a half to three feet, attended with the peculiarity of only one high tide and one low tide, in the twenty-four hours. The bottom appears to be well adapted to sustain the necessary superstructure resting upon piles, but should be minutely examined by boring, whilst the surveys of location are going on.

After crossing the Escambia, the route to Pensacola, a distance of ten miles from the present ferry, will pass over a light sandy soil, offering facilities as great as on the other side of that river. The country continues here to be so nearly level, that no excavations of consequence will be required.

* This stream empties into the Ufawbee, a tributary of the Tallapoosa.

* The former residence of an Indian doctor of some celebrity amongst the Creek Indians.

☞ An embankment from eighty to one hundred yards in length, with a maximum height of twenty to twenty-five feet, will be requisite in crossing the valley of the Bayou Texar, a stream which empties into Pensacola bay a short distance above the town. The road may be made to terminate any where between the mouth of this bayou and the city as now improved, but the point affording the deepest water for vessels to ride at anchor in, will probably be selected for this purpose.

The whole length of this railroad will be from two hundred and ten to two hundred and twenty miles. The distances here stated are not from actual measurement, but are derived as near as practicable from an actual reconnoisance of the whole route, aided by the best maps, projected from the surveys of the public lands, in the General Land Office at Washington.

General Remarks.

There are but few portions of the United States that afford natural advantages for the location and construction of a railroad, so great as are presented by the route which the road here contemplated will pursue. The country, generally, is so smooth and level in its aspect, requiring consequently but little labor to obtain the most advantageous grades for locomotive power, and timber of the best quality for forming the wooden superstructure, is every where upon the route, so abundant and so cheap, that the cost of construction will fall far short of what is usually requisite for similar works in other sections of the country.

There will also be a perpetual source of economy in transportation upon this road, arising from the few undulations and moderate inclinations which its profile will exhibit. The curves upon it will be few and moderate, and will connect long portions of straight road; features which are always desirable in railroads designed for the conveyance of passengers, because they admit of great velocity in transportation, without liability to accidents.

All the materials for construction will be found in abundance on the route, excepting alone the article of stone. Limestone and sandstone are found in some localities upon the route, suitable for culverts and the abutments of the short bridges which will occasionally be required. The soil is, however, well suited in many places for making bricks, which may be substituted for stone at a reasonable cost, and are known to answer perfectly well for such structures.

In many cases, instead of earthen embankments resting upon stone culverts for passing ravines requiring water passages, wooden bridges will be found as cheap, or even cheaper, and may be made to rest upon supports composed of the same material, for which stone may afterwards be substituted by employing the burthen cars in depositing it at the required points, during those periods when the traffic upon the road is most diminished.

All which is respectfully submitted by your obedient humble servant,

JAMES D. GRAHAM,
Major U. S. Topo. Engineers.

AVERY'S
ROTARY ENGINE.

INTERESTING FACTS AND DOCUMENTS IN RELATION TO AVERY'S ROTARY ENGINE.

MANY of this description of Engine are *now* in use, to the entire satisfaction of all who are *familiar* with their operation.

One may be seen at the ASTOR HOUSE, and another at Isaac Pierce's *mahogany saw mill*, in Attorney st., N. Y.; and in various other places, as will be seen by this pamphlet. One will be shipped, in a few days, for the government of PRUSSIA, and another for the government of RUSSIA.

The demand for them is now greater than can be supplied by the *constant labor of one hundred men*; and a much larger number will in a short time be engaged in their manufacture.

The annexed cut shows an edge view, a section cut through the centre, and a iew with the case taken apart.

Fig. 2. Fig. 1.

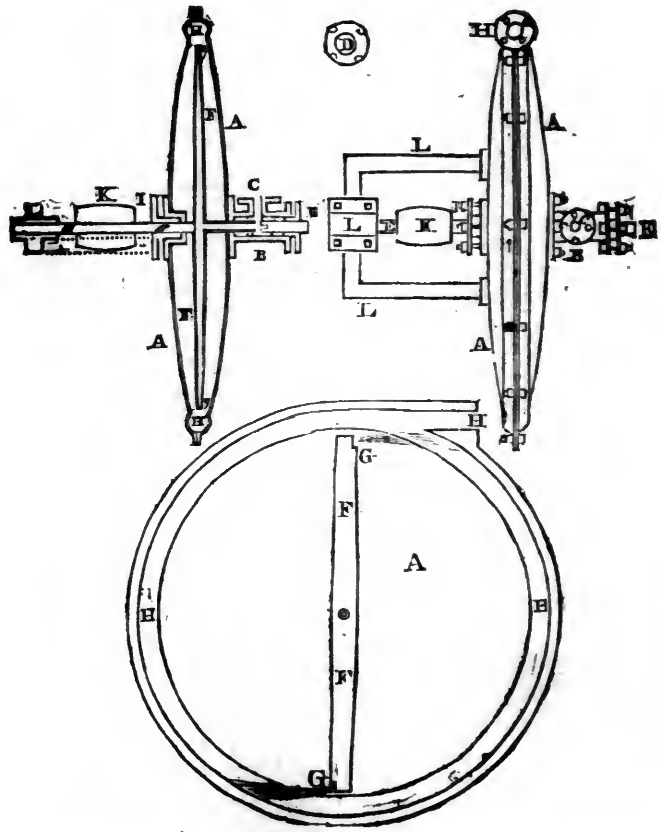


Fig. 3.

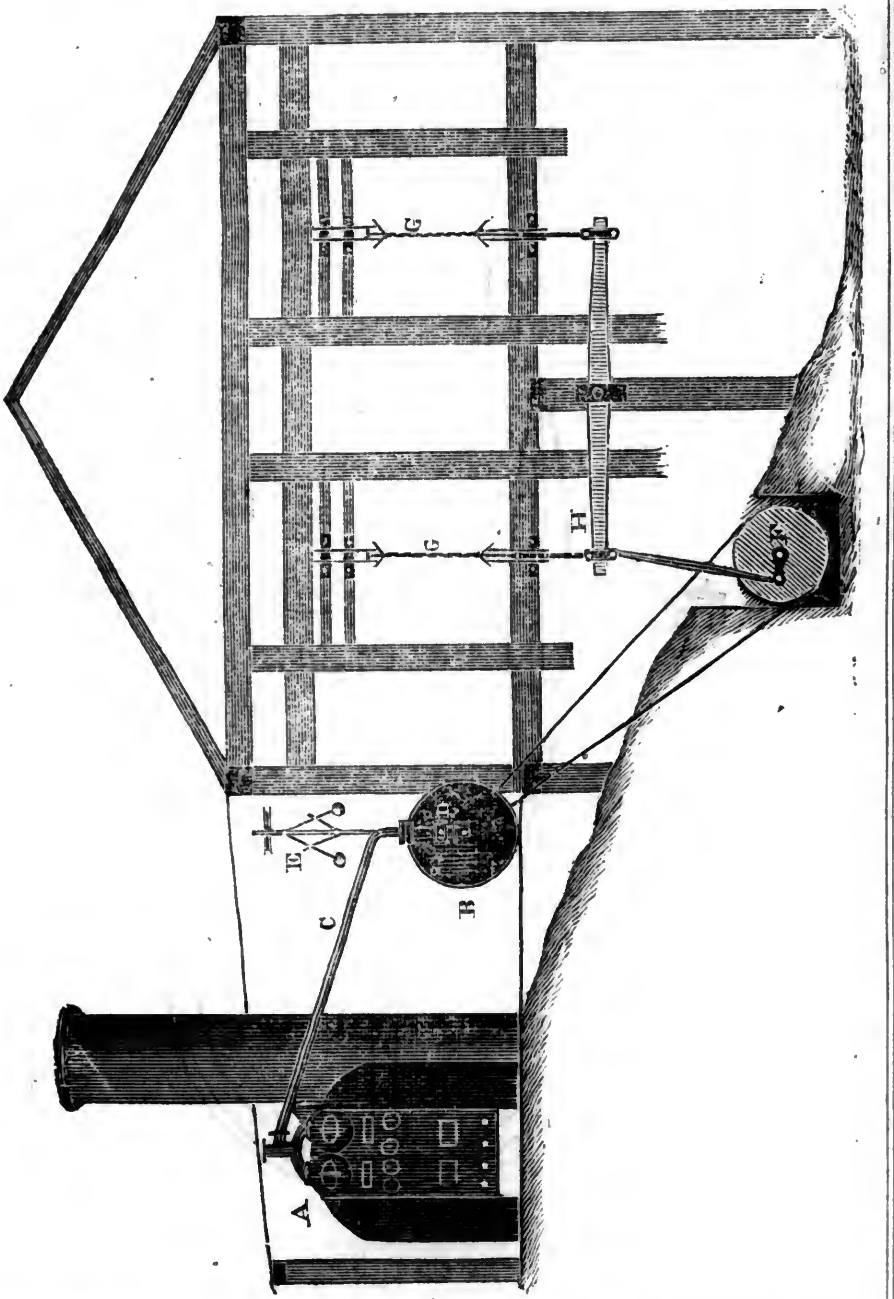
The above cuts, and references will give somethingof an idea of the Rotary Engine, but nothing short of a personal examination can do it justice. Fig. 1. A side view of the Engine. Fig. 2. Section of do. Fig. 3. The Case taken apart, showing the Arm F. within. A, case of cast-iron $\frac{3}{8}$ inch thick. B, packing-box, through which the steam is admitted at C. C, the passage for the steam from the boiler to D. D, metal open steam-box, surrounding the shaft under C. E, E, E, the shaft which is hollow to F. F, the arms through which the steam passes to G. G, the aperture, the size of which is as the work to be done. H, the escape steam passage This passage will be understood by referring to H, H, Fig. 2. I, stuffing-box. K, and-pully. L, Pillow-block.

The following cut represents a saw mill with two saws driven by a ROTARY ENGINE. There may be two *gangs* as well as two *saws*. A represents the boiler; B the engine; C the steam-pipe; D the shaft, into the *end*, or *side*, of which the steam passes from the boiler, through the pipe C; E the governor, which regulates the passage of steam; F the drum around which the driving band passes from the pully on the end of the shaft D. On the end of this drum is a crank for driving the balance-beam H, to each end of which is attached one or *more* saws, as at G, G.

This mill is represented as situated on a side hill, and the drum placed in a pit under the mill.

This is similar to the mill referred to in the letter of Mr. Buel, of St. [illegible]

A SAW MILL WITH TWO SAWS, OR TWO GANGS OF SAWS.



Saw mills of this description are in common use in the western and southwestern states, driven by Avery's Rotary Engine, which is now coming much into use, for flouring and saw mills, cotton gins, and other purposes, as will be seen by the accompanying extracts of letters to Judge Wilkeson, of Buffalo, who has the agency west of the Lakes and Alleganies. These are only a few of the very numerous letters, which mi ht be published, commendatory of the engine; yet they are, with others herewith given, sufficient to place it in its proper light before the community.

A candid perusal, and unprejudiced examination of the engine, w ll satisfy those who de-ire to be convinced. This engine speaks, by its *silence*, its own praise, to those who witness its operation.

The gentleman, Mr. Kinney, who wrote the letters from which the following extracts are made, resides at Louisville, Ky., and has a *Machine Shop there*, in which the first Rotary Engine was put up west of Pittsburgh. The Engine operated so much to the satisfaction of Mr. Kinney, and his partner, that they undertook the putting up of Engines in the south western States.

It will be observed that it was with difficulty introduced into use, in the south-west, as there were but *few* who dare trust their *eyes* when its operation was so directly in the face of *previous theories*, and especially whilst every machinist and man of science *opposed* it.

Louisville, Ky., June 30, 1835.

Messrs. Wilkeson & Sons,

Yours of the 25th May came to hand in due time. I have now an opportunity to put up a Rotary to drive 2 pair of 3½ feet mill stones, if it is done soon. I wish you to send me an Engine which shall be the most suitable for that purpose; and if you please, send 2 or 3 of the small size, (3 feet arm.) Please to send such parts of the Engine, or Engines, as were brought here by Judge Wilkeson. Please to send me also, soon as possible, all the information you can respecting the probable velocity of the large engine—the quantity of boiler requisite for the two pair of 3½ feet stones—the best mode of constructing all the machinery necessary to set the mill stones in operation, &c. &c. Wm. Kinney.

Louisville, April 15th, 1835.

Mr. Wilkinson—

Dear Sir—On the 30th inst. I received a letter from Wm. Linn, Esq., of Vandalia, Ill., requesting us to state to him the cost of a Rotary Engine, of sufficient power to drive a Saw to advantage, or a pair of four feet Stones to manufacture Flour or Meal, well and fast. I answered his letter immediately, stating every thing necessary respecting the Engines. That the price of the one of the power required will be $850, in this place, the expense of transportation and putting in operation to be added to it and also mentioned the probable cost of the same.

I have sold no Engines although multudes have.

Louisville, Ky., 4th July, 1835.

Judge Wilkeson:—

Sir—Your's of the 25th May is at hand. In compliance with your request I now write you at Galena. On the 30th ult., I wrote to S. Wilkeson and Sons requesting to have sent to me immediately one large engine suitable to drive two pair of 3½ feet mill stones, and also two or three small ones, with three feet arm. I have contracted to put up an engine to propel two pair of 3½ feet stones to manufacture flour or meal, for $900—a low price but I judged it best to do it. I expect to go to Richmond Id., on Tuesday next to put up the engine for E. Grover & Co.

Our engine operates as well as ever—Multitudes come to see it. But very few are willing to purchase at our prices—*The* principal objection is that all engine builders speak against Rotary engines; and that the engine which was put up at Cincinnati has been taken down. I shall take *that boiler and Engine* from Cincinnati to Richmond.

Louisville, 15th August, 1835.

Messrs. Wilkeson & Sons:—

Gentlemen—Your's of the 22nd July is received, and a letter, from S. Wilkeson, Esq., Dixon's Ferry, Ill., and also three boilers from G. and J. H. Shoenberger.—The boilers I shall use for Mr. Dupuy's mill as soon as the engine arrives, which I hope and expect will be soon. I arrived here on the 29th ult. from Richmond, Ina. I left E. Grover's & Co.'s engine in complete and successful operation. I met with no difficulty, the first time I raised steam, in making the engine operate to the entire satisfaction of its owners, and the admiration of the multitudes, who came to see the far famed Rotary steam engine. This is the *same engine and boilers* which were taken down at Cincinnati. E. Grover & Co. were so well pleased and satisfied with it that they unhesitatingly paid my bill which was $545 47.

Signed W. KINNEY.

Louisville, Aug. 23d, 1835.

Mr. S. Wilkeson & Sons,

Yours of the 8th inst. is received. The plan proposed to gear the Mill stones I approve of, and should adopt it at this time if I had not prepared to drive them by band. The 3 Engines all arrived safe on the 14th. I expect to leave here for Shelbyville on the 25th to put up the large Engine. On the 21st I received a letter from S. Wilkeson, Esq. in which he states that he has made arrangements to put up a Saw-Mill at Dixons Ferry, Rock River, Ills.; and that he should like to have me go there and put up the Engine. I have written to him at Rock River, and lest he should not be there, I will say at this time, that it will be very difficult for me to go especially if I go to the the Red River Country this fall or winter, notwithstanding I will go if I can obtain no other man. Mr. Barbaroux is anxious to have me go to, Natchitoches, Red River, and put up 2 Rotaries. A boat will leave here for that place about the 15th October.

Louisville, Ken. 28th Sept. 1835.

Messrs. Wilkson & Sons.

Gentlemen:—The Mill at Shelbyville operates admirably well; I put up the three 18 inch boilers which I received from Pittsburgh, and find that there is a superabundance of power to drive two pair of 3½ feet stones, so as to grind Wheat or Corn, well and fast. I remained two days after they commenced grinding, and left every thing operating to the entire satisfaction of all. Mr. Dupuy was much pleased with the engine, and unhesitatingly paid $400, and gave good security for the remaining $500.

Having all my machinery ready to drive the stones by bands when your plan arrived, (to drive them with gear.) I could not without much expense and delay, make the alteration. The large wheel is 6 feet, its shaft is 9 feet long, upon which is a drum, and from which drum bands pass to pulleys on the spindles which drive the stones; bands also pass from the drum to drive the force and cold water pumps, elevators bolts, screen, fan, and hopper boy, all of which perform their office well and sufficiently fast to convert 10 *bushels of Wheat per hour into Flour.*

Louisville, Nov. 13th, 1835.

Gentlemen;—Mr. Henry's Engine and its appendages arrived in due time and safe. I have shipped all Mr. Henrys Machinery and Mill-stones for *Kaskaskia,* and I shall start this day myself to put them in operation. I have also shipped Mr. Prower's Engine and other Machinery for Woodville, Mississippi. I shall probably be able to leave Kaskaskia for Woodville, about 1st Dec. Mr. Bull of this city, has been authorized by Mr. Dunbar of Mississippi, to contract with us for a Rotary Engine to propel Cotton Gins. Mr. Bull desires me to see Mr. Dunbar when I am in Mississippi; his residence is 18 miles from Natchez up the River.

Chester, Ill., 15th Dec., 1835.

Messrs. Wilkeson & Son.

I this day left Kaskaskia for Woodville, Miss., having put Mr. Henry's Engine in successful operation. He is fully satisfied with its performance, so far as he has had an opportunity of testing it. His Saw Mill is not yet built, but will be as soon as I return to Louisville, and can prepare the machinery. I have put two run of 3½ feet stones in operation for him, and believe the power is sufficient for three run of 3½ feet, or even four feet. I put up three boilers 20 feet long and 22 inches diameter, say exactly by that size. More pains should be taken to have the large Engines accurately balanced, and the pulley also should be put on the shaft before the arms are, and exactly balanced—if the pulley is not balanced it produces a vibration between the end of the shaft and the centre, against which it runs. I am more pleased with the operations of all parts of *this* Engine than any Rotary I have yet put up; and I believe it will be so managed, by those who have the care of it, that it will continue to perform well.

The bevel gearing which I put on the spindles of the stones, and the horizontal shaft between them, have cogs in the pinions, (which are on the horizontal shaft) and 42 cogs in the wheels (on the spindles)—the pitch is 1¾ inches. The wheels on the spindles, instead of being above the pinions, and thrown out of gear by a lever, are below, and are thrown out of gear by dropping them on to the bridge-trees. It will not answer to place the wheels above the pinions, for the jar of the wheels will tend to throw the stones off from the grain as they are, they work admirably well.—All the alteration which I would make in future is to put wooden cogs into the wheels. The large wooden band-wheel is 6 feet diameter. The stones have 135 revolutions per minute, and grind at the rate of seven bushels per hour.

Mr. Wm. Kinney's Letter.

In a letter dated Woodville, 2d February, 1836, the writer adds a postcript, wherein he remarks, viz. "I have put in operation for Judge McGhee *two* Cotton Gins and one pair of Mill Stones 3½ feet diameter, and I find that the Engine has an abundance of power, although I have been under the necessity of using very poor wood, but have no doubt that if I had another Cotton Gin to put on, it would drive the *three,* with the Mill. The boiler is 23 feet long, and 26 inches diameter. I expect to attach to this Engine a Saw Mill Saw, as the power is sufficient."—This engine has three feet arms.

Louisville, Kentucky, 15th May, 1836.

Gentlemen—Yours of the 30th ult. came to hand on the 11th inst. I rejoice that you have put, and are putting, Rotaries into Saw Mills, upon the Railroad, and upon a boat, and that thus far the experiments have been successful, (so far as the term experiment relates to the philosophical principle, upon which the Engine revolves, it is capable of demonstration,) for it will soon convince the people of this country that the Rotaries can be used for many purposes, better than the Piston Engine; and it will counteract the influence which the Engine *Manufacturers are exerting against it.*—You doubtless have, ere this, received a letter from me, which will state every thing relative to the Rotary Engine business in this place, which is of importance.

Mr. Barberoux, (the gentleman with whom S. Wilkinson, Esq., made a formal contract to put up Rotaries in the Red River County) is now in this city, and is anxious to have two Rotary Engines put up near Natchitoches, as soon as the 20th Sept., for which he will pay $1200 each, when they shall have been put in complete and successful operation.

The following letters were furnished us and were published in the Railroad Journal more than a year since, (see No. 18, Vol. 4.) They show the performance of the Engine in the Mill of Mr. Felt, of Clay, Onondaga Co., N. Y., which has been witnessed and admired by *thousands* of intelligent gentlemen from all parts of the country. The gentlemen whose names are attached are among the most respectable in Onondaga county:—

"*To the Public.*—Having been requested by Messrs. Elam Lynds & Son, to examine a Rotary Steam Engine, manufactured at their foundry, (of Wm. Avery's invention,) now in Mr. N. Felt's saw-mill, and in which I am informed they have had a common Piston Engine, with which they were unable to operate their mill successfully,—being much pleased with the operation of the Rotary Engine, although it was laboring under great disadvantages, I embrace this opportunity of saying to the public, that I am satisfied that there is abundant power to operate a mill successfully, and I consider them far preferable to any other Steam Engine now in use for milling purposes. Isaac Lewis.

"Syracuse, April 20, 1835.

"We were present at the above exhibition of the power of the Rotary Steam Engine, and fully concur with Mr. Lewis in his statement, from what we saw of the Engine, and from our confidence in him as a millwright and a practical mechanic.

Roswell Hinman,	Ashbel Kellogg,
Thos. Spencer,	J. G. Forbes,
M. D. Burnett,	P. D. Mickles,
M. S. Marsh,	V. W. Smith,
Daniel Elliott,	J. M. Patteson,
L. H. Redfield,	E. K. Smith."

The following inquiries have since been addressed to Mr. Felt, to which the answer annexed has been furnished. We recommend the correspondence to the attention of machinists.

We extract the inquiries from a letter to Mr. F. from E. Lynds & Son.

"1st. Have you made any alterations in your boiler, in any form or manner, since putting the rotary in use, so as to afford more steam with less fuel?

"2d Is there any difference in the amount of fuel required to perform an equal amount of labor with either of the engines? If so, which requires the least, nnd what is the difference in the quantity ased?

"3d. Does the rotary engine do more or less work, in the same time, than the piston engine? What is the amount of difference?

"4th. Which engine do you conceive to be the most simple in its construction, and in its application to any mechanical purpose the most natural? Also, which is kept in repair with the least expense?

From Mr. Felt. to Messrs. Lynds.

Clay, May 1, 1835.

"GENTLEMEN,—It is with pleasure I comply with your request in giving my opinion (founded upon practice and short experience,) in relation to the difference between the former High Pressure and Avery's Patent Rotary Engine, which I now have in operation in my saw-mill.

"In answer to your first question, I would say I have made no alteration in my boilers or arches.

"2d. As to the amount of fuel required I am not able to answer precisely, but am sure the rotary does not require more than two-thirds the quantity to put it in operation the piston engine required.

"As to the amount of the business performed, the rotary will do double the amount of the piston engine in the same time. So far as I am acquainted with the two engines, I consider the rotary the most simple in its construction and application to mechanical purposes, and I think is kept in order with the least expense. With the experience I have with the two engines, I should prefer the rotary for any mechanical purposes whatever.

"Respectfully yours,

"NORRIS FELT.

"Elam Lynds & Son."

—

The following letter is also signed by several of the citizens of Syracuse, after *another year's* successful use of the Rotary, since the preceding letters were written.

Syracuse, June 13, 1836.

The undersigned citizens of Syracuse have frequently observed the Rotary Engine of Wm. Avery's patent, made and used by Messrs. Elam Lynds & Son, in their shop and furnace in this village. It has been now for over three years in successful operation. The simplicity of the machine, its utility and ease of management has produced the most favourable opinion, and we believe that with all those who have it in use, there is a uniform judgment in its favor.

GEO. S. FITCH, JOHN WILKINSON,
E. L PHILLIPS, M. S. MARSH,
PHILO D. MICKLES, B. DAVIS NOXON,
THOMAS B. FITCH, I. G. CORLEE,
ROSWELL HINMAN, V. W. SMITH,
S. TOUSLEY, HENRY DAVIS, Jr.
S. W. CADWELL, L. H. REDFIELD,
W. & H. RAYNOR, who have one in use.
JOHN B. IVES, H. W. VAN BUREN,
JAMES BEARDSLEE,

Mr. GILMORE, the writer of the following letter, is an excellent Mechanic. He has had an opportunity of witnessing, or knowing the result and operation of most of the Engines sold by Messrs. Lynds & Son; and where he is known, it is altogether unnecessary for me to say any thing in relation to his standing. To those unacquainted with him, it is enough to say that his statement may be fully relied upon.

Syracuse, June 20th, 1836.

The undersigned, having been acquainted with the operations of Messrs. Elam Lynds & Son, in the manufacture and sale of William Avery's patent Rotary Steam Engine, would state for the satisfaction of those interested that within the period of the past two years they have manufactured and put into successful operation twenty Steam Engines, varying from six to 25 horse power, and for various purposes; all of which have, so far as has come to my knowledge, operated to the full and entire satisfaction of the purchasers. Also, that they have contracts on hand and partly completed, for thirteen Engines varying from six to forty horse power, all of which are to be completed by the first of Oct. next. I would also state, that the demand for Engines is rapidly increasing, and is now already beyond their ability to supply, and that they on that account have recently refused to enter into contracts for a large number of Engines.

A. R. GILLMORE.

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Mr. ELDRIDGE, the writer of the annexed letter, is personally unknown to me, but I have references to gentlemen of the first respectability in this city, as to his standing, which give me the utmost confidence in his statements.

Syracuse, 23d June, 1836.

Having witnessed daily the operations of Messrs. Elam Lynds & Son, in the manufacturing of Mr. Avery's Rotary steam Engine since May last. I therefore say, that the above statement is substantially correct, and although they have from 50 to 60 men in constant employ, the demand for the engine is four fold greater than their abilities to execute.

HARMON ELDRIDGE.

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The following letter is from gentlemen who have a Saw Mill in the town of Clay, Onondaga Co.

Clay, June 11, 1836.

GENTLEMEN.—We give it as our opinion from what knowledge we have of the Rotary Engine, that it is preferable to the Piston.

The slabs and saw dust during the summer will nearly keep the Mill in operation.

The average business of the Mill in sawing custom logs is about four thousand feet, and the Mill has cut over seven thousand feet out of a choice lot of logs.

J. FREEMAN,
E. L. SAWER,
J. W. SCHROEPPEL.

Messrs. E. LYNDS & SON. and
W. AVERY.

The following extract is from the pen of Dr. JONES, the able editor of the Journal of the Franklin Institute, in reply to a correspondent of that Journal, over the signature of "*Fair Play*," who questions the originality of the principle with Mr. AVERY, and of course the validity of his patent.

From the Jour. of the Franklin Institute.

"It so happenes that "Fair Play," and others, who desire information on the subject of Foster and Avery's Re-acting Steam Engine, (commonly called Avery's) will, in the present number,* have a full opportunity of seeing what constitutes the claim of these gentlemen to a patent for an improvement in this machine. They were fully informed respecting what had been attempted with engines similar in construction to their own, previously to their obtaining a patent; and it will be seen that they have confined their claim to improvement within very narrow limits, and so far as we are informed, their claim is a valid one. It may be said that their improvement is trifling; that, however, is their own concern, as those who do not need it are at full liberty to use the machine in any of the various forms which had been previously given to it, or to devise others which are new, without buying from them what may be deemed unimportant.

"We are not sufficiently well informed respecting the comparative results obtained from Avery's and the reciprocating, or Avery's and other rotary engines, to make up our minds respecting its real value. Between four and five years, however, have elapsed since this engine was patented, and it has been at work at Syracuse, and var ous other places, during the whole of that time, so that those who have seen it, and who possess a competent knowledge of the subject, have had time enough to investigate it. Before the patent was obtained, we expressed to Mr. Avery our general want of confidence in the real value of such engines, and our doubts respecting the importance of the improvements claimed; and we did not suppose that the career of the one in question would extend to two years; a length of life greater than has usually fallen to the lot of rotary engines; it still lives, however, maugre our anticipations, and all the reports which we have received relating to it, tend to show that it has not yet exhibited the first symptoms of decline."

The following extract from the specification, copied from the Jour. of the Franklin Institute, shows the claim of the patentees:

"We find it to be a point of great importance to give such a form to the revolving arms, as shall subject them to the least possible resistance from the air; we, therefore instead of making them in the form of round tubes, which has been heretofore done, give to them the form which results from making each half of the arm a segment of a large circle, so that, when the two halves are united, the edges of the tube present acute angles. The tubes, however, may be made elliptical, or oval, and the same end will be, in a great mea-

* See extract from the specification annexed.

sure, attained We use any number of such arms on the same shaft, as we may find best adapted to our purpose.

We do not claim to be the inventors of the reacting steam engine, nor of the case, or drum, within which we intend the arms shall, in general, revolve; but what we claim as our invention, is, simply, the giving the oblate, or flat, form to the revolving arms, so that, in proportion to their capacity, they shall experience much less resistance from the air than that to which they have been heretofore subjected, there by obtaining a greatly increased power.

AMBROSE FOSTER,
WILLIAM AVERY.

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In several articles published in other papers alluding to "Avery's Rotary Engine," *information* has been asked for; and in order to give an answer as satisfactory as possible I made personal examination and frequent enquiry of gentlemen of intelligence and character in this city, who are perfectly familiar with the *daily* operation of one of them with 30 inch arms, or five feet sweep, and the following is the result of my investigation; and for its correctness I can give the most satisfactory testimony if desired:

The Engine alluded to is now, and has been for several months, in operation in Attourney-street, in this city—where it has been visited by hundreds of intelligent gentlemen, who have been not only delighted, but astonished, at its performance—and especially with its *quiet*, and *modest* behavior—if I may so speak. It is not uncommon for gentlemen unacquainted with its appearance to go into the Engine room at the *Astor House* where there is one of eight horse power, after looking at the *boiler*, *pump* and *machinery*, *enquire for the engine*—notwithstanding they may be within a few feet of it in full operation. There is nothing in its *appearance* which indicates a *steam engine;* and in the cost of *repairs* and *attendance* there is very little more resemblance.

It will be observed that a statement is given in the following extract from the Mechanics' Magazine, of *the quantity of water evaporated*; and it may be proper for me to say that that result was arrived at after repeated and frequent measurements—I may also say that the result has since been even more satisfactory—the work having been done *with an average of* 35 *gallons of water per hour*—a result *very* different from what is *usually* estimated to be required for a piston engine. The estimate is, if I am not in error, from 7 to 9 *gallons per hour per horse power*. Allowing these statements to be correct—and they are susceptible of the most satisfactory proof,—it does not require very profound wisdom to arrive at the conclusion that *a less quantity of fuel, as well as of water, is used for the Rotary, than for the Piston engine.* Should it be also found, on enquiry, that the *economy* is *equally great* in the *first outlay* and in the *cost of repairs* and *attendance*, as it appears, by the above to be in the use of *water* and *fuel*—there can be little doubt of its coming and immediately too, into general use. That such is the fact I am prepared to shew to those who desire farther information.

The following extracts from the Mechanic's Magazine for April, pp. 244, will give something of an idea of the power and economy of this Rotary Engine.

"The arms of the engine are 30 inches long from the centre of the shaft to the apertures, and the apertures are each the 1/18 of a square inch—they are inclosed in a circular cast iron case—the shaft receiving the steam at one end and having a pully for the main band on the other.

"The following machines are all attached to, and operated by it, viz.:—

"1 upright saw with 30 inch stroke, or 15 inch crank—averaging 110 strokes per minute.

"1 buzz saw, 24 inch, cutting a kerf of 3/16 of an inch, with 22 to 2400 revolutions per minute.

"3 24 inch circular veneering saws.
"1 26 " " " "
"1 27 " " " " varying from 12 to 1500 revolutions perminute.

"1 15 inch buz saw, with 1200 revolutions per minute, and

"1 whip saw for curves, with 9 inch sweep and 250 strokes per minute.

"1 grindstone.

"1 blower for the furnace.

"And the pump raising water 30 feet into a reservoir for its own use.

"These machines are not *always* all at work at the same time—as some of them require repairing, or filing, or they are taking off or putting on logs, but this may be said without fear of contradiction—they *can* all be driven at the same time by the engine now in use, for 10, 12, or any number of hours that the superintendent and hands can tend it; and that, too, with the evaporation of an average *not to exceed* 40 *gallons of water per hour.*

"The boiler now in use was made for a piston engine, and was intended for 15 horse power.

"It has been asked, and frequently, what is the power of this engine. This is a question easier asked by many, than answered—yet most practical men form an opinion for themselves of the power required to carry this machinery—and it is, of course, in this way, estimased variously.

"It cannot, however, be put down at less than the following estimate, viz.:—

	Horse Power.	
The upright saw, sawing 110 feet per hour	5	5
The large buz saw, sawing 120 feet per hour,	5	5
The small, " "	1½	1½
The veneering saws	1	5
The whip saw, grindstone, pump, and blower		1½
		18

But to avoid over-estimates, we will put the whole at 15 horse power, to accomplish which 40 gallons of water were evaporated at an expense of fuel of *one dollar* for every ten working hours, and $1,25 cents for attendance on the engine and fire.

It should be borne in mind that these saws are all used in sawing mahogany—except the whip-saw, which is used for sawing all kinds of timber.

In addition to the above, a turning lathe is to be put in operation in a few days.

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The following letter is from an Engineer at *St. Clair*, Michigan, who has the care of one of the engines:

Messrs. ELAM LYNDS & SON—

Gent.—At your request, I herewith hand you my opinion (founded upon experience) as regards the operation of the Rotary Engine in Mr. Thos. Palmer's saw mill at St. Clair, Michigan. I have seen a number of saw mills in the same neighborhood where the common Piston engine is used, and some of them are called mills of the first class—the only data that I can get to compare the two engines is obtained from engineers tending those engines; and from that, we are doing *more* work with the Rotary than any mill in the Territory, with same quantity of fuel. I do not hesitate to say, that we can saw 6000 feet of inch boards, each and every 12 horus, with the two saws.

I have, in connection with another man, leased the Mill of Mr. Palmer for one year. We do all his sawing by the thousand.—Since starting the Mill this Spring, (we did not run it during the winter for the want of timber, which has to be floated down the St. Clair, which was frozen) I have run 46 days, and the result fully confirms what is stated above in regard to the comparative difference of the two Engines. We have visitors from all parts of the country daily, to see, and satisfy themselves as to the Rotary. All who have been here are much gratified, and I have no doubt you will receive orders to any amount you could ask.

Yours Respectfutly,
LEVI H. BUELL, Engineer

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The annexed letter is from Mr. JOHN HARRIS, of Charlotte, Mechlenburgh Co., N. C., who has the charge and superintendance of a Gold Mine, and it will be found interesting as explaining the mode of operation to obtain gold from the ore as well as in relation to the engine.

New-York, July 12, 1836.

MR. D. K. MINOR:—

DEAR SIR—Your note containing questions respecting the Rotary Engine has been duly received, therefore in compliance with your request I transmit to you the following answers,

1st. The diameter of the Engine, or length of arm is 5 feet.

2nd. Its estimated capacity or power, was considered by the maker to be equal to twenty horses, which power it has generally performed since it has been in full operation, so considered by myself as well as others employed at the establishment. I am not prepared to say what power the engine would be, by an additional pressure of steam, but the highest pressure used by us, never exceeds 100 lbs. per square inch in the boilers, and frequently not over 80 lbs.

3d. The machinery and apparatus used are of a very complex character,—*six Chillian mills,—two Arrestres,—one Hungarian Washing Machine,—four Shakers,* (making two sets of shaking tables,) and *one Pump* of six inches diameter, 110 feet in length, are the various kinds of machinery used and set in motion by the Rotary Engine. Perhaps a brief description of the nature of the machinery will better enable you to judge of the power required to propel such machinery. The Chillian Mill is much on the same principle as that of a Bark mill; consisting of a large stone 6 feet in diameter, and 14 inches thick, which is made to revolve in a vertical position in a circle of 4 feet diameter, which circle is enclosed by staves in the form of a tub, and made so as to contain water; the ore is therefore regularly deposited by means of a shovel under the vertical stones, which revolve crush the ore, and pulverize it to a powder, when it is carried off, by a constant stream of water passing through the tubs. Much depends on the attention paid, and the character of the ore ground in this kind of mill, as respects the power required to propel them. At our establishment they have always been considered equal to one and a half horse power each. The Arrestre mill differs in its construction, and mode of operation, from the Chillian mill. It consists in the first place of a large bed of solid granite rock, generally about 9 feet diameter, and from 12 to 18 inches thick, encircled by staves which form a complete tub, in the centre of which is placed a perpendicular shaft, and through which, about two feet from the bottom of the tub, pass two horizontal arms, extending the diameter of the tub; to these arms are suspended from four to six large rocks that will generally weigh from 200 to 300 pounds each, when the whole is set in motion by geering wheels from the top, and propelled to the speed of about 10 revolutions per minute, and the ore mixed with water is pulverized to the consistence of paste. This process, as well as the one described above, depends much on the manner in which it is treated, and the character of the ore, as respects the power required, which has been considered at our establishment equal to three horse power each mill. The other apparatus used for washing, etc., require but little power and therefore need no description. The pump is calculated to raise about 67 gallons of water per minute, with the present number, and length of stroke, which, together with the washing apparatus, is considered to require about 5 horse power, making altogether according to calculation 20 horse power.

4th. The Engine, since its erection, has been kept in constant operation, Sundays and accidents excepted.

5th. When in full operation, as all the machinery has been for four months past, 3 cords of wood has been found sufficient to raise steam enough to carry the whole machinery 24 hours.

6th. The quantity of water evaporated *per hour*, as near as I could ascertain, when in full operation, has been about 60 gallons.

7th. The Engine was first started about the beginning of Sept. 1835, and continued to work the pump and four mills only, until March, 1836, at which time the whole machinery was attached, making altogether nearly 10 months.

8th. The cost of repairs has been very trifling, the whole expense of repairs, that could properly be said to belong to the engine during the whole time, will not exceed ten dollars.

9th. With careful attention it is not liable to get out of order.

10th. The cost compared with a Piston engine of equal power will not, I presume, much exceed one half that of the Piston engine.

11th. If I was in want of another engine of about 20 horse power I would certainly prefer the Rotary to the Piston engine.

In conclusion sir, after answering your several questions, permit me to state that in my opinion, the Rotary is preferable in many respects to the Piston Engine. It can be attended by persons of less skill, is is less expensive in transportation and lest expensive in erection than engines generally of the piston kind. I am sir, very respectfully, Yours' &c.

JOHN HARRIS.

The following letter is written by Professor James Renwick of Columbia College, who has examined the engine and its performance.

To D. K. Minor.—I have seen the engine upon Avery's principle which is employed in the Saw mill in Attorney street, and witnessed its operation. Its performance appears to be fairly set forth and not over estimated in the article from the Mechanics Magazine for April, page 244. In comparing this engine with those of other forms, it is obvious that there is a very great saving in the original cost of the apparatus working with equal power. In respect to the saving of fuel, this is also great, when compared with that expended in engines as they are most generally employed; and the quantity consumed does not exceed that used in the most advantageous application of the condensing engine, where the work performed, by a given quantity of coal, has been quadrupled. Compared with the ordinary high pressure engines, the fuel employed appears to be reduced in the proportion of one to three. I cannot but believe, that the engine of Avery will, in many cases, be found more economic and efficient, than any other form which has hitherto been used.

Jas. Renwick.

Columbia College, 11th July, 1836.

D. K. MINOR, 132 Nassau-street.

New-York, July 1, 1836.

AGRICULTURE, &c.

We republish the following for the benefit of our readers, several of whom have made enquires how to obtain the N. Jersey marl.

Mr. Robert White, of Sherewsbury, New Jersey, or Mr. Geo. B. Thorn of this city, can give further information where and how it can be obtained.

From the New-England Farmer.

MARL FOR MANURE.

We have received by the kindness of William Rhodes, Esq., a sample of New Jersey Marl, referred to in the following advertisement, which we place under our editorial head that its location may be as conspicuous as possible.

To the members of the Rhode Island Society for the Encouragement of Domestic Industry—The Treasurer of the Society has procured a barrel of Marl from Monmouth, which he proposes to divide gratuitously among such members of the society as wish to make an experiment of the same either as a specimen to compare with our own beds of Fossil Manure, (which we doubtless have and now lie dormant) or on the crops of the present seasons.

It may not be amiss to say that by the use of this valuable fossil manure, the lands in the vicinity of the beds in New-Jersey have been increased in value double, and in some instances treble. Apply at the store of C. & W. RHODES,

Peck's Wharf, Providence, R. I.

The above notice relates to a subject of very great importance to the best interests, not only of persons engaged in cultivating the earth, but of every human being, whatever may be his occupation, pursuit or circumstances. It has been made abundantly evident by the researches of scientific men, that calcareous substances, or those earths, minerals, &c. of which *lime* composes a constituent part are useful not only by promoting the *fertility* but the *health* of a country. It would require volumes to give the facts and theories on this subject which have led to the conclusion that lime purifies the air as well as fertilizes the soil of countries in which it is furnished by nature, or supplied by art.

The following extracts from an article translated for the Farmers' Register, from the *Essai sur la Marne*, of M. Puvis, give important information on the value of marl to give salubrity to the air as well as fertility to the soil.

The results of marling may be considered in a point of view more elevated, and still more important than that of the fertility which it gives to the soil: they may perhaps have much influence on the healthiness of a country when it becomes a general practice.

Although it may not have been yet uttered by others this opinion appears founded on strong probabilities, on strong analogies and precise facts, all of which appear to give it a sufficient certainty.

It is known that the calcarous principle is one of the most powerful agents to resist putrefaction. It is employed to make healthy places inhabited by men and animals, in which sickness or contagion is feared; it serves to neutralize the emanations of dead bodies undergoing putrefaction; it destroys the deleterious effects which escape from privies, and which sometimes causes the death of those who are employed to cleanse them.

* * * * * *

We cannot imagine an action more direct, more close, and more intimate than that of marl on ploughed land. One conceives that it can attack the unhealthy principles in the soil as well, and in the same manner as lime water, or slack lime destroys them, in habitations, on dead bodies, and in privies. These great effects are produced by a single and superficial application. While the

addition of marl is made and acts on every part of the ploughed bed; and it is in their own laboratory, before they can be formed, and even in their elements that the principles of insalubrity are attacked.

In short the calcareous principle which changes the nature and productions of all the vegetable mould ought necessarily to change the combinations and modify the elements of them. The emanations of the soil, which are the result of these combinations ought then to change also; and these emanations ought to cease, being unhealthy, because the known and general effect of the calcareous principle is to give health.

* * * * * *

We ought not to conclude on this subject without observing that marl, to diminish sensibly unhealthiness in the whole of a country, ought probably to be extended to a great part of its surface. The marl of each farm should cause a diminution of unhealthiness according to what we think, for that property itself and its inhabitants: but they would still suffer from the unhealthy emanations of the neighboring places, which had not been marled. Salubrity would increase in proportion as the general marling would increase; and when the whole surface would experience the benefits of marl, then with the healthiness which would preserve individuals for labor and increase of population, with the fecundity which would offer the greatest products without being obliged to increase the labor, we would see the country advance rapidly towards a better future, &c. &c.

As regards the specimen of New Jersey Marl, sent to us by Mr. Rhodes, we can, at present, give no opinion, as we have not had leisure nor means to analyse it. We hope soon, with the assistance of some friends, who are skilled in chemistry, to be able to give an estimate of its value, and rules which will enable farmers to form an opinion of marl or other mineral manure which they may happen to discover, and wish to apply to some valuable purpose.

The following article contains hints useful to instrument makers and tuners. We have always been of the opinion that the practice of our predecessors in such matters has not been properly treated before adoption. The manufacture of musical instruments is increasing daily, in our country it has always been a favorite subject to us, and we desire to hear and see more of improvements in that branch.

ON TUNING—NEW MATHEMATICAL DIVISION OF THE SCALE.

Sir,—The following is a mathematical division of the scale, assuming the bass C as 30 inches:—

C	. . .	30.
C *sharp*	.	$28\frac{5508}{59049}$.
D	. . .	$26\frac{39366}{59049}$.
D *sharp*	.	$24\frac{51008}{59049}$.
E	. . .	$23\frac{41553}{59049}$.
F	. . .	$22\frac{11642}{59049}$.
F *sharp*	.	$21\frac{4131}{59049}$.
G	. . .	20.
G *sharp*	.	$18\frac{13038}{59049}$.
A	. . .	$17\ \frac{37}{49}$.
A *sharp*	.	$16\frac{38256}{59049}$.
B	. . .	$15\frac{15975}{59049}$.
C	. . .	15[illegible]

It is obtained thus:—

$\frac{2}{3}$ of 30	$= 20$		G above.
$\frac{2}{3}$—20	$= 13\frac{1}{3}$	$\times$ 2	D.
$\frac{2}{3}$—$13\frac{1}{3}$	$= 8\frac{8}{9}$	$\times$ 2	A.
$\frac{2}{3}$— $8\frac{8}{9}$	$= 5\frac{25}{27}$	$\times$ 4	E.
$\frac{2}{3}$— $5\frac{25}{27}$	$= 3\frac{7}{81}$	$\times$ 4	B.
$\frac{2}{3}$— $3\frac{77}{81}$	$= 2\frac{154}{243}$	$\times$ 8	F *sharp*.
$\frac{2}{3}$— $2\frac{154}{243}$	$= 1\frac{551}{729}$	$\times$16	C *sharp*.
$\frac{2}{3}$— $1\frac{551}{729}$	$= 1\frac{373}{2187}$	$\times$16	G *sharp*.
$\frac{2}{3}$— $1\frac{373}{2187}$	$= \frac{5120}{6561}$	$\times$32	D *sharp*.
$\frac{2}{3}$— $\frac{5120}{6561}$	$= \frac{10240}{19683}$	$\times$32	A *sharp*.
$\frac{2}{3}$— $\frac{10240}{19683}$	$= \frac{20480}{59049}$	$\times$64	F.

These multiplyers are not arbitrary numbers, but as the second stage brings us beyond the first octave, we must double it to bring it within the octave; and as the fourth stage brings us beyond the second octave, it must be twice doubled (or quadrupled), and so on of the rest.

A piano forte tuned according to this scale would, I think, have a very pleasing effect: but, independent of the impossibility of tuning to that exactness, piano forte makers, instead of doubling the length of string to produce the sound of the octave below, *must necessarily* use a thicker wire, or we should have piano fortes as large as houses.

The following is Earl Stanhope's scale:—

C—C, perfect octave.
C—G, perfect fifth.
C—E, perfect third.
E—B, perfect fifth.
C—F, perfect fifth.
F—B *flat*, perfect fifth.
E—A *flat*. bi-equal third.*
A *flat*—C, bi-equal third.
A *flat*—E *flat*, perfect fifth.
A *flat*—D *flat*, perfect fifth.
D *flat*—G *flat*, perfect fifth.
G—D, D—A, A—E, three tri-equal fifths.†

These tri-equal fifths, though flat, are not of such a degree of flatness as to be offensive to the ear; differing from a perfect fifth only 829,885 parts in 300,000,000, or $\frac{829885}{300000000}$. If this interval G—E, as in Kimberger's method, be divided into one perfect fifth, and two equally flat fifths—such, for instance, as the perfect fifths G—D, and the equally flat fifths D—A and A—E; then each of these two last fifths, by becoming too flat, is offensive to the ear. And if that same interval be divided into two perfect fifths, and one flat fifth, then this flat fifth so produced is still more offensive.

In tuning each key throughout the whole instrument, too much attention cannot be paid to the beatings, as that is by far the most accurate way of tuning by the ear. For, whenever a third, fourth, fifth, sixth, or octave is quite perfect, there is no beating to be heard. But, on the contrary, when any of them are in any degree imperfect, though not distant from perfection, a beating is always audible. A very slow beating proves that the distance from perfection is not great; but as the beating becomes quicker, the distance from perfection becomes more considerable, and, from the equality of the beatings, *equal deviations* may in like manner be correctly ascertained.

Some tuners in order to assist the fifths, have proposed to tune the octaves a little imperfect. The objection to this are obvious, for if we *sharpen* the octaves to assist the fifths, it injures the thirds; and if we *flatten* the octaves to assist the thirds, it injures the fifths. Such is the construction of the human ear, that we can bear a much greater deviation from perfection in the fifths than we can in the octaves, and a still greater deviation in thirds than either the fifths or octaves. Again, however small the deviation may be in a single octave, it becomes very sensible in two or three, and most offensive in six or seven.

We have been in the habit of considering the Wolf as an inherent imperfection in every instrument that has exactly twelve fixed keys in each septave; whereas so far from being an imperfection, it is precisely the proper distribution of it that produces that charming variety of character between the different keys, which is so essentially requisite in a well tuned instrument.

April 8, 1836. CORIO.

* A bi-equal third is thus obtained;—from one perfect octave deduct one perfect third, and divide the remainder into two equally sharp thirds.

† A tri-equal fifth is thus obtained:—divide the interval included by a perfect fifth from the key-note, and he second perfect octave above the perfect third from he same key-note, into three equally flat fifths which re tri-equal fifths.

We were once in want of a similar capillary gas tube to that mentioned in the following extract from the London Mechanic's Mag. We had not the means of constructing it but give the plan for the use of our readers.

Two concentric bars slightly conical are to be made to fit each other perfectly (somewhat after the manner described in the 2nd method below). By means of a screw or any other convenient apparatus, the exterior cylinder is to be raised from the interior one, and immediately an opening varying at pleasure from 0 up to the largest aperture required. This opening, however, is continuous, and a flame from such a tube would present a most beautiful appearance.

The ease with which such a tube could be made and the advantage of varying the size of the aperture, present improvements of some benefit.

It may be remarked that either tube may remain fixed while the other moves.

It would also be easy to construct a gas valve on the same principle.

METHOD OF MAKING CAPILLARY TUBES IN METAL.

For gas-burners, for the safe combustion of mixtures of oxygen and hydrogen, and for other purposes, it is often desirable to divide the end of the discharge-pipe into fine capillary tubes, of the depth of half an inch or more. It is difficult and expensive to bore such apertures in a piece of solid metal, and it is hardly possible to be executed at all, if the apertures are required to be of very small diameter.

Two new methods of producing such capillary tubes have been communicated to the Society of Arts—one by Mr. J. Roberts, of Queen street, Cheapside, and the other by Mr. Henry Wilkinson, of Pall Mall—which are thus described in the last part of the Society's Transaction:—

Mr. Robert's Method.

"Mr. Roberts very ingeniously and expeditiously subdivides the end of a metal pipe into small tubes of any required depth, by means of pinion-wire. Pinion wire is made by taking a cylindrical wire of soft steel, and passing it through a draw plate of such a figure as to form on its surface deep grooves in the direction of radii to the axis of the wire; the ribs which separate

these grooves from one another may be considered as leaves or teeth, and of such wire when cut into proper lengths, are made the pinions used by watchmakers.—Hence arises the name by which this wire is commonly known. If now a piece of this wire be driven into the end of a brass pipe of such a size as to make a close fit with it, it is evident that that part of the pipe has thus been subdivided into as many smaller tubes as there are grooves in the wire. By using a draw plate fitted to make smaller and shallower and more numerous grooves than are required in common pinion wire, it is manifest that wires or cores may be produced, which, when driven into metal pipes, as already described, will subdivide them into capillary tubes of almost any degree of tenuity."

Mr. Wilkinson's Method.

"In the course of some experiments on artificial light, which I was engaged in about twelve months since, I was desirous of obtaining a great number of extremely minute apertures for a a gas burner; and, finding it impossible, in the ordinary way, to obtain them, a new method occurred to me, which immediately produced the desired effect. I showed it at the time to several eminent, scientific men, who were unable to conceive how these apertures were formed; and, as I made no secret of the method, they were equally pleased at the simplicity of the operation; and the specimen herewith sent has been exhibiting at the Gallery of Practical Science for several months. I did not attach much importance to it myself; but, as I do not find that it is at all known, and now think it might be useful in a variety of ways, I have sent it for you to lay before the Society; and should they be of the same opinion, I shall feel much pleasure in communicating the mode of operation, by which any number of apertures, hardly visible to the naked eye, and of any length (*even a foot if required,*) may be made in any metal in *ten minutes!*

"The process consists merely in turning one cylinder to fit another very accurately, and then, by milling the outside of the inner cylinder with a straight milling tool of the required degree of fineness, and afterwards sliding the milled cylinder within the other, apertures are produced perfectly distinct, and of course of the same length as the milled cylinder. A similar effect may be produced on flat surfaces, if required."

[From the Farmer and Gardener.]

Tuesday, July 12, 1836.

SALE OF IMPORTED STOCK.

The Rev. J. A. Robertson, of whose importation of improved short horn Durhams and Ayrshire cattle we spoke last year, sold a few days since to the Hon. *Harmar Denny*, of Alleghany county, Pa. his splendid young Bull, Buckingham, 2 years and 3 months old, a cow rising 3 years old called Cowslip, and an *Ayrshire* cow between 6 and 7 years old, named *Virginia*, in honor of the old dominion, the State which Mr. Robertson has adopted as the future home of himself and family.

The two first of these animals, are of the very purest blood of the improved short horns, that could be obtained in England. They were selected by Mr. Robertson in person, who besides being an excellent judge himself, enjoyed opportunities and facilities which fall to the lot of few gentlemen. Allied to some of the first families in the empire, and being then on the eve of departing for this country with the view of purchasing an estate for a permanent residence, all of his own, as well as the friends of his family, generously tendered their offices to aid him in his selections of stock, so that his own judgment, which is both shrewd and ripe, was backed by those of his numerous acquaintances. The animals thus auspiciously selected were purchased without regard to price; *superior excellence* in *points, handling*, and *pedigree*, being the only objects thought of. He imported them in November last into Philadelphia, and brought them thence to this port by water, whence they were sent to an estate he very soon afterwards bought in Middlesex co., Va. They were bought for his own private use, but having unfortunately for the health and safety of those noble animals, located himself in the tide-water district of Virginia, a region so baleful to the health of horned cattle brought from a distance, as almost to render the death of all introduced therein as certain. Few, indeed, survive the first summer. Thus situated Mr. Robertson found himself compelled, in justice to his own interest, and in humanity to his animals, to dispose of them, in order that they might be saved to the country. This change of his original intention, though felt by him as a sacrifice generously offered up, is the more easily borne as he will return to England in the fall, where he will have an opportunity of making other selections to supply the place of the animals he has just disposed of. When his cattle arrived here last fall, we had the pleasure of examining them, and then spoke of their fine qualities as we thought they merited. Recent opportunities of more thorough examination confirme us in the opinion we then formed, that *Buckingham* and *Cowslip* are among the very best improved short horns ever introduced into this country, and we are certain they will do much in the hands of their present patriotic and public spirited owner to give tone and character to our native stock.

Buckingham is rising 2 years old and has a body of exquisite form and most ample length. He is a dark rich mahogany red and white, the latter so arranged as to give the happiest effect in furnishing relief to the eye. In his port he is majestic and graceful—and as he walked before us the other day through a small grove attached to our barn yard, we almost conceited as he passed from point to point, saluting the females of his tribe, into which he had just been introduced, that he was inspired with as much conscious pride of his own importance as is an Eastern Monarch when the charms of his Harem is unfolded to his longing and enraptured eyes.

He strode onward with an elastic step and head erect, until he came to his own associates, *Cowslip* and *Virginia*, who had preceded him a few weeks,—with these he halted; in them he recognized the matchless companions not only of his voyage across the Atlantic—but of his *love*—for they are both ancient to him, and if he did not pour out with the volubility of a biped, the joy that is *not* felt—he certainly did, with the eloquence of a noble beast, give evidence of his recognition, his good feeling, gallant attention, and unchanged regards. It was impossible to mistake the import of the speechless salutation that ensued—each knew the other, and were all as happy as dumb beasts could be, in meeting again after a separation of a few weeks.

Whatever may be the fate of Buckingham, and his beautiful consorts, Cowslip and Virginia, we feel sure that America owes a debt of gratitude to their late owner, whose generous high souled spirit induced him at so much expense, risk and anxiety of mind, to bring them to the land of his adoption. Nor will the debt be less to our patriotic fellow citizen, Mr. Danny, who, with so much munificent liberality has purchased them with the laudable view of improving the stock of the country. Should he design to offer the services of this high bred Bull, his neighbors should not fail to avail themselves of them, for without derogation from the virtues of any other animal now in our country, we question much whether there is one of his superior in all the attributes of a thorough bred improved short horned Durham.

The following were the prices at which they were sold.

Buckingham, $750.
Cowslip, $400.
Virginia, $300.

Their pedigrees are as follows:

Bull, Young Buckingham—Calved March 24, 1834, by Col. Craddock's Buckingham, Dam by Scipio, g. d. by old Stephen.

Scipio and Stephen were the property of Mr. Charge, one of the most eminent breeders in the county of Durham. *See Herd Book.*

Stephen was directly descended from *Comet*, which was sold for 1000 guineas. *Old Buckingham* won the *Barnard Castle* prize in *Durham*, and was got by *Ephygum*, dam by Young *Rockingham*, g. d. by *Wonder*. Ephygum, was by *Old Rockingham*, and won a premium in *Manchester*.

Heifer, Gowslip, is a beautiful fashionable roan of great size, fine form, and rising 3 years old, got by Architect, dam by *Rob Roy*, g. d. Mr. *Thornton's George*, g. g. d. *Burdon*. *Architect* was got by *Highflyer*; dam *Lady Brough*, a celebrated cow, sold at Mr. Wytham's sale, of Darlington. She is in calf by Buckingham. *See Herd Book.*

Highflyer was sold to Capt. Davis, at Mr. Mason's sale. of Clinton, for 201 guineas; *Rob Roy* was a first rate bull of Col. Craddock's. *Cowslip* is now in calf by Young Buckingham.

Virginia, a light red and white, imported by the most noble the Marquis of Westminister, from *Ayrshire*, in April 1831, she was then 15 months old. She is of the stock of Mr. Aiton, and is also in calf by Buckingham.

DIFFICULTIES OF IMPORTING STOCK.]

Mr. E. P. Roberts—

Dear Sir:—In reply to your remarks concerning English prices of short horns, I beg leave to state a few fact, which I shall do with all due respect for the gentleman whose recent importation has been assumed as an apparent criterion for fixing an estimate upon mine. A native of America, and particularly one whose inexperience, want of connexion in the country, and pursuits, unfit him for such an agency, must run great hazards at every step in travelling through the great cattle county of Durham in search of choice short Horns. He is suddenly ushered in amongst a shrewd, wary body of men, many of whom will not hesitate to extol their cattle, and urge forward their sale thereby upon their pedigree and parts, at the expense of truth and honesty. The confiding stranger becomes presently inspired with confidence by the cordiality of his reception, and may be induced to make a purchase of an animal which had been fastened upon his fancy by these means and in all probability would be afterwards recommended to a neighboring breeder, with whom his late host was in concert,

in regard of trepanning a foreigner into a purchase of imperfectly bred animals with defective pedigrees, and this is practised with more impunity upon a foreigner and inconsiderate amature in cattle, knowing that the former would be without the reach of complaint, while the latter, would be looked upon as a novice in the trade with more means than brains, would be laughed at as a novice and told to profit by his experience.

As regards the expense of importation, which appears to have been very much underrated, we behold the constant risk of losing the animals by nautical and other contingencies, (that can only be estimated by professed breeders,) with much more solicitude than any incidental cost of transportation abroad.

I may have been lavish, in my own expenditure, but I consider myself amply repaid in the enjoyment of the gratification which I assure you I derive, 1st, in having been the humble means of bestowing a permanent benefit upon the the soil of my adopted country, and 2nd, in having landed these valuable and matchless animals in health and condition, without a bruise or injury of any sort; which your own experience will doubless instruct you has seldom, if ever been done. There are numberless trifling precautions which would escape the minde of an unsteady minded person, and which can only be seen by the exertion of thought, which materially contribute to the safety and health of the animals, to say nothing of the veterinary skill frequently required aboard the ship, the want of which has so often lost both horses and horned stock, while on their voyage to America. Longer experience, and a more intimate acquaintance with the Durham market, will eventually convince persons who may not be incredulous, of these plain truths.

In reference to my own stock, I imported them solely for my own estate, and never even intended to allow Buckingham to stand; and our melancholy disappointment in Middlesex county, especially in regard of grazing, has alone compelled their sale; but I am about to return to Europe, and if I be spared to come to American again, I intend to bring the purest and most valuable brood stock of the choicest breeds of British cattle, which has ever been sent to this country.

I remain, dear sir,

Yours, very faithfully,

J. A. R.

Expensive Tables.—Tables of tiger and panther-wood (different varieties of the citrus) appear to have been first brought into fashion by Cicero, who is said to have given for a single one a million sesterces, *i. e.* 8072*l.* One belonged to Gallus Asinius, which was valued at 8879*l.* Two, which had formerly belonged to King Juba, were actually sold, one for 9700*l.*, and the other for somewhat less. Another, which had been for some generations in the family of the Cethegi, was sold for 11,300*l.* and in the time of Pliny was accidentally destroyed by fire. The largest ever known belonged to Ptolemy, king of Mauritania: it was four feet and a half in diameter, and four inches thick, being formed of two semicircular planks, so skillfully joined that the place of juncture was not discernible.—These tables were generally set in a broad border of ivory.—*Mr. Aitken—Trans. So. of Arts.*

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23d day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILWAY IRON.

95	tons of 1	inch by	½	inch.		FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.
200	do	1¼	do	½	do	
40	do	1¼	do	⅜	do	
800	do	2	do	½	do	
800	do	2¼	do	½	do	
soon expected.						

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2¾, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.

Rochester, May 22d, 1826. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior	back-strap Shovels	
150 do	do	do plain	do
150 do	do	do caststeel Shovels & Spades	
150 do	do	Gold-mining Shovels	
100 do	do	plated Spades	
50 do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

MILL-DAM FOUNDRY.

TO BE SOLD OR LEASED the above well known establishment, situated one mile from Boston. The improvements consist of,

No. 1. *Boiler House*, 50 feet by 30 feet, containing all the necessary machinery for making boilers for *Locomotive* and other steam Engines.

No. 2. *Blacksmith's Shop*, 50 feet by 20, fitted with cranes for heavy work.

No. 3. *Locomtive House*, 54 feet by 25, used for putting together Locomotive Engines. Several of the best Engines in use in the United States have been put in this establishment.

No. 4. A three story brick building, covered with slate, 120 feet by 46, containing two water-wheels, equal to 40 horse power; Machine Shop, filled with lathes, &c.; Pattern Shop; Rolling Mill and Furnaces, capable of rolling 4 tons of iron per diem, exclusive of other work; three Trip Hammers, one of which is very large; engine for blowing Cupola Furnaces, moved by water-wheel; one very superior 12 horse Steam Engine, which could be dispensed with; and a variety of other machinery.

No. 5. An Iron Foundry, 80 feet by 45, with a superior air Furnace, and two Cupolas, Core oven, Cranes, &c. fitted for the largest work. Attached to the Foundry is a large ware-house, containing Patterns for the Castings of Hydraulic Presses, Locomotive and other Steam Engines, Lead Mill Rolls, Geering, Shafts, Stoves, Grates, &c. These were made of the most durable materials, under the direction of a very scientific and practical Engineer, and are supposed to be of great value.

No. 6. A building, 65 feet by 36, containing a large stack of chimneys, and furnaces, for making Cast Steel. This building has been used as a boarding-house, and can accommodate a large number of men.

No, 7. A range of buildings, 200 feet long by 30, containing counting room, several store rooms, a Brass Foundry, room for cleaning castings, a large loft for storing patterns, stable for two horses, &c. &c.

The above establishment being on tide water, presents greater advantages for some kinds of business than any other in the United States. Coal and Iron can be carried from vessels in the harbors of Boston, to the wharf in front of the Factory, at 25 to 30 cents per ton. Some of the largest jobs of iron work have been completed at this establishment; among others, the great chain and lift pumps for freeing the Dry Dock at the Navy Yard, Charleston.

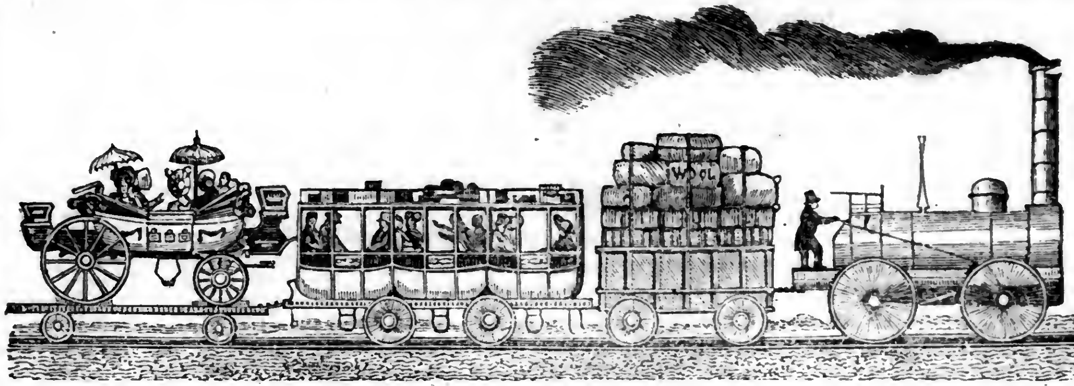
The situation for Railroad work is excellent, being in the angle formed by the crossing of the Providence and Worcester Railroads. The Locomotive "Yankee," now running on the latter road, and the "Boston," purchased by the State of Pennsylvania, were built at these works. With the Patterns and Machinery now n the premises, 20 Locomotives, and as many tenders, besides a great quantity of cars and wagons, could be made per annum.

For terms, apply to
THOS. J. ECKLEY, Boston,
or to ROBERT RALSTON, Jr. Phila.

Boston, April 21, 1835. j25—4t

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, JULY 30, 1836. [VOLUME V.—No. 30.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JULY 30, 1836.

Desirous of extending useful information and of awakening attention to obeects of such great importance as those treated of in this No., we have issued a far larger number of copies than usual, for the purpose of gratuitous distribution. It will be found that we have devoted this No. entirely to the subject of LOCOMOTIVE ENGINES.

We are gratified to perceive that the citizens of Owego are moving for the purpose of opening a communication between the Canals and Railroads of New-York and Pennsylvania. No State pride or selfishness should prevent a free intercourse—but trade be unrestricted.

"PUBLIC MEETING.–The citizens of Owego and its vicinity, are respectfully invited to attend a meeting, to be held this evening, (Wednesday) at Mr. Goodman's Long room, for the purpose of taking into consideration the best means of connecting the public improvements of the States of New-York and Pennsylvania, by a Canal or other water communication."

Wednesday, June 29, 1836.

EXCURSION TO PHILADELPHIA, AND REMARKABLE PERFORMANCE OF THE LOCOMOTIVE "GEORGE WASHINGTON."

In pursuance of our request, Mr. Norris made arrangements with the Commissioners of the Columbia Railroad, for the use of his locomotive.

Tuesday, July the 19th, was the day appointed for the trial.

We left here on Monday afternoon, at 4 o'clock, accompanied by Mr. George N. Miner of this city, Mr. Theo. Schwartz of Paris, and Messrs. Elliot and Beats, of Alabama. Mr. S., who was to sail for Europe the next day, gladly made the trip, with a view to carry home his own testimony as an eye witness.

Our journey over the Camden, and Amboy, and Trenton and Philadelphia Railroads, was highly interesting, and the conversation of that evening will long be remembered with pleasure. We arrived at Philadelphia about midnight and fter sundry mistakes and mischances, succeeded in obtaining some repose.

On Tuesday morning, two cars drawn by horses, set out with a party of upwards of forty. We arrived at the foot of the inclined plane before 6 o'clock, while the rails were yet quite wet with dew.

On our arrival, it was found that owing to accident or design, while the fire was burning, the water had been blown out of the boiler so as to endanger the tubes. The result was a leakage of some consequence during the day.

The engine started at the foot of the plane and on the plane. After proceeding a few feet, the wheels were found to slip, and the engine returned. It was said that the rails were found to have been *oiled* at this place, a small quantity of sand was strown over the spot, and the engine again proceeded. She regularly and steadily gained speed as she advanced to the very top, passing over the plane in 2 min. 24 sec. The enthusiasm of feeling manifested cannot be described, so complete a triumph had never been obtained,—the doubts that had been entertained by some, and the fears of others, were dispelled in an instant, the eager look that settled upon every ones face, gave way to that of confident success, while all present expressed their gratification in loud and and repeated cheers.

The length of the plain is 2800 feet.

The grade 369 feet to the mile, or 1 foot rise in 14.3, which is a much steeper grade than the planes on the Mohawk and Hudson Railroad, those being 1 in 18.

Making an ascent of 196 feet in 2800 feet.

Weight of engine with water 14.930 lbs.

Load drawn up the plane, including weight of tender with water and coal, two passenger cars and 53 passengers, 31.270.

Pressure in the boiler, less than 80 lbs. to the square inch.

Time of running 2 min. and 24 sec.

It is to be remembered that the rail were wet with dew.

As to the oil, it was afterwards mentioned that bets were made with the workmen to a considerable amount and those having been lost by the successful performance of the engine on a former day, were now quadrupled, and to save themselves it is not unlikely that this means was provided to accelerate the descent rather than the ascent of the engine.

At the conclusion we shall give the dimensions of this engine.

The party again embarked after examining the workshops, and proceeded to Paoli to breakfast, and thence to Lancaster, the engine conveying in at the same time a number of freight cars.

The unfortunate location of this road is very evident, frequent and short curves are introduced so uniformly, that it would be supposed that such a location was to be prefered to a direct one. Having a desire to

witness during the passage the surrounding country, which is most beautiful—we seated ourselves on the outside—but alas, we were obliged to recall our practice at ducking the head, acquired on the Erie Canal. In transverse bridges this may be excused, but in viaducts for the Railroad itself—if this must be covered, we see no reason for leaving not more than a foot clearance from the top of the cars. The locomotive bows its chimney head most respectfully to every one of the bridges—meanwhile the smoke unstrained of its sparks, fills the small space left, and most effectually dredges the passenger. The practice of using but three rails for two tracks is most villanous, especially as the bridges are covered.

We arrived safely at Lancaster and partook of an excellent dinner. A number of toasts were given, and conversation turned generally to the subject of internal improvement. Mr. Roberts, engineer of the Harrisbnrgh road, and Mr. A. R. Campbell, engineer of the Morristown, and of the West-Philadelphia Railroad, were present; a number of the company were citizens of Philadelphia, and we much regretted on looking over the names to find that Mr. Franklin Peale, and Isaiah Lukers, had been among those who had started with us, and whose personal acquaintance we had not the pleasure of making. We have long known these gentlemen as laborers in the scientific world, and would have had much pleasure in seeing them face to face.

After dinner, the company were presented to Governor Ritner, who was then in town. He afterwards accompanied the party some few miles from Lancaster and back again, when he left us, much gratified, with his rapid journey.

We returned in a large 8 wheel car, a form that we much admired.

The whole weight attached to the engine, (tender &c. included,) must have been over 14 tons, if not 15. The time of running, (exclusive of stoppage,) from Lancaster to the head of the Schuylkill inclined plane, was 3 h. 11 min., being a distance of nearly 67 miles. This, it is to be remembered, was over a road having curvutures of less than 600 feet, radius up ascents, of sometimes, 45 feet per mile. On level and straight portions of the road, a velocity of 47 miles, was attained.

As the trip had already been protracted, this engine was obliged to leave at the head of the plane, on her return to Lancaster the same evening and we descended by the rope.

The bridge at this point, over the Schuylkill, is a very fine one, the masonry being of a very substantial character.

We returned to our quarters, in good season, and highly delighted with our trip.

On the next morning we had the satisfaction of examining an engine now building for H. R. Campbell, under his own direction, and of which, a more extended description, with calculations, is given in this No. The solidity of this engine is very great—there is no doubt as to its wearing well.

We also visited the U. S. Mint, where we were politely shown the different pieces of machinery, by Mr. Adam Eckfeldt, who has filled the situation of director, for 42 years. Most of the machinery has been arranged, perfected and executed, under his eye.

The machinery is in most beautiful order—it is mostly moved by a very fine steam engine, by Rush and Muhlenburg.

Since our last visit a new milling machine has been introduced from France, we believe. The action is extremely beautiful, and contrasts well with the old process.

On Wednesday evening, we returned to this city—having, during our absence of two days and one evening, travelled over 300 miles, besides attending to much business, and having as much pleasure as is possible to crowd into so small a space of time.

The following are the dimensions of the "George Washington" engine, of Mr. William Norris:

Diameter of cylinders		$10\frac{1}{4}$ inches.
Length of stroke		$17\frac{5}{8}$ "
Number of tubes	78	
Outside diameter		2 "
Length		7 feet.
Diameter of driving wheels		4 "
" " Truck "		30 inches.

The engine is six wheeled, having two driving wheels.

Whole weight of engine	14,930 lbs.
Actual weight on driving wheels	8,700 "

It must be remembered, that there is no contrivance as in some engines, for increasing the adhesion, by throwing the weight of the tender upon the engines—the axle being in front of fhe fire box, preventing any such arrangement.

This engine, we are now informed, is making the regular trips, though a full load has not yet been obtained, on account of the scarcity of cars.

The greatest load, as yet, drawn by it over the road, was 119 tons, gross weight, in 22 cars. The Engineer confidently expects, to draw 150 tons, at 12 or 15 miles per hour. She now usually works with 70 lbs. pressure of steam. Mr. Norris considers that these fine effects are owing to an improvement in the adjustment of the valves—which he has attained, after a long series of experiments.

We wish him, and all others, engaged in the same cause—all possible success in accomplishing their object, and obtaining the proper reward for it.

The following is a list of the names of the gentlemen who were of the party:

We the subscribers were present and witnessed the experiment and complete success of the "George Washington," in ascending the inclined plane, with a train of cars containing fifty-four persons, besides engineers, firemen, &c., up the Columbia Railroad, at Philadelphia, on the 19th July, 1836.

Israel Morris,	Theodore Schwartz,
Israel Roberts,	Alex. McClure,
George Robbins,	T. R. Peale,
Rufus Tyler,	Mark M. Reeve, M. D.
J. C. Cresson,	F. Blackburne,
William Morrison,	E. Durand,
S. Griffits Fisher,	P. B. Goddard, M. D.
A. W. Thompson,	Octavius A. Norris,
Robt. B. Davidson,	H. R. Campbell,
John E. Garrett,	George R. Oat,
A. M. Eastwick,	Townsend Smith,
Joseph Harrison, Jr.	J. Sidney Jones,
Frederick Gaul,	Joseph Oat,
Alex. Krumbhaar,	Smith Jenkins,
Geo. N. Miner,	Isaac P. Morris,
Franklin Peale,	Frederick Vogel,
R. M. Patterson,	Mahlon Ortlip,
William S. Otis,	James Poultney.
D. K. Minor,	Daniel Smith,
George C. Schaeffer,	Thos. Moore,
T. E. Gubert,	Walter Sims, Nashville, Tenn.

We are gratified to perceive, as we do by the following circular, that the people in the town of Pawlings, Dutchess county, are moving in relation to the rrilroad from this city to Albany. We hope their example will be followed by every town on the line of the road, when it will in truth, become the road of the people.

Sir:—At a meeting of the inhabitants of Pawlings, convened at the house of Gideon Slocum & Sons, on the 9th of July, 1836, to take into consideration the propriety of aiding and assisting in the construction of the New-York and Albany railroad; the undersigned were appointed a committee to call on the farmers and others, inhabitants of the town, to ascertain what amount of stock would be subscribed, in said town.—In pursuance of such appointment, the committee have seen about fifty inhabitants and have the assurance that *fifty thousand dollars* will be taken in this town when the books are opened, which will be sufficient to defray the expense of the road through the town, a distance of about six miles.

If you should see the propriety of pursuing similar or such other measures as you may suggest for the promotion of this important work, it is believed our united efforts will be crowned with success.

George W. Slocum,
Benjamin Burr,
Samuel Allen,
Jonathan A. Taber,
Jonathan Akin.

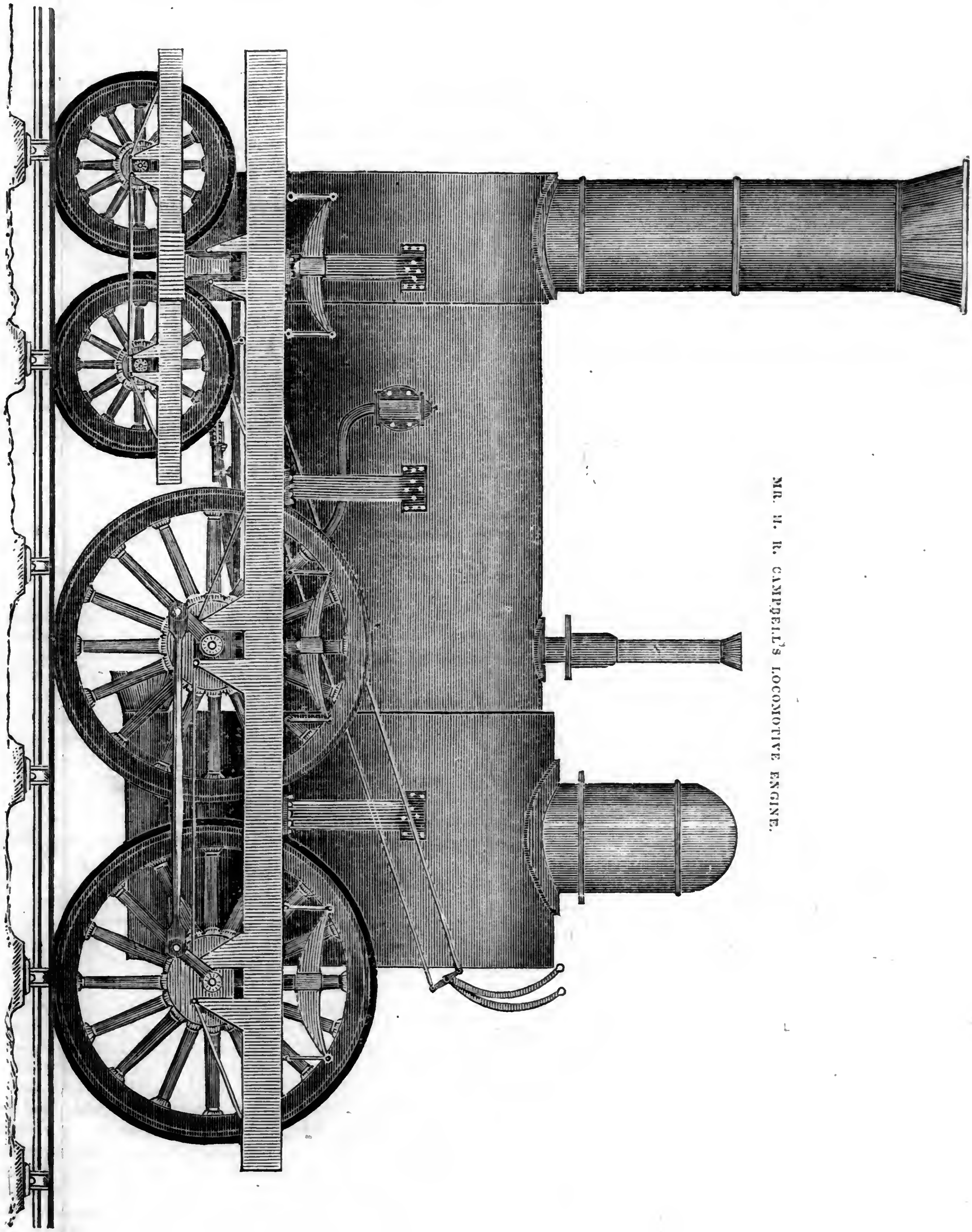
Pawlings, July 16, 1836.

The following letter, addressed to Mr. H. R. Campbell. of Philadelphia, is from Mr. Lewis, C. E., of the Brooklyn and Jamaica railroad. These calculations were made before the appearance of the work of the Chev. de Pambour—and we understand that the results given, very nearly agree with those obtained in that work.

The engine referred to in this letter, is to have 8 wheels—weight, 12 tons. It is the one referred to also, in our excursion to Philadelphia as having been seen by us.

The weight of the one of which the cut is given, is of the first class—weight, about 14 tons, having 8 wheels.

This cut represents a Locomotive engine,



MR. H. R. CAMPBELL'S LOCOMOTIVE ENGINE.

of the first class, weighing 14 tons, having 8 wheels (4 driving wheels). This engine will be able to draw as heavy loads as any engine calculated for rails of the present width and arrangement.

Both of these engines are to use either anthracite coal or coke.

It is intended to give further particulars respecting it, in another number.

Scale of drawing, 1 foot to $\frac{1}{4}$ of an inch.

New-York, Jan. 20, 1836.

HENRY R. CAMPBELL, Esq.:—

Dear Sir—I have received your statement of the dimensions of your proposed engine, and in return will furnish you with my estimate of its power on a level railroad; and of its ability to ascend inclined planes of greater elevation than have heretofore been deemed practicable for Locomotive engines. It does not require the spirit of prophecy to predict that the effect of the improvements now making in the construction of Locomotives, will be the entire abolition of stationary power on railroads, and, by allowing the adoption of higher grades than have yet been resorted to, hold out inducements to the formation of roads in situations where the nature of the country has hitherto precluded their introduction.

I shall commence with an examination of the mechanical action of Locomotive engines, and of the resistance to be overcome on a level railroad and on an inclined plane.

Let d = diameter of cylinders in inches.

l = length of stroke in inches.

P = pressure on cylinders per square inch.

R = whole resistance to the motion of engine and train, viz. friction of the parts of the engine, friction of the axles of the carriages composing the train, and on inclined planes the gravity of the mass in motion.

The area of the two pistons being $2\,d^2 \times .7854$, the force acting against them is $2\,P\,d^2 \times .7854$, and as they move through a distance 2 l (or make two strokes) during one revolution of the driving wheels, $4\,P\,d^2 l \times .7854$ will represent the momentum of the force which overcomes a resistance R acting at the circumference of the driving wheels during one revolution. The circumference of the driving wheel is $D \times 3.1416$ and consequently $D\,R \times 3.1416$ will express the momentum of the resistance overcome. Hence

$$4\,P\,d^2 l \times .7854 = D\,R \times 3.1416 \text{ or } R = \frac{d^2 l\,P}{D}.$$

When an engine has its greatest load, the pressure of steam in the boilers and in the cylinders will be the same. Taking P for the pressure on the safety valve the above equation will determine the maximum resistance an engine will overcome.—That portion of the resistance arising from the friction of the engine depends much upon the excellence of its construction, but may be estimated at 5 lbs. per square inch of the area of the piston, in addition to the usual allowance for the friction of the axles in railroad carriages, viz. 10 lbs. per ton.—Putting r then to express simply the resistance of the train to motion, from the joint effects of gravity and the friction of the axles we shall have $r = \frac{d^2 l\,(P-5)}{D}$

Let us now ascertain the weight an engine will carry up a plane of a given inclination.

Let W = gross weight in tons, engine inclusive.

A = ascent in feet per mile.

Then $\frac{2240\,W\,A}{5280} = \frac{14\,W\,A}{33} =$ Gravity of load in lbs. and 10 W = friction of load in lbs.

Hence whole resistance

$$R = \frac{14\,W\,A}{33} + 10\,W = \frac{d^2 l\,(P-5)}{D}$$

From which we have $W = \frac{33\,R}{14\,A + 330}$

Also $W = \frac{33 d^2 l\,(P-5)}{D\,(14\,A + 330)}$

Having found expressions for the *maximum* load an engine is capable of carrying, prior to entering on the subject of the velocity of the proposed engine with given loads or the adhesion of the engine to the rails, I shall state the dimensions of some of the parts of Mr. Baldwin's and your engines. The capabilities and actual performances of the former being well known, it will not be difficult to deduce what may be expected of the latter.

In the engines built by Mr. M. W. Baldwin.

d = Diameter of cylinders 10.5 inches.

l = Length of stroke 16 inches.

D = Diameter of driving wheels 4 feet 6 in.

Weight of engine and water $7\frac{1}{2}$ tons.

Weight on driving wheels 5 "

Traction without wheels sliding 2777 lbs.

Surface of boiler exposed to fire 298 square feet.

Content of fire box $22\frac{1}{2}$ cub. ft.

Hence

$$R = \frac{98\,P}{3},\ 2 = \frac{98(P-5)}{3} + w = \frac{1078(P-5)}{14\,H + 330}.$$

In engine building by Mr. H. R. Campbell

d = Diameter of cylinders 14 inches.

l = Length of stroke 16 "

D = Diameter of driving wheels 4 ft. 6 in.

Weight of Engine and water about 12 tons.

Weight on driving wheels 8 tons.

Traction without wheels sliding 4.480 lbs.

Surface of boiler exposed to fire 723 square feet.

Content of fire box 53 cubic feet.

Hence

$$R = \frac{1568P}{27},\ r = \frac{1568}{27}(P-5) \;\&\; W = \frac{8624(P-5)}{63A + 1485}$$

It is known that M. W. Baldwin's engines can convey a gross weight (Engine and Tender included) of 114 tons up grades of 30 feet per mile at a velocity of 10 miles per hour, maintaining a constant pressure on the safety valve of ninety pounds to the square inch, and that with this load in dry weather, no slipping of the wheels on the rails takes place. The effective pressure of steam, is as we have shown, 5 lbs. less than the pressure indicated by the safety valve or 20 lbs. less than its total elastic force, estimating the atmospheric pressure at 15 lbs. to the square inch. Hence using the above formula $R = \frac{98\,P}{3}$ for ascertaining the effect of a given pressure on the cylinders at the circumference of the driving wheels, we have:

Elastic force of steam (P = 105)	3.430 lbs.
Resistance of atmosphere (P = 15) = 490 lbs.	
Friction of machinery (P = 5) = 163	
Total resistance	653
Traction of engine	2.777 lbs.

The gravity and friction of 114 tons, found by the formula

$$r = \frac{14\,W\,A}{33} + 10\,W \text{ is}$$

$$\frac{14 \times 30 \times 114}{33} + 1140 = 2591 \text{ lbs.},$$

which leaves 186 lbs. for the resistance of the engine and train on curves.

The weight on the driving wheels being 5 tons or 11,200 lbs. and the traction 2,777 lbs. We find that the traction is nearly $\frac{1}{4}$ the insistent weight. Supposing the weight on the driving wheels of your engines to be 8 tons or 17 920 lbs. and adopting this proportion we have 4.480 lbs. for the limit of traction of your engine. In ascending high grades the traction might be considerably increased by throwing part of the weight of the tender on the driving wheels. Coulomb estimates the friction of iron on iron at $\frac{1}{3.55}$ the weight; but his experiments were confined to flat surfaces, and as the amount of adhesion must decrease, when the area of the adhering surface is diminished, the limit of traction above stated can not vary far from the truth.

In Engines similarly constructed, the quantity of steam generated under the same application of heat, is in exact proportion to the surface of the boilers exposed to the action of the fire. But where there is a greater proportional content of fire box, we must suppose a greater proportional consumptional of fuel, and consequently a more intense application of heat. The proportion of exposed surface in the two engines is 1 to 2.43, but the proportion of the contents of the fire boxes is 1 to 2.80. Adding to the first ratio $\frac{1}{3}$ of the differsnce for the more intense application of heat. I shall estimate the evaporating power of your engine at 2.55 times that of those built by M.

W. Baldwin. As the elastic face of the steam varies in the direct ratio of its density, the momentum of the steam generated by the boiler, or its elastic force multiplied by its velocity of generation will be its momentum in the cylinders, and consequently, also its momentum at the circumference of the driving wheels. No error will therefore arise in refering the forces and resistances immediately to the circumference to the driving wheels or find their effects as applied to the traction of the engine.

This method will avoid much unnecessary calculation, and enable us at a glance, to see how every item of the account affects the general computation. The steam generated by Mr. Baldwin's engines, has been shown to be capable of overcoming a resistance of 3,430 lbs. moved 10 miles an hour or 34.300 lbs. moved one mile per hour.

Now the evaporating powers of the two engines being as 1 to 2.55, your engine will generate steam of an electic force of 34.300 + 2.55 = 87 465 lbs. moved one mile per hour. The resistance from the pressure of the atmosphere and friction of machinery amounting to 20 lbs. per square inch on the cylinders, is estimated at the circumference of the driving wheels, since

$$\left(R = \frac{1568\,P}{27}.\right)\ \frac{1568 \times 20}{27} = 1161 \text{ lbs.}$$

Hence we have the following rules applicable to your engine.

To find the traction, the velocity being given, divide 87.465 by the velocity and subtract 1161 from the quotient.

To find the velocity, the traction being given, add 1161 to the traction, and divide 87.465 by the sum.

Assuming 450 tons as the greatest load (gross) the engine can convey on a level road (for want of adhesion) and estimating the friction at 10 lbs. per ton, the velocity will be $15\frac{45}{100}$ miles per heur.

The following table will exhibit the traction at velocities from $15\frac{45}{100}$ to 25 miles per hour.

Velocity in Miles per hour.	Traction in pounds.
$15\frac{45}{100}$	4.560
16	4.305
17	3.984
18	3.698
19	3 443
20	3.212
21	3.004
22	2.814
23	2.642
24	2.483
25	2.338

The following table shows the gross load (engine inclusive) your Locomotive will carry up grades from 1 to 100 feet per mile at a velocity of $15\frac{45}{100}$ miles per hour. A column is added which shows what weight on different ascents is equal to a 100 tons on a level road, and furnishes a very convenient table of multiples for finding what load on a graded road is equivalent to a given load on a level.

Rise per mile in feet.	Load in tons.	Load = 100 tons on a level.	Rise per mile in feet.	Load in tons.	Loads = 100 tons on a level.
level	450	100	51	142	31.61
1	432	95.93	52	140	31.19
2	415	92.18	53	138	30.78
3	400	88.71	54	137	30.39
4	385	85.49	55	135	30.
5	371	82.50	56	133	29.62
6	359	79.71	57	132	29.26
7	347	77.10	58	130	28.90
8	336	74.66	59	128	28.55
9	326	72.37	60	127	28.21
10	316	70.21	61	125	27.87
11	307	68.18	62	124	27.55
12	298	66.26	63	122	27.23
13	290	64.45	64	121	26.92
14	282	62.74	65	120	26.61
15	275	61.11	66	118	26.32
16	268	59.57	67	117	26.03
17	261	58.10	68	116	25.74
18	255	56.70	69	115	25.46
19	249	55.37	70	113	25.19
20	243	54.10	71	112	24.92
21	238	52.89	72	111	24.66
22	233	51.72	73	110	24.41
23	228	50.61	74	109	24.16
24	223	49.55	75	108	23.91
25	218	48.53	76	106	23.67
26	214	47.55	77	105	23.44
27	210	46.61	78	104	23.21
28	206	45.71	79	103	22.98
29	202	44.84	80	102	22.76
30	198	44.	81	101	22.54
31	194	43.19	82	100	22.33
32	191	42.42	83	99	22.12
33	188	41.67	84	98	21.91
34	184	40.94	85	98	21.71
35	181	40.24	86	97	21.51
36	178	39.57	87	96	21.32
37	175	38.92	88	95	21.13
38	172	38.28	89	94	20.94
39	170	37.67	90	93	20.75
40	167	37.08	91	93	20.57
41	164	36.50	92	92	20.40
42	162	35.95	93	91	20.22
43	159	35.41	94	90	20.05
44	157	34.88	95	89	19.88
55	155	34.38	96	89	19.71
46	152	33.88	97	88	19.55
47	150	33.40	98	87	19.39
48	148	32.97	99	87	19.23
49	146	32.48	100	86	19.08
50	144	32.04			

You will perceive that I differ from Wood in the theory of the action of locomotive engines, as much as I do in the practical results. He estimates the effective power of engines at 30 *per cent* of the actual pressure of steam indicated by the safety valve, after deducting the friction of the engine itself.

Now in Mr. Baldwin's engines twenty pounds at the safety valves gives a traction of 2.940 lbs. 30 per cent is 882 lbs., so that without taking into account the friction of the engine, we should have a force sufficient to move but 88 $\frac{2}{10}$ tons on a level road, or 38$\frac{3}{10}$ tons up a grade at 30 feet per mile! *No percentage* can be assigned, for a certain resistance is opposed to the motion of machinery, which does not depend upon the pressure of steam. Not a word is said on the subject of the resistance of the atmosphere, although a large amount of steam is always consumed in overcoming this resistance. Page 368, the proper load for an engine upon a level, is 9 or 11 times its weight as the case may be, "that is, the engine will carry this weight and no more without the wheels sliding. The wheels of Baldwin's engine than should slide when the load exceeded 82 $\frac{1}{2}$ tons on a level road, or 36$\frac{3}{10}$ tons on a grade of 30 feet per mile! I have adopted his statement of the friction of cars which he estimates at 10lbs. per ton. I think it will be found too great, but I have no accounts of any experiments to enable me to make the proper correction.

Yours respectfully,

WM. J. LEWIS.

SHORT SKETCH OF THE HISTORY OF LOCOMOTION.

We had proposed to ourselves, on this occasion, to give a connected history of this subject, short, but still showing facts of prominent importance—with a view to draw attention to the rapid improvements, that have been made within a comparatively short time.

From various reasons we have not been able to give the attention due to so important a subject. We have, however, prepared a summary of the different steps in the history of locomotion, which we lay before our readers without further comment.

It is a fact as instructing as curious, that for a long time, ingenuity was taxed and severely taxed, to overcome a difficulty that after all proved to be imaginary. It was thought that a locomotive carriage, (or one in which the power originated,) when placed upon iron rails or a common road, would not advance if the power was applied directly to the wheels. Or in other words, the *adhesion* of the wheels, was thought to be insufficient to advance the carriage *even on a dead level.*

In consequence of this supposed obstacle various attempts were made to furnish a *hold* to the wheels.

The first engines constructed with this object in view, were made by Messrs. Trevithick & Vivian. They proposed having *bosses or nail heads* of sufficient size and of proper form to furnish a hold to inequality purposely made, in the surface of the wheels.

In 1811, Mr. Blinkensop obtained a patent for a rack rail—the wheels of the locomotive being furnished with corresponding cogs.

In 1812, Mr. Chapman obtained a patent for advancing a locomotive by means of a chain extended over the whole line and fastened at the ends. This chain was passed once around a grooved wheel which was

moved by the engine, the resistance offered by the chain which could not itself advance, caused the engine to move.

In 1813, a contrivance, often mentioned as an instance of great ingenuity, was produced by Mr. Brunton. In this machine, an apparatus, similar in construction and motion, to the legs of an animal, was moved by the engine. In fact it was a locomotive walker, pushing along the engine, &c.

These contrivances are familiar to most persons, and therefore do not require a more extended notice in this article. They were entirely superseded in the year 1813, by a discovery of singular merit. In fact. Mr. Blackitt, (who had failed in the employment of some of the above named engines) *actually discovered that the adhesion of the rails and wheels was sufficient to propel, not only the engine, but a weight of some amount after it.* Though this may appear to us, a somewhat left-handed discovery, yet there is no doubt, but that to this gentleman belongs a vast deal of credit, for successfully establishing the fundamental principle of locomotion.

The first experiments on this subject were made upon the Wylam railroad, and the amount of adhesion ascertained by manual labor. The first engine said to have been used upon the road, had but one cylinder, and a flly wheel, to regulate the motion. As may be supposed, this was but a troublesome affair, moving steadily—by jerks. What a contrast with our complete machines of this day!

From this period, however, rapid advances were made, and the locomotive engine began to work its way into favor.

In 1814, Mr. Stephenson constructed an engine, with two cylinders, in which the cranks were placed at a right angle, the one to the other, so that both were not at a dead point, or in full power, at the same time. This was effected by an endless chain, having iron cogs on the axles—and maintained a more equal motion. The chain was finally abandoned, and simply a straight connecting rod substituted.

This engine was able to draw on an edge rail, ascending 1 in 450, 30 tons, exclusive of its own weight, four miles per hour.

Other improvements were afterwards made, and among them was the one dispensing with the use of cogs, in communicating power to the wheels.

The next important point in the history of locomotives, is connected with that of the Liverpool and Manchester railroad.

There was a division of feeling among the directors, some in favor of stationary engines, while others desired locomotives.

Messrs. Stephenson and Lock, and Messrs. Walker and Rastrick, were employed to collect information on the subject From the report, and information furnished, the directors were more at a loss than ever. Meanwhile thousands of projects were poured in upon them.

There was, however, some partiality shown to locomotives; and to settle the question, the directors offered £500 for the best locomotive engine, the trial to be before proper judges, and certain conditions to be fulfilled. Among them, we insert the 2nd article.

" The engine if it weighs six tons, must be capable of drawing after it, day by day, on a well constructed railway, on a level plane, a train of carriages of the gross weight of *twenty tons*, including the tender and water tank, at the rate of ten miles per hour, with a pressure of steam in the boiler not exceeding 50 lbs. on the square inch."

Let the reader recollect that this was in 1829—seven years ago!

The offer of this reward brought out several engines, of the result of the experiments, and their effect in determining the directors in favor of locomotive engines, our readers are well aware.

The most successful engine was the Rocket, of Mr. Stephenson; the distance was travelled at rates varying from $11\frac{1}{4}$ to 29 miles per hour. The great merit of this engine was owing to tubes inserted in the boiler, as is now universally practised—this was the invention of Mr. Booth, Treasurer of the company.

Many engines were made for this road, several still retained by the company, after having been crowded out by more improved machines, before they had had time to wear out.

On the Sutton and Whiston inclined planes, rising 1 foot in 96, or 55 feet per mile, the use of stationary power was contemplated. We find, however, that in June, 1830, about the time of the public opening of the road, a weight of 33 tons, (including tender), was carried up the Whiston plane, by the Arrow, assisted by the Dart, at a speed of 17 miles per hour, decreasing to 4 miles per hour. The same engine, unassisted, drew six tons weight up the plane, at the rate of over 15 miles per hour!!—These were considered as fair experiments, and were published, in order to give an idea of the great power of the engines. In December, 1830, the Planet drew a gross weight of 80 tons up the Whiston plane, "*assisted by other engines*," at the rate of 9 miles per hour!!

Let us leave the old world and turn to the new.

The merits of Locomotives had been for some time discussed in this country, but the data furnished by the English experiments, were adopted as English engines were used. Presently engines were made in this country, and then wonderful stories were first heard of engines doing more than they could do. *according to the English calculations.*

The Baltimore and Ohio Railroad Company, with a most praisworthy perseverance, brought forward one improvement after another, until some began to doubt the propriety of pushing the matter so far. It is true that, subject as we all are to error, too sanguine expectations have in many instances been entertained, but we have only to do with actual performances and such as have been repeated.

We have no means at hand for ascertaining the particulars of the ascent of plans for sometime back, and in truth, owing to the nature of the surface of our country, whenever great summits were to be overcome, inclined planes with stationary power were used, and ascents of 45 feet per mile were considered as inadmissable.

The Baltimore and Ohio Company, encouraged by their success, are altering their inclined planes by changing the route, and it is now their intention to cross the Alleghany mountains without using stationary power.

The location of the Erie road, on which it was very desirable to avoid the delay, expense and hazard of using stationary power, brought the merits of locomotive engines into more conspicuous notice than ever.

In the report of the Baltimore and Ohio Railroad Company, published Oct. 1834, it was stated that the "Arabian" had drawn "upwards of 112 tons on a level, at the rate of near twelve miles an hour, and the same weight up an ascent of 17 feet per mile, on a curve of 1000 feet radius, at the rate of $6\frac{1}{2}$ miles an hour."

From the report of last October, we learn that in "December, 1834, the same engine passed over the plains at Parrs Ridge, ascending $\frac{3}{5}$ of a mile at the average rate of 264 feet per mile, with two cars full of passengers, making with the tender 11 tons, exclusive of its own weight of $7\frac{1}{2}$ tons."

Again, "on the 26 September last, a load amounting to 113 tons, was attached to the Washington, a new engine, on the plan of the Arabian, weighing 8 tons, with a view of making an experiment of the effective power of the Company's engines, on the branch road. With this great weight, the engine travelled to the city of Washington, at a rate, not less at any place, than ten miles an hour, preserving this, the least speed up ascents five and six miles in length, of twenty feet to the mile. The train was several times purposely stopped on the ascending grades, and when the steam was again applied, the engine would steadily regain its previous velocity, and maintain it with apparent ease. The same load was brought from Washington to Baltimore, at the same rate. The *average* speed was much greater, and upon the level parts of the road, seemed entirely at the discretion of the engineers. The same engine, on a level, exerting the same power, would have drawn 213 tons at the rate of ten miles per hour. During the whole time there was a superabundance of steam. Performances like this are, it is believed, unequalled in the history of Railroads."

This report was published last fall, and

these statements were considered, as "putting the best foot foremost." Indeed we have found many who considered that a proper allowance was to be made, in the statement of the facts—not to make the subsequent improvement appears to be too great, we will not take them at their word, but will allow the report to stand as it is.

In the report of H. R. Campbell, Engineer of the West Philadelphia Railroad, presented in October last, Mr. C. asserted that Baldwin's engines on the Columbia road drew "trains of 20 and 24 cars, containing each three tons of merchandize, up 45 feet grades, at 10 to 12 miles per hour; while engines of English construction, from the works of Robert Stephenson, Esq. the celebrated Engineer, carry up the same road only 14 cars, at the same rate of speed.—This great difference is produced by the superior arrangement, and mechanical application of power to Mr. Baldwin's engine, and not from any difference in the weight and adhesive power of the respective machines."

This statement so contradictory to the general opinion, has drawn out much discussion—and the report of Mr. Seymour of the Erie road, stating the facts as they are to be found on the different roads, were also, "thoroughly analysed."

It is not singular, that surprise should be excited—but that the facts are correctly stated, is certain.

Now, there is an engine on the Columbia road—the "George Washington," weighing only $7\frac{1}{2}$ tons, that has drawn over 15 tons up a plain ascending 369 feet per mile, at the rate of 14 miles per hour.

This same engine, has drawn as much as 119 tons in 22 cars, over this road (which is a most severe one for such trials, having numerous and short curves) with great ease, she not yet having tried her utmost power.

We desire our readers to compare these rapid improvements, and to study carefully the results.

We have omitted many matters of interest in this sketch, it being merely intended to place before the view at once, the most important experiments in Locomotion.

Note.—We should have done injustice to that patriarch of internal improvements memory, Oliver Evans, had we omitted mentioning his attempts to establish steam carriages, and his predictions already verified which then brought upon him the suspicion of mental derangement. The particulars are well known to every one.

TO THE READERS OF THE JOURNAL, ENGINEERS, DIRECTORS OF RAILROAD AND CANAL COMPANIES, CONTRACTORS AND ALL OTHERS ENGAGED IN WORKS OF INTERNAL IMPROVEMENT.

We embrace the opportunity offered by the distribution of an extra number of copies of the present impression, to address our readers and others on a subject of importance to them and to us.

It has been our intention for sometime past to prepare our Journal for more extensive usefulness. These preparations have been gradual, and we hope certain because gradual. The circulation of the Journal being in places far distant and scattered over the union, its readers are enabled to obtain, whenever there may be, information respecting all matters of interest to them. It also furnishes the most ready means of communication between engineers and others interested in the cause of internal improvements.

Now what we desire, is to have from Presidents and Directors of Companies—copies of all their reports up to the present time (as nearly all those on hand were destroyed last winter by the great fire.)

From Engineers also, copies of such reports of their own and others as they may have at their disposal—and also short and condensed accounts of such Railroads or Canals as they have been or may be engaged upon—stating their length—grades—elevations at different points above high water or some other known level—and as much of the topography of the surrounding country as may be necessary to a correct understanding of the location—estimates of expense of grading, &c., and in particular, the size, weight, and figure of the rail, used with an account of the mode of structure. (It is the worth of but a few minutes to give from a model or the rail itself a figure of full size on a sheet of letter paper.) Also the total cost per mile, together with the number, size, different plans of bridges, with particulars as to the success of each.

Similar details are desired in regard to the construction of Canals, Tunnels and Hydraulic work of every description.

With this information we shall be enabled to lay before our readers a better practical body of engineering than any work in any language can afford. Our readers will be enabled to see and judge for themselves of the propriety of this or that mode of construction; in short, to have before them in their studies, information to be acquired at present only by a journey from one end to another of the Union, winding between hills up one side of a valley and down the other, making a journey nearly equivalent to one around the globe—including a trip to England, Scotland, Ireland, Wales, France and Germany. In short without the trouble of visiting every public work in the world—information respecting them all will be before our readers. We shall also be able to publish a revised and corrected Railroad map, bringing it down to the latest dates.

Our foreign correspondence and exchange will enable us to give the most recent intelligence from all parts of Europe.

We shall ever feel happy to visit our friends and examine personally their works; and some facts, such as the details of the experiment in this No. are only to be given satisfactorily by an eye witness.

All we ask is to give us free access to and over your different roads, and on every occasion of importance, and at stated intervals if possible, one or both of the proprietors of the Journal will be present and examine whatever there may be of general interest.

We ask this because the result will be of general benefit, and it will be much less difficult for two yearly free tickets to be spared to us from each road, than for us to spare the cost of travel yearly over each road in the Union. The Journal has been sustained so far under every disadvantage from a subscription list of zero, we call upon its friends and all concerned, to push its list, its usefulness and improvements generally, as far up towards infinity as they please.

We also desire to make our columns the medium of communication of such memoirs and other articles as our friends may favor us with—they are always open to free gentlemanly discussion, and from the undoubted talent engaged in this profession in our country, much valuable information may be elicited.

It is also our wish to advertise all lettings of public work, making our Journal the means of conveying intelligence between Contractors and Companies—and in this respect we enjoy a great advantage numbering both parties among our constant readers.

We have also made preparations to answer calls for instruments for engineers, of every discription, and made under our own supervision. We hope in a few months to be able to furnish complete outfits to Engineers—all the instruments being made by a maker of extensive practice, and information acquired from the best workmen in England and this country—and made as we have said under our own direction.

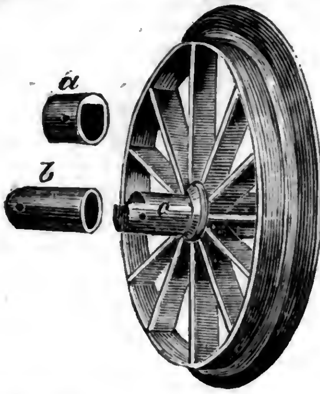
A properly prepared price current of Railroad, Canal—and the leading bank stocks, is intended to be inserted, as also a review or other notice of all new works relating in any manner to the profession.

We hope that we have convinced our readers by the exertions already made, and by what we have said, of our intention to increase as much as possible the utility and interest of the Journal as well as of their ability to assist us. We promise them not to be found wanting.

Those editors who may receive this number of the Journal, are requested to copy the above circular; and also to give us the benefit of the light of their countenance on the present, as on former occasions; and send us their paper in exchange hereafter.

RAILROAD AXLE JOURNALS.

The certain and unavoidable destruction of the Journals of Railroad axles renders



it necessary, or at least highly important, that a cheaper and more expeditious mode of repairs should be devised than is now in common use. By the ordinary mode of repairing journals, whether by overlaying them, or by splitting and welding in a piece of iron at each end and then turning them down as in their first formation, the expense is, on an average, $4 for each journal, or $16 for *each car*—and this repair must be performed as often as once in four years—it being estimated that the machinery and carriages will require to be renewed every four years.

If this estimate be correct the annual expense will be $4000 a year on a thousand cars, for repairs of the *journals* of the axles alone; or $40,000 per year on a road which, like the Erie railroad, is estimated to require 10,000 cars, and this too in addition to the increased original outlay for cars, in consequence of the additional number required to take the place of those "in the Hospital," for repairs.

Several efforts have been made to reduce this item of expense, yet none, that we are aware of, has succeeded, unless the one referred to in the following account shall be found to succeed. It has been, and is now in use, and thus far to the entire satisfaction, as we are informed, of those who have witnessed the result of experiments with it on the Baltimore and Susquehannah railroad—and it will, we apprehend, soon be duly appreciated and introduced into general use on all railroads.

This mode of repairing the *journals* of axles, and indeed of all kinds of machinery, will be readily understood, by a reference to the accompanying drawing and description; and it will also be perceived that the repairs can be accomplished, where the axles are *made in the proper manner*, at an expense of a few shillings, certainly *not to exceed a dollar* for each journal, or *four* dollars for each car, and the delay of an hour. Indeed it may be done while the car is loaded, and even on the track, thereby avoiding the trouble of taking the disabled subject to the *Hospital*, which is not unfrequently at the distance of many miles from where the repair may be required.

It will be observed that this drawing represents one wheel with a part of an axle, shewing the journal prepared to receive the *thimble*, or *ferrule*, *a*. and, *b* representing the two ends of a cylinder, which is of iron, case hardened, or steel, ⅛th of an inch in thickness, and made to fit accurately to the journals of the axle *c*, which should be of the best quality of iron. This thimble is kept from revolving on the journal, by the square, as shown in and on the outer end *a* and *c*; or it may be confined by a pin, as shown in *a*, *b*, *c*.

The expense of these thimbles, it will be perceived, cannot exceed 60 to 75 cents each; and the cost of labor in putting them on, a mere trifle, certainly not over 25 to 50 cents.

The *economy* in this item of repairs is a matter of no small consequence—as it will amount, on a *single car*, to at least $2,50 and probably *three* dollars a year, and on a *thousand* cars to $3000—and on the *New York and Erie* Railroad, to $30,000. Yet this is not perhaps its most important feature—its greatest value will be found in the *facility* with which the repair may be made, and the saving in the first cost, from the less number, of cars required.

The proprietor, Mr. D. C. Force resides at Baltimore, and is now prepared to sell rights to companies to use them, or to manufacture the thimble, as may be desired. Information may also be obtained and the mould examined at the office of this Journal.

SUSPENSION BRIDGE OVER THE NIAGARA.

Our readers must be aware that the crossing of this river at Lewiston, as usually effected by the ferry, is not always safe, and during much of the winter impassable.—The rapid increase of the various towns in the vicinity, the constant travel to the falls, and above all the construction of numerous public works, all having a direct bearing upon this point—have indicated the necessity of a bridge—and independent of considerations of economy, none other is here practicable than a suspension bridge.

The value of suspension bridges has been some time established and numerous works constructed on this principle fully sustain their reputation.

In England the far famed Menai bridge by Telford is the most splendid in the world, and of immense utility. The first bridge however, on this principle, was built of iron, over the Tees, at Durham, somewhere about the year 1752. It was intended only for foot passengers. The bridge over the Tweed, at Kelso, was finished in the year 1820. The length was 300, the width 18 feet. The Menai bridge was completed in 1825; its length is 560 feet and width 30 feet. Several other bridges of this description have been more recently erected in England,—and among others that at Dry burg Abbey is celebrated for its extreme beauty.

In France, this mode of construction has been generally established. There is one over the Seine, at Paris, one over the Charente, one over the Dordogne and one over the Rhone.

In Switzerland, the Fribourgh bridge has attracted much attention. It is thrown over the Sarine and its valley, and affords a safe and direct transit instead of the old circuitous and sometimes dangerous road.

The bridge at Geneva has several piers, and the suspension chains are below the road way.

In the United States many small suspension bridges have been constructed—among the largest are, two over the Monongahela; one over the Brandywine and another over the Merrimack, measuring 244 feet between the points of suspension.

It must be evident to the most careless observer that no situation is so advantageous for a suspension bridge, as a valley or river with high and precipitous banks.—This is precisely the situation most unfavorable to a common bridge, especially as the heighth above the water has no effect upon the cost or durability of suspension, while it vastly increases the one and hazards the other in the common form, so much so as in many cases to render it impracticable.

In the present instance, besides the depth and rapidity of the river and the heighth and sudden descent to the water from the banks, the accumulation of ice in winter is alone an obstacle of sufficient magnitude to prevent the construction of an ordinary pier bridge. From a diagram before us we perceive that the length of the bridge from bank to bank is to be 930 feet, the width of the surface of the water being 597 feet. The point selected for crossing is the most favorable that could be found on many accounts.

The estimates and surveys ,have been made by Francis Hall, Esq., C. E. Two different plans are proposed; one being estimated at $93,541, the other at $131,511.

The towers can be built on the bank requiring a less cost for masonry but a greater strength of chain and longer curve, while if they are built at or near the water's edge, their height will be much greater, while the length of the chain will be reduced from nearly 1000 to 600 feet. In either case the height of the roadway will be 125 feet from the surface of the water.

An idea of the strength of this sort of structure may be had from the estimate of the engineer. The heaviest load that can possibly be placed upon the bridge would be cattle covering its surface, and this load would be sustained at a pressure 358 tons short of that required to produce rupture, at the lowest calculation and after making proper deductions.

The chains are calculated to sustain a strain of over 1000 tons beside the bridge itself, and the suspending rods a weight of 6000 tons including their own weight.

The materials for this bridge can be obtained with ease. The best stone for the masonry can be found on the spot and lime also.

The revenue of this bridge estimated at the present rates will yield a handsome per centage on the capital, while there is no doubt but that the transit at either point will be more than doubled by this increased facility.

So fine a specimen of man's work beside the most wonderful piece of nature's handiwork could not fail to attract universal attention. We have only to recollect the important improvements in progress to be convinced of the absolute necessity of some such mode of communication. A glance at the map will suffice.

We understand that the subscription books are open at Lewiston, where Mr. Amos S. Tryon will give any information that may be desired.

While speaking of suspension bridges, we may remark, that we have in our possession much information on this subject including the descriptions in detail of the most remarkable constructions. This is, however, in a form inaccessible to very many. From it could be translated and compiled a volume most useful to the engineer. Should encouragement be offered the work would be undertaken.

We are happy again to hear from C. R. W., the more so since we have found that free and candid discussion has already brought out much information on this all-important subject.

We call attention to some curious results mentioned in the communication.

We would also express our hope that Mr. Campbell will accomplish his object, and that C. R. W. may be able to afford him the satisfactory, and we also hope substantial, proof mentioned below.

To the Editors of the Railroad Journal:

GENTLEMEN—In your editorial remarks on a communication in your paper of the 9th of July, you show yourselves friends to fair manly discussion, without that overweaning fastidiousness which would prevent one man differing from another for fear of giving offence. You state very truly that my views have been mistaken, and, I have no doubt, with equal truth, that I and others have mistaken the intent of Mr. Seymour's report, though the general terms in which these great performances were mentioned very naturally led to the conclusion that they might be safely calculated on in practice.

My former communication was written immediately after a discussion on the subject of grades, in which these very experiments were brought forward to prove that the "late improvements" rendered it inexpedient to incur any serious expense in keeping the grade within 24 feet per mile. Under these circumstances I expressed myself somewhat stronger than was perhaps absolutely necessary; and, on that account, shall not animadvert on the introduction of Mr. Campbell's next argument in enginery, or his assumption of superiority, but beg leave to assure that gentleman that, next to himself, no member of the community will be better pleased with his success than I shall, of which it may be in my power to afford him most satisfactory proof, even should the power of his engines be only half of what he so confidently anticipates.

Your scientific correspondent, W. L., must refer to some other communication than mine, when he says that I assert, that an $8\frac{1}{2}$ tons engine will take 100 tons up an ascent of 25 feet per mile, or that there is any discrepancy in Mr. S.'s statements of the *relative* power of locomotives on a level or inclination. It was the *absolute* power of the engines which I questioned; and in endeavoring to investigate the question, made a great error, which has unaccountably escaped notice. I assume the adhesion at $\frac{1}{12}$—it should be $\frac{1}{8}$; and as Mr. S. justly remarks, the extra weight of the engine should be taken into the account. Making this alteration, we have $\frac{8\frac{1}{2}}{8} \times 224 = 238$ tons gross, as the maximum load on a level, in place of 119, as given in my former communication. I have here changed the value of the traction from $\frac{1}{211}$ to $\frac{1}{224}$, as given by Mr. Knight in his last report, and the result does not differ materially from Mr. S.'s statement.

W. L. also appears to confound the traction of the carriages, depending on the friction of the axles, with the power of the engine, which is limited by the adhesion of the wheels to the rails; for the inclination, which will place the cars in equilibrium, must infallibly give the value of the traction. Thus Mr. Knight estimates the traction at 10 lbs. per ton $= \frac{1}{224}$ of the load $= 23.5$ ft. per mile; de Pambour at 8 lbs. per ton $= \frac{1}{280}$ of the load $= 18.8$ per mile.

This able correspondent furnishes himself a striking instance of the tendency which these "flattering statements" have to mislead even the best informed.

This gentleman assumes the traction at $\frac{1}{200}$, as given some years since by the B. & O. Railroad Company, while by looking into the last report, he will find it estimated 10 lbs. per ton $= \frac{1}{224}$ in practice. By substituting this value of the traction in his equation and subsequent calculations, he will find the difference in favor of stationary power reduced nearly one half.

This last report of Mr. Knight's contains a mass of information extremely useful to the public; and by comparing his experiments with those of de Pambour, it appears that American engines are very far superior to English ones, but that the English cars or roads exceed ours in the ratio of 4 to 5 in reducing the traction.—This latter circumstance is curious, and worthy of notice.

This same report also gives the cost of the branch road to Washington, and this is decidedly the severest commentary on steep grades which has yet fallen under my observation. On the Liverpool and Manchester Railroad the passengers are taken over grades of 55 feet per mile, without the aid of auxiliary engines, and as the revenue of the road between Baltimore and Washington will be derived principally from passengers, and as their engines are decidedly more powerful than English ones, the above grade of 55 feet per mile would offer no obstruction to the business of the road, and would certainly have lessened the cost of grading very much, for the present road has no steeper grades than 20 feet per mile. This is certainly carrying out the principle of "forcing a line," to such an extent that like the "medecin malgre' lui," I shall find myself forced into the ranks of the advocates of high grades. It is therefore clear that these extraordinary feats are received by the Baltimore and Ohio Company merely as tests of the power of their engines, and not as furnishing data for their practice, which is regulated by the soundest principles.

In conclusion, I observe that, if I have presumed to question, not the accuracy but the propriety of adopting any of the improvements of the B. & O. Company, I have never for a moment forgotten the difference between the author of original investigations of difficult subjects and the mere critic. Should ever the latter detect a flaw, a man of Mr. Knight's abilities will be the last to consider himself infallible; for there can be little doubt that he who never makes a mistake, will seldom do any thing creditable to himself, or beneficial to the community.

Your obedient servant,

C. R. W.

Montreal, July 18, 1836.

Messrs. Editors—I have observed in your paper of the 16th inst., a communication from Mr. W. Norris of Philadelphia, prefaced by yourselves with a hope that some

one would take up the facts it contained, and reconcile them to theories hitherto adopted.

The facts are, that an engine weighing 14.930 lbs. drew itself, and a load weighing 19.200 lbs. after it, up an inclined plane, 2.800 feet long, ascending 196 feet, which is at the rate of 1 in 14 $\frac{235}{1000}$+ (and not 1 in 13 as then stated) and that it passed over the plane in the space of two minutes and one second, or at the rate of 15 $\frac{77}{100}$+ miles per hour (instead of 14$\frac{2}{3}$ as there stated). And that the pressure on the boiler was a fraction under 60 lbs per square inch.

The data given will admit of a comparison with established theory, on only one point, and that point simply the adhesion of the wheels of the engine on the rail—and to follow out the comparison on this point will take but a moment.

All who are acquainted with the history of railroads and of locomotive engines know, that various experiments have demonstrated the maximum amount of adhesion to be at least $\frac{1}{6}$ of the weight. Now let us see what power the engine exerted during the experiment, and this will be the amount of adhesion in the present instance.

Pambour's recent experiments on the friction of Railway carriages, gives the amount at 8 lbs. per ton of 2240 lbs. and 8 lbs. per ton, increased friction of the engine machinery, on account of the load. The friction of an engine, on a level road without any load except itself is 15 lbs. per ton, of its own weight.

Then if we apply the foregoing to this case we shall have for the friction of the

engine	100lbs.
for the friction of the load	68 "
and the gravity of the engine and load is	2.389 "
It will be seen that the friction of the load, + the gravity of the engine and load, is equivalent to the friction of 307 + tons, therefore we must add for the increased friction of the engine machinery	307 "
Making the total amount of resistance, and of course of adhesion	2,864 "
And if we take $\frac{1}{6}$ the weight of the engine we have	2.488 "
Showing a discrepancy between theory and this experiment of	376lbs.

which is a fraction less than $\frac{1}{7}$. say 15 per cent in all.

Without knowing the dimensions of the cylinders, and of the working wheels, as well as the length of the stroke of the pistons, it is impossible to judge of the performance of the engine, or to compare it with former theories.

It has been supposed that an ascent of 860 feet per mile would limit the progressive motion of a Locomotive engine upon ordinary railroads: but if the above data is correct, it would be increased to 1013 feet per mile. It will be seen that there are two errors in Mr. Norris' statement, and will it be uncharitable to account for the discrepancy with theory, by supposing that possibly there is yet some other mistake, about the length or height of the plane, or the precise weight of the engine, or load? so that after all, the wonderful performance will turn out to be nothing more than what every man faimiliar with railroads, and Locomotive engines would have predicted before hand. For my own part, I cannot see any thing very remarkable in the fact, that a Locomotive engine, which can of course run itself up a plane ascending at the rate of 800 feet per mile, should draw .19.200 lbs. after it, on a plane ascending at the rate of 369 feet per mile, at a velocity of 15 $\frac{77}{100}$ miles per hour. If the adhesion of the wheels is greater than the resistance of the load, it is very evident that the velocity will be just in proportion to the amount of steam applied.

After all, it should not be forgotten, that the same amount of power, as was exerted by this engine during the experiment, will draw itself and a load of 307 tons after it on a level road at the same velocity that it will draw itself and 19.200 lbs. including the tender on the said plane. If the weight of the tender was 3 tons, then the amount of load, beside the engine and tender, was 5 $\frac{57}{100}$ tons, and it would require 54 additional engines of the same power, to help this one up said inclined plane, with its proper load for a level road.

Yours, &c.

Wm. H. Talcott.

Albany, July 25th, 1836.

"Eastern Railroad commenced.—Yesterday afternoon ground was broken on the Eastern Railroad: or in the language of the workmen this "Railroad was broken." It was a sudden commencement, and we learn that. although the work on the whole route had been previously contracted for, it was not determined until yesterday morning at a meeting of the Directors, that the work should commence in due form, on that day. At 4 o'clock, P. M. the Directors being present at East-Boston, Col. Geo. Peabody, President of the Board, made a brief and appropriate address, the substace of which was, that as the Company had surmounted many obstacles in obtaining the charter, so they were determined to overcome all obstacles in the speedy completion of the Road. Holding spades in hand, he and the other Directors, suiting the action to the word then dug up a portion of the sod, placed it in the barrows, and wheeled it into the valley. Thus was commenced the good work of internal improvement. The regular workmen, with their carts and implements, then took up the work in earnest. We learn that contracts for the whole route to Newburport have been completed with responsible men, at five per cent lower than the original estimates of the Chief Engineer, and that in the course of a fortnight, from 1200 to 1500 men will be employed on the whole route to Newburyport. This work, thus auspiciously commenced, is not only interesting to the stockholders, but to the people of Boston genernlly, and of the whole eastern section of the State, and Maine. There is nothing to prevent the completion of the work within the time originally proposed. On this occasion, a notional salute of 26 guns was fired."

We are pleased to learn that in all the contracts made for the construction of this Railroad, the use of ardent spirits among the workmen is prohibited.

First Steamboat on Oneida Lake.—By the following proceedings it will be seen that the experiment of steam navigation on the Oneida River and Lake has proved successful. The steamboat "*Seneca*," owned by Colonel Baldwin, was built, we believe, at Baldwinsville, on the Seneca river, and has passed from that point to the Oswego river, thence up the Oneida river to the Oneida lake, and traversed every part of that lake. The experiment must satisfy all, the feasibility of making these waters navigable for a *large description* of vessels at a trifling expense, and of the reasonable petition of the citizens of the country bordering upon them for Legislative aid in their improvement.

A Brighton wiseacre, according to a journal of that town, has been *preserving* the coin of the realm by inclosing some in a ball of wax, which he placed in a balloon of Indian rubber inflated with gas, so as to raise it several thousand feet above the earth, "*where, floating in space*, the memory of our nation and its monarch *may be recorded for hundreds of thousands of years!*"—*Age.*

VAN BUREN HARBOR.

We publish the following report in relation to Samuel Cushing, Esq. civil Engineer, with a view of disseminating information in which many of our readers have a direct interest.

It appears to be a comparative statement of the capabilities of the different harbors on Lake Erie, between Buffalo, and Erie in Pennsylvania. Of the correctness of the report, we can only judge by the character of the gentleman whose name is attached to it—as we are not, that we are aware of, personally acquainted with an individual interested in the place. It is possible that, in giving place to this report, we may be deemed unfriendly to those places in its vicinity with which it is more immediately contrasted; and it may not therefore be improper for us to say, that our partialities, and prejudices, *if we have any*, are in favor of those, and against their rival, Van Buren harbor, and therefore we ask the friends of Dunkirk and Portland, to furnish us with such reports of actual survey, as will place the whole subject before the community.

TO THE PROPRIETORS OF LANDS, AT

VAN BUREN HARBOR, ON LAKE ERIE,

IN THE COUNTY OF CHAUTAUQUE, NEW-YORK.

GENTLEMEN:—

The survey of Van Buren harbor, upon which I have been engaged during the last month, being completed, I have the honor to present you with a chart, showing the results of the survey, together with the following report.

As early as the season would admit, the survey was commenced, and though much unpleasant weather occurred, it was continued with few interruptions till finished.

On arriving at Van Buren, I was agreeably disappointed in the appearance of the place, having, from want of correct information relative to it, greatly underrated its capabilities. Instead of being low and swampy, as I had expected, the country bordering the Lake is dry and elevated, possessing generally an aluminous soil, with a firm and even surface.

At the distance of from three to eight miles from the Lake shore, a ridge of hills rises from a belt of alluvial country, whose gentle slopes occupied by productive farms, present a pleasing picture of agricultural prosperity.

Between the ridge of hills and the shore the country is slightly undulating, intersected by the courses of rivulets which issue from the hills and discharge themselves into the Lake. Several of these streams are of sufficient importance to furnish valuable mill sites, and they are already occupied for such purposes to a considerable extent. Stone of good quality and easily accessible is procured from the hills, and is much used in the vicinity for building bridges, and other works requiring durability. The country abounds with timber of various kinds adapted to building purposes; white wood, many specimens of which are of gigantic dimensions, hemlock, maple and sycamore are abundant and rendered valuable by the vicinity of saw mills.

Brick of good quality can be made in any quantity in this neighborhood, the soil near the Lake being well adapted to its manufacture, and fuel for kilns being cheap and abundant. The lime used at Van Buren is burnt on the spot, from stone brought from the opposite shore of the Lake.

By examining the chart herewith presented, it will be seen that Van Buren Harbor, is formed by an indentation in the shore of Lake Erie; having on the northeast a sunken reef of rocks extending in a northwest direction, about half a mile into the Lake, and on the west and northwest a point of land, with shoal water beyond it for a distance of seventy-five rods.

The harbor is bordered around its greatest portion by a sloping beach of sand and gravel about fifty feet wide, the upper side of which merges in the clay formation common to the country, and is closely invested with luxuriant vegetation. The point on the western side of the harbor, presents towards the Lake a perpendicular wall of rock about twenty feet in height whose upper surface being covered with a sufficient depth of soil, supports a heavy growth of timber, which from the shelter it affords, adds materially to the safety and convenience of the harbor.

In the vicinity of Sturgeon Point, the rock again appears on the shore though not in the perpendicular bluffs which it exhibits at Van Buren Point; but in lower ledges, with usually a beach of sand and shingle between them and the water. The rock, a species of slate, is found in horizontal layers, of various thickness, intersected by perpendicular seams; it is unfortunately unfit for building purposes, in general, though it answers well for filling the interior of the timber frame work of wharves and breakwaters. To the action of water upon particular portions of this rock, are perhaps to be attributed those singular natural fountains of carburetted hydrogen gas, which are often seen in its vicinity, and which are frequently of sufficient magnitude to afford an economical means of procuring artificial light. In the village of Fredonia about four miles from Van Buren, this gas is extensively used for the purpose of lighting shops and dwellings, and though from the predominance of hydrogen in its composition, it burns with a paler flame than the manufactured gas, it is nevertheless highly approved of by those who use it. At several points in and near Van Buren, the gas is seen rising in bubbles through the water.

The greatest quantity is found in the creek, the position of which is shown on the map, another locality is in the Lake close to the shore, a few rods east of the wharf.

It is doubtful, however, whether these fountains afford gas in sufficient quantities to be available for useful purposes.

The natural capabilities of the harbor, in a commercial point of view, will be perceived, by an examination of the map, to be of considerable importance.

It will not, it is true, bear comparison with Atlantic harbors, either for capacity or safety, but it will lose nothing by comparison with those of Lake Erie, within the limits of the State of New York. In deciding upon the merits of this harbor, it must be judged therefore, not by comparing it with those on the seaboard, but with its own immediate neighbors.

It will be borne in mind, that a perfect harbor must possess most, if not all the following qualities, to wit: Protection from the winds and waves; anchorage ground of sufficient extent to accommodate safely a large number of vessels; sufficient depth of water to admit the largest vessels that may be expected to enter, and one or more points of entrance so situated that ships may enter or leave the harbor in all winds. For the purposes of shelter from storms these requisites are perhaps sufficient, but when the harbor is designed to become a place of resort for vessels where they may not only lie at anchor in security, but may also conveniently load and discharge cargoes, other circumstances must be taken into view. The formation of the adjacent country with regard to its suitability for the site of a commercial city; the facilities for building wharves and warehouses; the health of the climate, and the quality of the water to be used by the inhabitants, and other circumstances of less importance, must be attended to.

It seldom happens that all these circumstances are united in perfection at any one place, on the contrary, it is usually found that in any two harbors, one will excell the other in one or more of them, while in other respects it may be inferior.

The harbor of Van Buren possesses naturally many of the requisites above enumerated. Its entrance being spacious and conveniently situated with regard to the anchorage ground, it is accessible in all winds by sail vessels as well as by steamboats; a ship even with the wind directly ahead, having plenty of room to beat into, or out of, the harbour.

The natural protection of the harbor is good against all winds except those from the north and north west, and these quarters it is proposed to defend by a breakwater, similar to those erected at other harbors on the lake.

It is probably known to you, that most of the harbors on the south shore of Lake Erie require this artifical protection, before they can be considered safe in the severe gales which sometimes occur from the northwest. Buffalo harbor was furnished by government with a breakwater for this purpose, at a cost of more than $200,000. The expense of the breakwater proposed for Van Buren harbor, would not exceed $50,000, while it would protect twenty acres of good anchorage from the force of the northwest gales. This breakwater would be constructed on a less expensive plan than that at Buffalo, which consists of heavy stone, so laid as to be permanent without the aid of timber. The proposed work would be similar to those erected at Dunkirk, and would be formed during the winter of stone and timber united. A crib or framework of timber of the width of the intended breakwater, and of a convenient length, would be made upon the ice immediately over the site of the proposed work; the corners of the frame being securely fastened together, and the whole strengthened by a sufficient number of cross ties.

The framework would then be filled with stone procured from the shore of the lake; during which operation it would gradually sink until it rested safely on the bottom, after which other sections would be added in the same manner till the required length was attained. Seventy-five rods of the proposed breakwater will be founded in less than eight feet depth of water, and the remainder will be between that depth and a depth of eighteen feet. The top of the work should be at least ten feet above the surface of the water, for though some that have heretofore been built are much lower, it is now ascertained from experience, that perfect security cannot be attained with a less height. Provided with such a breakwater located in a proper position, Van Buren

harbor would be well protected from the northwest storms, while it would still preserve an entrance way sufficiently wide to allow vessels to enter or leave it in any wind.

With regard to protection from the northeast, it will be remarked, that the reef from Sturgeon Point extends more than half a mile into the lake, with from three to six feet water on it in ordinary times; and the effect of a northeast wind being to depress the surface of the water in this part of the lake, the depth on the reef is lessened at such times, and its effect in breaking the swells, is in consequence proportionally increased. The same cause therefore, which renders protection necessary in this quarter is instrumental in producing it at the very time when it is needed.

Further protection than is afforded by the reef would doubtless be desirable, from the greater comfort that would thence ensue to vessels lying at the wharves during a northeast storm; but as a means of affording additional *security*, it would scarcely be of sufficient importance to warrant much expenditure. The heaviest waves produced by a northeaster are now checked and broken into foam by the rocks of the reef, to the leeward of which the surface is comparatively calm, and free from those dangerous white-crested seas, whose effects are most to be dreaded.

From the opportunities I have had of seeing the harbor under the influence of a strong northeast wind, I do not doubt that a vessel might lie there securely at anchor in any gale likely to occur from that quarter. The depth of water in the harbor, as will be obvious from an inspection of the chart, is amply sufficient for any vessels navigating Lake Erie, none of which, I am informed, draw more than nine feet when loaded, and a large proportion of them not more than eight. At the head of the present wharf at Van Buren, there is eleven feet of water; and at no place between this and the entrance of the harbor is there less than ten and a half feet.

Having thus shown the importance of Van Buren harbor, by describing its capabilities without reference to those of other harbors, I shall, for the purpose of showing its advantages in a stronger light, compare them with those of some other places that I have examined. One of these is Portland harbor, situated about fourteen miles southwest of Van Buren, and having a breakwater and lighthouse. The position of this harbor is such that it can scarcely be made secure without great expense, being entirely open to all winds except those from the south and west. The breakwater extending from the shore, in a northerly direction, about six hundred feet into the lake, is consequently serviceable only in winds from the west, and the facilities for further protection are quite limited. The place, in short, is deficient both in capacity and security. It will doubtless be a convenient place in good weather for steamboats to touch at, in their progress up and down the Lake, for the purpose of landing freight and passengers; but for a port where vessels are to lie in all weathers, its capabilities are quite too limited. The bold and rocky character of the shores to the eastward of the breakwater forbid the idea of occupying them for wharves and warehouses, even if they could be protected from the force of the waves. This harbor, if such it may be called, is in all respects greatly inferior to Van Buren.

The place to which your attention will now be directed, is Dunkirk harbor, situated about five miles northeast of Van Buren.

The chart of this harbor, herewith presented, was taken from a survey made last autumn, by T. S. Brown, of the U. S. Engineers, whose reputation is a sufficient guarantee for its accuracy. Being drafted on the same scale as the map of Van Buren harbor a comparison of the two may be easily made, and the wide difference between them will be obvious at a glance.

The bottom of the harbor is a basin principally of smooth rock, having in its deepest part a bed of clay, which has probably been washed from the adjacent shores during the storms, and deposited in this place.

At the northwest extremity of the harbor is the main channel, or entrance, being two hundred and sixty feet wide, and eleven hundred and fifty feet long, running in a direction nearly east south east.

This position of the entrance is decidedly a bad one, and taken in connexion with the length and contracted width of the channel, constitutes a very unfavorable feature; for in consequence of its position on the northwest side of the harbor, there must always remain in this most exposed situation, a space open to the Lake, as it cannot be here fortified without entirely closing the entrance, or otherwise making it highly inconvenient and dangerous. It will hence ensue that a vessel lying at the wharves or at anchor in front of them will have nothing interposed between her and the northwest gale, which, coming through the opening, will sweep the harbor with a fury scarcely less than it exhibits on the open Lake; and when it is considered that the most tremendous gales experienced on Lake Erie usually come from this quarter, the disadvantages of an opening here, will be apparent. It will further be observed that the northwest breakwater at this harbor, though it is unquestionably of great utility in diminishing the dead swells, does not directly shelter any portion of its waters, excepting such as are too shallow to be approached by vessels, while a breakwater of the same length at Van Buren harbor would protect twenty acres of good anchorage from the northwest storms.

With regard, then, to the important requisite of protection against gales from the northwest, it must be obvious from what has been said, and from an examination of the charts, that in this particular Van Buren harbor, with the proposed breakwater, would have greatly the advantage over Dunkirk. Against the northeast storms the natural protection of Van Buren is superior to Dunkirk, and its facilities for articificial improvement in this quarter are at least equal. As yet there has been no breakwater erected in this direction at either harbor.

Another characteristic of Dunkirk harbor, which must be considered as very unfavorable, is in the nature and formation of its principal entrance. In consequence of its great length, and contracted breadth, it is inaccessible in head winds, to sail vessels without the aid of steam power, and it can never be safe to enter it in any wind when blowing strongly. A vessel running up the Lake in a northeast storm, with the intention of seeking shelter in Dunkirk harbor, would approach the entrance with the wind directly abaft; in order to enter the harbor, she must then turn a right angle, and with the wind on her beam, pass through a channel eleven hundred and fifty feet long, and two hundred and sixty feet wide; a manœuvre, which, at such a time, is manifestly full of danger. Van Buren harbor, on the contrary, as is evident from the chart, can be entered, or departed from, in any wind, its entrance being sufficiently spacious, in regard to breadth, and depth, to admit of beating either into, or out of, it. The space between the head of the proposed breakwater, and a depth of nine feet of water opposite to it, is twelve hundred feet wide; and as this is the narrowest part of the entrance, a ship in beating into, or out of the harbor, would seldom be obliged to make a tack so short, even, as this. Hence it is plain that Van Buren harbor is superior to Dunkirk, not only in point of safety, but also in facility of access. It is, moreover, at least equal to it, in the quality of its anchorage, and in the opinion of masters of vessels, who are acquainted with both harbors, Van Buren has greatly the advantage also in this respect. It will be perceived also from the formation of the two harbors, and the depth of water in each, that the facilities for building wharves, are greater at Van Buren, than at Dunkirk. At most points in the latter harbor, they will require to be nearly double the length, to reach deep water, than will be necessary at Van Buren.

From a review of all the circumstances it will be evident that Van Buren harbor is not only intrinsically valuable for its natural capabilities, but that it becomes still more so by comparison with its immediate neighbors.

In conclusion I would state, that without prejudice in favor of, or any interest whatever in, this harbor, I have formed the opinions expressed in this report, from the facts developed by the survey; and I have the satisfaction to know, that in these opinions, I am supported by some of the ablest Engineers and most experienced sea Captains in this country, to whom the charts have been exhibited, and who have without any exception given opinions coinciding with those herein expressed.

I am, gentlemen,
with great respect,
your ob't. serv't.

Providence, July 22, 1836. S. B. Cushing.

Cleaveland, Warren, and Pittsburgh Railroad.—This is part of the great line of communication connecting the country on the Upper Lakes with the cities of Philadelphia and Baltimore. It is therefore of little less importance to the prosperity of Michigan, than if it lay wholly within the limits of the State.

The route has been examined recently by an engineer, and estimates made of the expense, some considerable obstacles occur on the eastern part of the route; the greatest is the Rock Bluff near Youngstown, which will require about 35,000 cubic yards of rock excavation, and as many of earth. The greatest ascent or descent is not more than 40 feet per mile. The distance from Warren (Ohio) to the Pennsylvania line, is 23 miles, and the expense of grading and bridging is estimated at a little less than four thousand dallars a mile.

A meeting of the Directors have ordered that 5000 additional shares of stock be created, and that the same be sold in the cities of Pittsburgh, Philadelphia, and Baltimore. It was likewise ordered, that the first five miles of the road commencing in the vicinity of Erie street in the city of Cleaveland, be located and put under contract, on or before the first of September next; and that a further portion of the road not less than twelve miles, be put under contract on or before the first of October next.—*Detroit Jour. & Cour.*

NICKOLL'S PATENT CONDENSING RAILWAY LOCOMOTIVE.

Sir,—I beg to invite the opinions of your correspondents upon the following proposed improvements upon my plan (*Mechanics' Magazine* No. 635,) for a railway condensing locomotive.

The boiler being constructed and situated as before described and represented, I would substitute in the place of the two equi-angular crank condensing engines, D, two double-acting high pressure engines, with the addition of a condensing apparatus (consisting merely of an enlarged air-pump,) which I would fix in the place of the condenser F; the apparatus in question, together with the hot-water pump, to be worked through the medium of a cross-head and separate cranked shaft, by an excentric, from the shaft of the engines.

Concerning the refrigerator for cooling the hot water of the condenser, late experiments have convinced me, that to maintain the cooled water, even at the temperature 80° Fah., an evaporating superfices of full 200 feet, per horse power would generally be desirable.

It is not necessary to employ the draft of a furnace, or other means, to produce a current of fresh air in the refrigerator—for moisture, so far from loading the air with its weight, communicates, like heat, increased expansion and elasticity; consequently, as by reason of the heat and vaporisation of the hot water in the refrigerator, the specific gravity of the air therein would be lessened, so by a little elevation of the eduction air chambers T, the refrigerator would establish a current of fresh air for itself.

With a given quantity of steam, I anticipate about one-twelfth greater effect by the employment of my high pressure condensing, instead of the ordinary high-pressure locomotive; but the steam blast being wanting in the condensing locomotive, the expenditure of fuel might perhaps exceed in a sixth ratio what might be required in an uncondensing locomotive; the ultimate economy, however, (to pass by other well-known inconveniences of the steam blast,) I apprehend to be more than questionable, because of the powerfully exfoliating influence of the very intense heat which the blast occasions upon the thin and oxygensible material of which locomotive boilers are, and, with our present knowledge of metallurgy, must be constructed. Yet, if in no other point of view, assuredly as respects economy in the item of water, the superiority of my condensing, as compared with the ordinary locomotive, may be admitted—first, on the grouud of the presumed somewhat more economical application of the steam; secondly, from the cooling influence of successive currents of fresh air upon the hot water of the refrigerator; and thirdly, from the vaporisation of a given weight of water, say of the temperature 100° Fah., (according to what one may infer from lately published experiments of Desormes,) absorbing about one-third more caloric, than steam evolved of four atmospheres elasticity.

I am, Sir, your obedient servant,

J. W. Nickoll.

STEAM CONVEYANCE BETWEEN PADDINGTON AND THE CITY FOR HIRE.

Mr. W. Hancock, whose perseverance certainly deserves success, commenced running his steam carriages, the "Enterprise" and "Erin," on Wednesday morning last, at nine o'clock, from the station in the City-road to London Wall; from thence he proceeded to Paddington, and returned to the city. On the first day he performed three of these journeys, on the second, four, and on the third (yesterday,) two, before noon. The average time of travelling over the above ground has been 1 hour and 10 minutes, including stoppages to take in passengers, water, and coke. This is just half the time the horse-omnibusses take in going over the same ground. In the nine journeys performed, the number of passengers carried was 220, averaging about 12 persons each single trip. Mr. Hancock intends to run his carriages regularly the same number of journeys daily, for the present, and very shortly to increase the number.

[*Lond. Mec. Mag.*

Thames Tunnel.—The excavation made for the Thames Tunnel is about 38 feet in width, and 22 feet six inches in height, presenting therefore, an opening exceeding 850 feet. The whole of this excavation including its two sides, which may be computed at 400 feet, is secured by means of a powerful apparatus designated the shield, as is also the roof of it, which measures 350 feet. At full tide, the weight of both earth and water, which constitute *the superincumbent pressure*, is not less than 700 tons.

The *ceiling* of the shield consists of 24 or 26 pieces of cast-iron, denominated staves, closely adjusted; and as they are sometimes made to relieve each other, and therefore subjected to an increased load, they are, for greater strength, made like inverted troughs of cast-iron; their breadth is 18 inches, the depth of their sides 7 inches, and their length 9 feet, independently of a tail of wrought-iron which overlays the brick work. The edges in front are made sharpe for entering the ground, and the external surfaces of the staves are planed very true. Similar staves are laid against the sides of the shield, all planed and equally well adjusted; each stave can be impelled singly as sheet piles are. Upon the whole the shield may be viewed as a coffer-dam, which, instead of being moved in a perpendicular direction, is placed and impelled horizontally. The standing part of the shield consists of 12 parallel frames all independent of each other.

The front of this vast excavation is protected in a different manner from that of the sides. It is panelled all over with small boards, each of which is 3 feet long and six inches wide. There are, therefore, upwards of 500 of these boards, technically called *polings*, for covering the whole face of the excavation. Every one of these polings is held in place, and securd by means of two hand-jacks or screws, abutting against the frames. There are, therefore, upwards of one thousand of these jacks in action for securing the face of the excavation, or rather, for pressing against the ground with sufficient power to prevent any disruption of its various strata for; were the ground to be at all deranged, the pressure against the sides and front of the shield might soon increase to 2,500 or 3,000 tons, independently of that of the superincumbent pressure.

It is further to be remarked, that every successive tide, which at its full head is 76 feet above the foot of the excavation, causes an incessant variation in that pressure, tending to strain the hard strata, and to soften or knead the intervening soft ones; a subject quite unnoticed by projectors of plans fect, which proved fatal to those who attempted the drift-way under the Thames in 1808. The pressure exerted against the front of the excavation by the agency of the shield, must therefore be uniformly kept at a maximum. The shield is advanced only 9 inches at a time, while the brick structure proceeds simultaneously.

It would be well if those who feel disposed to enter the list of competitors were first to consult the report of those miners who directed the attempts that were made and carried on with so much perseverence, between the years 1803 and 1808, with the ultimate object of opening a road-way under the Thames at Rotherhithe. These were miners (Cornishmen.) engineers in that branch of the art, and, consequently, eminently qualified for the task in every respect; they were as sanguine too, as any of the projectors of this day; and their excavation was limited, in the first place, to a simple driftway, the height of which was only 5 feet, the breadth 2 feet 6 inches at the top, and 3 feet at the bottom, forming, therefore, an excavation that was sixty times smaller than the excavation which has been made for the Thames Tunnel. Diminutive, however, as this hole was when contrasted with that of the Tunnel, the ground of the roof, though supported by substantial planking, gave way once in a fluid state, leaving an unsupported cavity over the roof of the drift-way; still it held

itself up; but a second accident of the same nature having occurred under a very high tide, the river broke the ground and entered the drift. In both cases it was the loose ground that first forced its way into the drift, and the river afterwards. The miners succeeded in filling the hole and in re-entering the drift, but the men could not continue the working; they were, according to the engineer's report, *driven out of it by the frequent bursts of sand and water*, and it was acknowledged by him to be quite impracticable to proceed further; so, after having probed the ground from underneath in many places, he concluded and reported that it was impossible to make an excavation of any size under the Thames.

But he resorted to one expedient which he conceived would answer the emergency—one which, at any rate, demonstrates the intrepidity of this engineer. That is, in order to clear or pass through the place which had been filled up in closing the hole made by the breaking in of the river, he reduced the height of his drift from 5 to 3 feet. The men and the engineers, too, had therefore to work on their knees. Awful enough for such a task! Thus reduced, the area of the excavation of this drift hardly exceeded the one-hundreth part of that of the Thames Tunnel under corresponding circumstances.—*London Mechanics' Magazine.*

From the Times.

ALBANY AND WEST STOCKBRIDGE RAILROAD.—A report of the superintendent of this work is before us, accompanied by a report of the Engineer, showing the result of a very extensive survey of different routes, the capabilities of the country to sustain the road, with many other interesting facts. Three entire routes have been surveyed and estimated upon, one of which runs directly by Lebanon Springs, twenty-five miles from Albany, at which there were last year seven thousand visitors.—The distance upon this route from Albany to Stockbridge, is 41 3-4 miles, and can be constructed upon a grade which will in no instance exceed forty feet ascent per mile, which is only 2 1-2 feet per mile more than occurs on the Boston and Providence road for five miles together. The cost of the road laid with entire iron rails, is estimated at $647,529 exclusive of carriages and depots, which is about $15,500 per mile.

The annual income of the road, from passengers and freight is estimated at $179,304, from which is deducted, for expense of operating, repairs, &c, $63,515, leaving a balance of $115,788, being an interest of more than 18 per cent. on the entire cost. Should the route by the Springs be adopted, about $33,000 should be added to the income of the road without increasing the expense of operating it.—In this estimate very little is put down for New-York and Albany travel, which will all pass over this road whenever the New-York and Albany road is made, which, it is said, is soon to be commenced. The railroad from Boston to Albany, now going forward, connects with this road at West Stockbridge, and the New-York and Albany road will connect at the same place; so that it is to become not only a part of the line of road from New York to Albany and the West, but is to be the thoroughfare through which all the interior of New-England is to be supplied with bread stuffs from our canals. There are no canals to compete with this road, either for freight or passengers.

The superintendent concludes his report by remarking that, "From the report of the Engineer, show the business to be done upon the road, the accession to that business within the reach of the company by going by the Lebanon Springs, and the probable construction of the New-York and Albany road, bringing the entire winter travel, and much of the summer travel, between those two places over the entire line of this road, it cannot be doubted that it presents some of the best railroad stock in the State.

This is the most difficult part for constructing a railroad from this city to Albany, to connect with the railroads running thence to the west and north, and it is gratifying to learn that a route has been found so easy in its grades and so cheap of construction, and it is hoped our citizens will take a proper interest in an object so desirable as that of opening a communication by railroad between this city and Albany, and especially so, as the prospect is so fair for a profitable investment.

The books for subscription are to be opened on the 27th inst., as will be seen by the notice in our advertising columns.

HEIGHT OF BAROMETER, &c. NEAR THE TOP OF CHIMBORAZO.—On his ascent of Chimborazo, M. Bossingault found the barometer to stand at 14.47 inches at 2 P. M., the thermometer being at 46° Fah. The height above the level of the sea was 6004 netres (6670 yards.)—*Ibid.*

INTERNAL IMPROVEMENTS.—The following extract from the Oswego Advertiser of the 9th, is the best practical proof we have seen of the Oneida Lake, River, and Seneca River being now navigable for Steamboats, and in a fair way, we trust, of being improved for a Ship canal. With a very moderate expenditure, in proportion to the advantages to be derived, one of the most beautiful and picturesque routes to Niagara Falls can be opened, viz: by steamboats to Albany; railroad to Utica; packet, to the head of Oneida Lake, and then through this Lake and river with steam, to Oswego. This beautiful sheet of water, 22 miles long, is studded on its margin with fine farms; its banks gradually rising to 300 feet in the distance of a few miles from its gravelly shores.

One hundred thousand dollars was asked of the last Legislature, to improve the outlet of Lake Oneida and the Seneca River to the inlets of Cayuga and Seneca Lakes. An able and favorable report was made on this subject by Genearl Borland, chairman of the committee on canals.—The application was late in the session, and the necessity that then existed to invest the cost of the Erie and Champlain Canal debt, so as to carry the salt and auction duties to the general fund, was, it is understood, the principal cause which prevented the subject being acted on

A glance at the map of the State of New-York will show the propriety of improving the channels of trade, between Lakes Oneida, Cayuga, Seneca and the other small Lakes, lying *in the centre of the State*, with which canals and railroads are connected—and in one instance to the south by Ithaca and Owego, to the coal and iron mines of Pennsylvania, whilst on the north by Oswego, and the contemplated Sodus Bay Ship Canal, we are brought in connection with Canada, and by the Welland canal, with the "Far West."

A new era is now opening to the State of New York in internal improvements. The constitutional difficulty that heretofore existed, to take any part of the revenue, derived from the tolls on our great work, the Erie canal, until after the debt was provided for, has passed by.

We have now productive works of internal improvements, which, with the salt and auction duties, produce us alone one million and a half of dollars per annum—yearly increasing—and without one cent of State tax.

The policy and prudent course pursued by our State Officers, in husbanding the revenues of our Canals for the extinguishment of the debt, for their cost, has been blamed by the inconsiderate, and they have been stigmatized as unfriendly to internal improvements. A moment's reflection will show it is not so. It was the only course for an able financier, A. C. Flagg, to pursue. The constitution the tolls of the Canals—salt and auction prevented duty being directed to any object, until their cost was provided for. There was in reality no necessity for taxation, although recommended by Governor Marcy, with the view, no doubt to provide for any deficit (as our general fund was nearly exhausted, having been mainly expended to build our canals,) for a liberal State expenditure, and for the interest, on any loans, for internal improvements, then claimed from various quarters.

The people, through their representatives, would not tax themselves;—their good sense pointed out to them a mine of wealth in their system of internal improvements. They waited patiently until the Comptroller announced, the last winter, to the Legislature, that the period would arrive—1st July, 1836—when the debt for building the Erie and Champlain canal could be provided for and safely invested. The pledge has been redeemed. The last Legislature (which has only one parallel in this State) covered themselves with honor, in their acts, to build the Black River and Olean canals, and for the liberal aid they yielded in the credit of the State of three millions of dollars to build the Southern railroad.

The long list of railroad charters, crossing the State in every direction, is further evidence of their desire to promote internal improvements. We look forward with confidence, to the next Legislature, to improve the *natural* navigation; connecting our inland Lakes by removing all obstruction to a navigation of at least seven or eight feet water, *with locks to pass steamboats;* destined to supersede sails, at no distant day, with as much certainty as steam will supersede sails on the Hudson; and is yearly getting into more use in our coasting trade, and will be largely used, in steam frigates, for our naval defence.

B.

METEOROGICAL RECORD,

For the month of November, 1835, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10′ N., Long. 91° 59′ W.,) by P. G. Voorhies.

NOVEMBER.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	52	64	60	calm	clear	
2	55	70	62	..	..	foggy morning
3	60	71	69	SE	cloudy	rain all night
4	65	64	64	calm	..	heavy rain all day and all night
5	64	65	65	SE	..	clear evening
6	58	65	61	calm	clear	
7	52	78	68	..	cloudy	
8	64	67	66	..	..	a little rain
9	62	66	61	..	..	rain at noon—clear evn'g
10	65	72	68	S	..	heavy rain and thunder all day
11	44	49	49	N	clear	
12	41	51	48	NW	..	first white frost
13	42	66	62	NE	..	. .
14	58	70	67	SE	cloudy	heavy rain all night
15	57	78	74	S	..	
16	58	64	60	calm	..	rain all day and all night
17	55	68	59	..	..	. . .
18	58	76	74	SW	..	
19	74	79	75	..	..	high wind at noon
20	71	78	66	calm	..	showers—rain at noon
21	57	59	56	NE	..	. all night
22	47	49	46	N	..	rain at noon and evening
23	42	50	45	NW	clear	
24	36	45	42	N	..	
25	32	47	46	NE	..	
26	38	50	48	calm	..	cloudy evening
27	41	43	42	..	cloudy	drizzling rain all day
28	38	54	43	..	clear	
29	32	51	48	..	..	heavy white frost
30	34	68	62	..	..	

Red River fell this month 3 feet—below high water mark 5 feet 11 inches.

METEOROLOGICAL RECORD.

For the month of December, 1835, kept at Avoylle Ferry, La., (Lat. 31° 10′ N., Long. 91° 59′ W.,) by P. G. Voorhies.

DECEMBER.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	49	64	61	calm	clear	
2	50	65	63	NE	..	
3	51	70	68	SE	.	cloudy and calm in the afternoon.
4	55	75	67	calm	..	Red River rising
5	52	59	53	N	cloudy	clear at noon
6	34	64	56	..	..	white frost
7	38	67	53	calm	..	
8	51	59	52	..	clear	
9	53	62	56	..	cloudy	rain all day and all night
10	54	50	50	N	..	. . .
11	36	50	41	calm	..	
12	33	51	50	..	clear	heavy white frost
13	32	60	54	..	..	. .
14	40	62	59	..	..	white frost—cloudy in the afternoon
15	39	67	62	..	..	
16	41	68	62	..	..	white frost
17	46	72	67	..	cloudy	foggy morning
18	60	72	68	S	..	clear at noon and rain all night
19	67	74	68	SE	..	
20	58	76	54	NW	..	rain in the morning and clear in the evening
21	46	62	58	calm	clear	
22	43	53	49	..	..	heavy white frost
23	32	56	52	..	..	
24	52	58	65	SE	cloudy	rain all night
25	53	62	56	calm	..	light showers all day
26	54	64	57	..	..	Red River on a stand
27	49	55	51	..	..	clear at noon
28	44	61	58	..	clear	light white frost
29	42	48	62	..	..	Red River falling
30	45	70	66	..	..	
31	42	68	62	..	..	white frost

Red River rose this month 2 feet 3 inches—below high water mark 3 feet 8 inches.

Great South Carolina Railroad.—The project of constructing a Railroad from Charleston to the Mississippi valley—extending it to Cincinnati—is awakening very general attention through the region of country to be effected. A large convention is now in session at Knoxville, upon the subject. Georgia sent a delegation to the convention; but although they knocked at the door, the South Carolinians would not "let them enter"—except as spectators. They will not allow Georgia to have any thing to do in the matter.

Colour of the sky as seen from high mountains.—M. Bousingault comparing his own observations upon several high mountains, is disposed to attribute the blackness which the sky sometimes presents, to the effect of strong light reflected from the snow and ice upon the eyes. He observed a remarkable difference of tint in the sky seen from the highest point of Chimborazo which he was able to reach, and from the plain. On the ascent of Antisana at a much lower elevation, the sky seen from the icy plain appeared black, and in the evening of the day of observation he was struck with snow-blindness.

In no ascent has he been able to see the stars in day time, an experiment which he made fully in his ascent of Chimborazo.—*Ann. de Chim. et de Phys.*

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

JAMES G. KING, President.
21—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whittemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tililson,	St. Francisville, Lous'a.
Capt John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.
Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior back-strap Shovels			
150	do	do	do plain	do
150	do	do	do caststeel Shovels & Spades	
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

MILL-DAM FOUNDRY.

TO BE SOLD OR LEASED the above well known establishment, situated one mile from Boston. The improvements consist of,

No. 1. *Boiler House*, 50 feet by 30 feet, containing all the necessary machinery for making boilers for *Locomotive* and other steam Engines.

No. 2. *Blacksmith's Shop*, 50 feet by 20, fitted with cranes for heavy work.

No. 3. *Locomtive House*, 54 feet by 25, used for putting together Locomotive Engines. Several of the best Engines in use in the United States have been put in this establishment.

No. 4. A three story brick building, covered with slate, 120 feet by 46, containing two water-wheels, equal to 40 horse power; Machine Shop, filled with lathes, &c.; Pattern Shop; Rolling Mill and Furnaces, capable of rolling 4 tons of iron per diem, exclusive of other work; three Trip Hammers, one of which is very large; engine for blowing Cupola Furnaces, moved by water-wheel; one very superior 12 horse Steam Engine, which could be dispensed with; and a variety of other machinery.

No. 5. An Iron Foundry, 80 feet by 45, with a superior air Furnace, and two Cupolas, Core oven, Cranes, &c. fitted for the largest work. Attached to the Foundry is a large ware-house, containing Patterns for the Castings of Hydraulic Presses, Locomotive and other Steam Engines, Lead Mill Rolls, Geering, Shafts, Stoves, Grates, &c. These were made of the most durable materials, under the direction of a very scientific and practical Engineer, and are supposed to be of great value.

No. 6. A building, 65 feet by 36, containing a large stack of chimneys, and furnaces, for making Cast Steel. This building has been used as a boarding-house, and can accommodate a large number of men.

No, 7. A range of buildings, 200 feet long by 30, containing counting room, several store rooms, a Brass Foundry, room for cleaning castings, a large loft for storing patterns, stable for two horses, &c. &c.

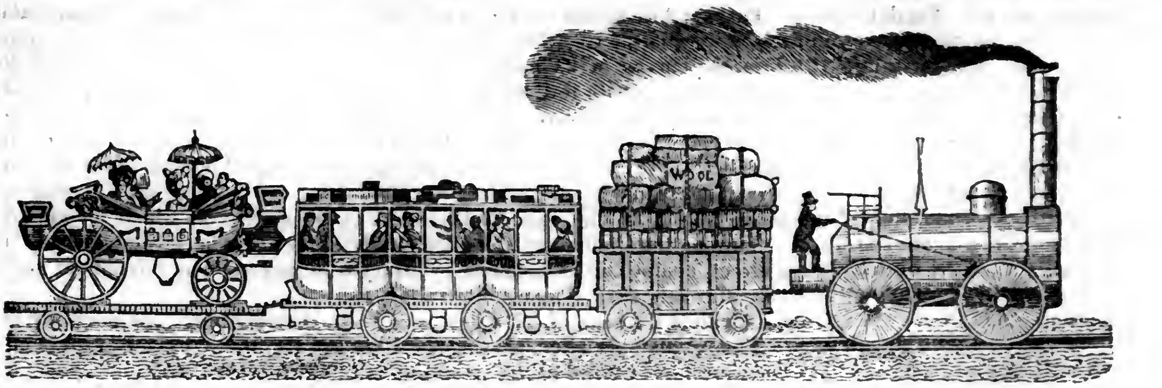
The above establishment being on tide water, presents greater advantages for some kinds of business than any other in the United States. Coal and Iron can be carried from vessels in the harbors of Boston, to the wharf in front of the Factory, at 25 to 30 cents per ton. Some of the largest jobs of iron work have been completed at this establishment; among others, the great chain and lift pumps for freeing the Dry Dock at the Navy Yard, Charleston.

The situation for Railroad work is excellent, being in the angle formed by the crossing of the Providence and Worcester Railroads. The Locomotive "Yankee," now running on the latter road, and the "Boston," purchased by the State of Pennsylvania, were built at these works. With the Patterns and Machinery now in the premises, 20 Locomotives, and as many tenders, besides a great quantity of cars and wagons, could be made per annum.

For terms, apply to
THOS. J. ECKLEY, Boston,
or to ROBERT RALSTON, Jr. Phila.
Boston, April 21, 1835. j25—4t

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, AUGUST 6, 1836. [VOLUME V.—No. 31.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 6, 1836.

To ENGINEERS.—We have once or twice spoken of the importance to Engineers of giving early and specific orders for Instruments. The demand is so great that very few can be had for months after the orders are given.

We desire now to say to those who wish to order Instruments through us, that they will save time in all case by giving specific directions what they wish us to *order* for them—as every thing must be ordered and take its turn—and the order will be given in their name, and information given as to the time when the order will be completed.

UTICA AND SCHENECTADY RAILROAD.—This road was open to the public on the 1st instant, having been completed in less than two years.

On Tuesday the 2nd, in the two morning trips, over 500 persons passed over this road, this being the first day on which fare was taken.

The road promises great facility to travellers, and as great profit to the stockholders.

We were present at the celebration, and shall give particulars in our next.

GEOLOGICAL SURVEY.—The Governor of the State has completed the arrangement of the detail of this survey, and most of the nominations have been made. We look forward to the results of this movement of our State with intense interest.

From the Savannah Georgian.

KNOXVILLE CONVENTION.

A.

Report of J. EDGAR THOMPSON, Engineer, as to the practicability of running a railroad through the Rabun Gap, and also by Mr. McNair's, in Murray county or Walker.

Knoxville, July 5th, 1836.

To WILLIAM DEARING, ESQ.
President of the Geo. R. R. & B. Co.:—

Sir:—In pursuance of a resolution of the stockholders of the Georgia railroad and Banking company, I have the honor to communicate to you the result of my examinations of the country between Athens, Georgia, and Knoxville, Tennessee, made to ascertain the practicability of constructing the proposed railroad from Charleston to Cincinnati and Louisville through Georgia.

The limited period consumed in these examinations will prevent me from making at this time, more than a general statement of the facts developed in the course of the reconnoisance. These, however, are sufficient to enable me to state with perfect certainty, that *no stationary engine* will be required on the whole route from Augusta to Knoxville; and a rise at two points only extending 40 feet per mile. In this opinion I am fully sustained by Col. Brisbane, an Engineer of South Carolina, who accompanied me in my examinations from Athens to the summit of the Blue Ridge.

Commencing at Athens (a distance by railroad 248 miles from Charleston,) we ascend the left bank of the Oconee river, to Big Sandy creek, thence we pursue the Western slope of the latter stream, gradually rising to the summit of the Ridge, separating it from the Oconee, continuing on this Ridge a short distance we have the waters of the Savannah river on the right, and at the Poplar Spring, 37 miles from Athens, those of the Chattahoochie flowing into the Gulf of Mexico on the left. This Ridge is here denominated the Chattahoochie Ridge; along its summit we continue 15 miles, and thence descend a small stream called Camp Creek, three miles to Hazel Creek, thence up the Hazel one mile, and following a small branch, cross the Ridge parting it from the Looquer river, and fall into the valley of the latter, on or near the mouth of Deep Creek. From Athens to the Poplar Spring, the ground is unusually favorable for the construction of a railroad, and will not require, at any point, an inclination of more than 30 feet per mile between the Poplar Spring and the Looquer, the ground is uneven, rendering necessary, unless a heavy expense should be incurred in the graduations, inclinations of from 50 to 60 feet per mile; the curvature, however will be easy.

Entering the valley of Looquer, a tributary of the Chattahoochie, we ascend along its margin by an easy and uniform inclination not exceeding 20 feet per mile, without encountering any material difficulty, until we reach Hamilton's Mill, where the river becomes and continues very sinuous for a distance of three miles—in this space the stream must be crossed at several points, and deep excavations made through some of the spurs of the hill projecting into the valley. Passing these the river banks, though still circuitous, are favorable to Raper's Creek. Thence we ascend Raper to its source encountering little obstruction, except at its passage through the Oaky Mountain, when it falls perpendicularly 15 feet, at which point some expensive work will be required. Leaving Raper we cross the Ridge parting it from Talalah, and descend a small stream to the right bank of the latter; up this, we ascend one mile, and cross the river just below the entrance of Wild Cat Creek; upon this portion of the line no gradation will be required exceeding 40 feet per mile. After crossing the Talalah, we follow Simpson Creek between 5 and 6 miles, then a small branch one mile—at the head of which we pass the Saddle, a low depression between the Grassy Mountain and the Blue Ridge, di-

viding the waters of the Talalah and the Stecoa. To overcome this elevation, we contemplate a rise not exceeding 70 feet per mile, and a short tunnel to pass under the Ridge 75 feet below its apex, and 800 yards in length. Passing the Saddle we descend Cobbs Creek, a branch of the Stecoa, over an even ground 3½ miles,—thence turning North, we enter the valley of the Stecoa, leaving Clayton on the right, and ascend to the summit of the Blue Ridge at the Rabun Gap, our inclination not exceeding 30 feet to the mile.

To comprehend the ease with which the ascent to the Blue Ridge is effected at this point it is only necessary to recur to the circumstance that that portion of Georgia lying at the foot of the Blue Ridge, (which here forms the backbone of the U. States) is on elevated table land. This feature of the country will be manifest to any one who will inspect the maps of Georgia and observe the singular direction of the Chattahoocie river. Its course, it will be perceived, runs parallel with the Ridge, from which issues the watters of nearly all the rivers which rise in the State and fall into the Atlantic—the elevation of its* bed being scarcely less than their source. The Talalah river at that point we cross it, flows through this table land—descending rapidly to its verge where it is precipitated by a succession of rapids and perpendicular falls in the space of two miles, a heighth of 800 to 1000 feet, and thence flows with a rapid current to meet the Chataga a distance of five or six miles.

At this intersection it is understood that Capt. Bache made the descent from the Blue Ridge at the Rabun Gap, to be between 15 or 1600 feet; consequently the Talalah, at the point we cross it, cannot be more than three or four hundred feet below the Gap.

It is also believed, that after a more careful examination of this country shall have been made that other approaches to the Gap may be found which will afford even greater facilities to ascend it than the route we have pointed out.

The Rabun Gap is the head of a wide and fertile valley expanding as we descend the little Tennessee (which here takes its rise) to a width of two miles passing the N. Carolina line, it gradually contracts until the mountains that close in upon the river, some 7 or 8 miles below the town of Franklin, and 27 from the Ridge, thence 8 miles the narrow flats on the margin of the stream, afford space for the easy construction of the road. The descent from the Gap will average from 10 14 feet per mile.

The line will occasionally cross the river to straighten its course, the river being here narrow, this will not be expensive.

The river now becomes more rapid and very circuitous, which character it retains to the mouth of the Tuckaseige a distance of 15 miles. Upon this portion of the route, much expensive work will be required. The river must be crossed frequently and through some of the parts of the mountain, short tunnels will be necessary.

* Chattahoochie.

Passing the mouth of the Tuckaseige the course of the river becomes more uniform, the curves of its banks, though often abrupt, can with few exceptions be followed without difficulty. It will probably be necessary to cross the stream twice, before we have entirely passed Smokey Mountain, thence to the point of the Chillhonee Mountain, the ground is favorable.

Turning the Chillhonee Mountain nearly a direct course can be obtained by Maryville through a rich limestone valley to Knoxville a distance of 27 miles.

The gradations after passing the Blue Ridge will not exceed at any point 35 feet per mile.

ESTIMATE.

Of the cost of forming the road bed for a single track railroad over the route examined.

For a double track it will be a safe calculation to add two thirds of the amount estimated for a single road.

From Athens to the Poplar Springs, 37 miles	$182,000
From Poplar Springs to the Talalah, 45 miles	392,000
From Talalah to the Blue Ridge, 14 miles	164,000
From the Blue Ridge to Whitakers, 35 miles	168,000
From Whitakers to the Tuckasiege 15 miles	244,000
From Tuckaseige to Chillhonee Mountain 38 miles	304,000
From Chillhonee Mountain to the Holetoo at Knoxville, 27 miles	202,000
211 miles	$1,656,000
Add 12 per cent for contingencies and superintendance,	198,000
Total,	$1,854,000

From the above estimate it appears that the length of the road from Athens to Knoxville is 211 miles, and that the average cost of graduating the road bed will be $8,786 73 per mile, the bridges to be built with stone piers and wooden superstructure; this estimate is considered as amply sufficient to complete the road in a permanent manner.

To the above amount if we add $5,200 per mile for a single track of superstructure laid complete, we have the aggregate cost of the whole road two millions nine hundred and fifty one thousand two hundred dollars.

The valley of the Little Tennessee unquestionably presents the most direct, and least expensive channel, through which a railroad from Charleston to Cincinnati can be made.

In addition to this important advantage, which it possesses over all other routes, it is not to be forgotten that the line passing through Georgia will be uninterrupted by stationary engine power.

At one point only it is necessary on the line examined, to use an assistant engine, and I am informed by Col. Brisbane, that since we parted he examined another route which is much shorter than that described; and in his opinion would entirely obviate the necessity of using an inclination exceeding 40 to 55 feet per mile, to reach the Blue Ridge. Thus exhibiting the unprcedented spectacle of a continuous line of railroad of 323 miles in length traversing for upwards of 100 miles a mountainous region on which locommotive engine power can be advantageously used, without interruption throughout its whole extent.

Having now concluded my observations on the route by the valley of the Little Tennessee, I will call your attention to another line which has been suggested passing through a fertile region of country entirely around the Blue Ridge. This route would have been examined had my time permitted, the information desired, however, is partly supplied by the reports of Col. Long on the Mississippi and Atlantic railroad, and Mr. Nichols on the Coosa river, now before me.

From an examination of these reports I should consider the route, entirely practicable. Mr. Nichols states the important fact that the ridge separating the waters of the Tennessee and Coosa is only 131 feet above the head of boat navigation on the waters of Hiwassee.

The route leaving Athens would cross the West prong of the Oconee, and thence follow the ridge, separating it from the Apalachee to the Chattahoochee, thence crossing this river it would pass through counties Forsyth, Cherokee, Cass, and Murray, to the State line near McNairs thence, there is a beautiful limestone valley to Knoxville, passing Calhoun, Athens, (Tenn.) Madison and Maryville.

The length of the road in this direction would be about 250 miles.

The most important advantages which this line of improvement presents, is the facility with which a connection may be formed with the Tennessee river at or below Dallas. This river is navigable for eight months in the year for steamboats drawing three and an half feet water up to Knoxville, and for flat bottom boats drawing two feet at all seasons.

Also the favorable direction which it offers to form a continuous line of railroad communication between North Alabama on the one hand and Nashville, West-Tennessee on the other.

Respectfully submitted,

J. Edgar Thompson.
Civil Engineer.

B.

Details of a Route for a Railroad, submitted to the Georgia Delegation by General Newnan.

It is believed that the best route for a Railroad from the Ohio river to the Southern Atlantic coast, would be to pass through the State of Kentucky, so as to strike the Cumberland Mountain at the Elk Fork at Wheeler's Gap, about fifty miles to the North of Blair's Ferry on the Tennessee near the mouth of Holston, and 30 miles below Knoxville.

From Blair's Ferry, the road would pass

40 miles through the level, fertile and beautiful valleys of Sweet Water and Dry Valley, to Calhoun on the Hiwassee.

At this point, a route should diverge to the right through a very level valley in Georgia and Alabama, for a distance of 200 miles, to Wetumpkee, a few miles above the junction of the Coosa and Talapoosa rivers, to which point it is believed steamboats arrive at all seasons of the year.

From the Hiwassee, the Georgia road should pass up the Chetatee valley, down the Red Hill valley near the Big Spring, and then down the Connesauga, and cross the Ostenola to Newtown, a distance of 50 miles.

From Newtown the road should run on, and pass the Etowa at some point between Sally Hughes and Brewster's ferry, and strike the Chatahoochee at some point in the vicinity of Shallow Ford, a distance of 70 miles—crossing the Chatahoochee, the road, it is presumed, would branch out in a direction to Macon, Athens and West Point, or Columbus.

The Alabama route would pass through the centre, and richest part of the State, and through a cotton region of 400 miles in extent. The Georgia reute would pass through cotton regions of 800 miles in extent. We have every reason to believe that it is impossible for Kentucky, Tennessee, Ohio and Indiana to find better markets for their produce, or safer or cheaper channels by which to receive their supplies. Nashville might be connected with this route, by a lateral Railroad to the mouth of Holston, 170 miles, or at Chatadga in Walker county, by crossing the Tennessee at Ross' ferry. This would give to the West four markets instead of one. From the directicn of these routes, the country through which they pass, and from surrounding circumstances, the warmest expectations may be formed, that from their completion, the most vigorous and munificent Legislation would accrue on the part of Georgia and Alabama. These condensed views, it is presumed, will be sufficient for the occasion, though the subject is fraught with a great many other important considerations in relation to one moral, social, commercial and political condition, and will readily present themselves to all intelligent inquiring minds.

C.

Route of Road suggested by Jacob M. Scudder.

The undersigned would respectfully suggest to the Georgia Delegation the following as the shortest and most practicable route for the connection of the proposed railroad with Georgia. He has been politely furnished by the Hiwassee Railroad Co. with the description of the route from Knoxville to the Valley near McNair's, at which place it will connect with the route into Georgia, as follows:

From Knoxville to Blair's ferry on Tennessee river, 30 miles—from Blair's ferry to Philadelphia, 5 miles—from Philadelphia to Athens, 20 miles—from Athens to Armstrong's ferry on the Hiwassee river, 15 miles—from Armstrong's ferry to McNair's, 22 milles.

By this route from Knoxville to McNair's, you pursue the grassey valley to Campbell's station, thence to Blair's ferry, or near there; thence up the Sweet Water Valley to the dividing ground between the waters of the Sweet water creek and Mouse creek; thence down the Mouse creek valley till you come within 5 miles of Athens; thence through a level gap in the ridge of Estenala valley; thence down said valley to about 2 miles below Athens; thence through a gap of the ridge to Chestua valley; thence down the valley to near Armstrong's ferry; thence up the valley of South Chestua to the dividing ground between South Chestua and Connesauga river, and thence down a valley to near McNair's where it crosses into Georgia.—From McNair's on the Connesauga river to Spring Place in Murray, Georgia, 16 miles, entirely through a valley north west of the mountains; thence to Coosawatee river at an Indian town of that name, 14 miles, and in the same valley, which will bring the road to the verge of the mountains and opposite to where the Talking Rock creek enters into the Coosawattee river. Talking Rock creek rises 16 miles from this point and runs in a north westwardly direction, and parallel with the Federal road to the point above stated; and to avoid what are known as the Coosawattee mountains, the road will pass up the said Talking Rock creek, the first 4 miles being perfectly level; the next 6 miles have not been so strictly examined, but I cannot believe but that in so short a distance a road can be easily made, as there are no material falls on the creek, and the road will pass on its margin. The next 6 miles will pass in the valley of the creek, and without a rise perceptible to the eye. The next three and a half miles is a gradual ascent, and agreeable to the means I had to judge. rises only 75 or 80 feet in that distance, and at the end of which we reach the summit of a long, beautiful and very level ridge, dividing the waters of Shary's Mountain and Long Swamp Creeks, for the distance vf 21 miles—and terminates at Heightown or Etowah river, near the junction of Long Swamp Creek and said river. From this point on the Etowa, routes may be selected in any direction, as the mountains and spurs of the mountains, have been entirely passed. But to proceed with this route, it would be best, but not absolutely necessary, to pass up the Etowah, as it bears in the proper direction—four miles thence to the Chattahoochie river, at or near Gothard's Ford, about two miles above Winn's Ferry. This is about twenty miles, and passes over a smooth and even country.

It will be borne in mind that this report is not predicated on mathematical calculation, but the line was viewed by the eye expressly for the railroad route.

To continue the route to Athens, Georgia, after crossing the Chattahoochie river, pass along a level ridge around one of the prongs of the Oconee river, and intersect the Federal road at Rile's, a distance of eight miles—thence or near the Federal road, which is a smooth level ridge or high ground, not crossing the smallest stream a distance of fifteen miles—thence crossing one prong of the Oconee river, a continued level of high ground eighteen miles to Athens. Respectfully submitted,

(Signed) JACOB M. SCUDDER.

KNOXVILLE CONVENTION.—The following gentlemen from Georgia attended the Convention:

A. S. Clayton,—Athens,
Will. Dearing "
Wm. M. Morton, "
James M. Wayne,—Savannah,
S. B. Parkman, "
M. H. McAllister, "
Jos. W. Jackson, "
J. R. Matthews,—Habersham co.
Turner H. Trippe, "
S. A. Wales, "
Rich'd W. Habersham, "
George D. Phillips, "
Thos. G. Janes,—Greene co.
J. Edgar Thompson,—Augusta,
Wm. W. Holt, "
Charles J. Jenkins, "
Robert Campbell, "
A. Cunningham, "
T. G. Casey, "
John M. Rose,—Dahlonega.
H. B. Shaw, "
A. B. Holt, "
Charles Evans,—Clarke co.
Ew'd Paine, "
M. J. Walker,—Rabun co.
H. T. Mosely, "
J. H. Sloan, "
E. Coffee, "
J. V. Harris,—Elbert co.
Thos. J. Heard, "
Beverly Allen, "
Joseph Rucker, "
A. Hammond, "
Simeon Oliver, "
William White, "
Jacob M. Scudder,—Forsyth co.
W. B. Harban,—Lumpkin co.
W. H. Gathright, "
Jas. Edmondson,—Murray co.
L. R. McCamy, "
James Donahoo, "
J. B. Morton, "
Josiah H. Gill, of Hall co.
Rich'd Winer, "
C. W. Parks, "
John M. Raiford,—Ruckersville.
Joel E. Mercer,—Talliaferro co.
James R. Butts,—Macon.
Washington Poe, "
M. H. Chappell, "
Steward Floyd,—Morgan co.
William Johnson, "
Joseph W. Walton, "
H. Hemphill, "
R. H. L. Buchanan,—New Echota.

It will be seen from the following account from the Boston Gazette and Centinel, that the great Eastern Railroad has actually been commenced, and under auspecies that leave no doubt as to its compection. This has been a favorite project with our eastern friends, and one that cannot fail to have an important bearing upon

their interests,—especially upon those of East-Boston.—*Courier & Enquirer.*

The detroit Journal of June 20th says: —"*What would be the disposition of the people of Green Bay, in reference to forming a part of the State of Michigan?*—Their business—the sources of their prosperity, lie this way. Their commerce must pass through the strait of Detroit. They will have little commercial connection with the western part of Wisconsin. The Mississippi is the natural channel for the trade of that region. It will be a trip of but a few hours from Green Bay to the mouth of Grand River. When the Grand and Sagana rivers are joined by a Steamboat channel of fifty miles, the trip from Green Bay to Detroit will be made in 48 hours, more or less. From the head of Green Bay to the rapids of Grand River, will be only about 24 hours running. A Railread car will run from Grand River rapids to Detroit in eight hours.

By cutting a ship canal of a few miles from the head of Green Bay to Lake Michigan, the voyage from thence to the mouth of Grand river will be reduced to about 10 hours."

CHAMPLAIN AND ST. LAWRENCE RAILROAD.

The public opening of this important route took place on Thursday last, under circumstances of peculiar interest, and to the general satisfaction of a numerous and respectable company, who had been invited to partake of the hospitality and good cheer of the Stockholders of the Company.—Among the guests, who assembled on board the *Princess Victoria*, at about 10½, were the Earl of GOSFORD, Sir CHARLES GREY, Sir GEORGE and Lady GIPPS, Mr. ELLIOT, Secretary of the Commissioners, several of the Members of the Legislative Council and House of Assembly, and of the mercantile body and garrison, and many respectable strangers, to the number of about three hundred. The fine band of 32d Regiment enlivened the company with their superior excellence in the performance of many admired overtures. The trip to LAPRAIRIE was performed in about fifty minutes. The subsequent journey to ST. JOHN's is thus faithfully described by the *Courier* of this morning.

"After landing at the railroad wharf, which runs out into the river a considerable way, the company proceeded to the cars which were in waiting at the termination of the railway to convey them to St. John's. Before starting the locomotive engine made two short trial trips with its tender, and as the accident which occurred lately to it had not been thoroughly repaired, it was deemed advisable to attach to it only two of the passenger cars, all of which are very comfortably fitted up and elegantly painted outside; while the other cars with the rest of the company, were drawn each by two horses. The locomotive with its complement soon shot far ahead of the other cars, which passed along the road, just as fast as the nags, which were none of the fleetest, could drag them. The motion was easy, and elicited from many, comparisons far from favorable to the usual comforts of travelling by the stage road. In less than two hours from starting, all the company had arrived at St. John's in good time, and in excellent mood for the collation in the railway station house, which was pleasantly cool, and decorated with green branches. The repast, with its accompaniments of sparkling champaigne and madeira, was not more enjoyed, than it was universally admitted to be in itself, suitable and excellent.

After partaking of the bounty of the stockholders and the good catering of SWORDS, with the judicious assistance of DAVID LUCK, that attendant on all joyous occasions, the company were requested by the Hon. PETER M'GILL, the Chairman of the Association, to lose no time in drinking the few toasts he had that day to propose. The first was "the King" and the Hon. Chairman took the opportunity of mentioning all the circumstances connected with the commencement and termination of the route, the advantages it would confer on the Province, and the spirit of enterprize it was destined to create for similar works, of which this railroad would be the happy forerunner. All the honors were paid to the health.

The second toast he gave, was "The President of the United States," as the official representative of a people with whom we were now connected in a happy, and he hoped lasting peace; whose support had been most extensively given to the completion of the present work, and with whom, through its operations, they were to be brought into still greater and closer bonds of union. After the cheers had subsided. TIMOTHY FOLLETT, Esq. of this city, returned thanks in a very neat and appropriate address, for the honor conferred upon his country and fellow-citizens, and strongly urged upon all present to be influenced by the same enterprise and energy which characterised the AMERICAN people, and which would result in the same prosperity.

The third toast was "the Earl of Gosford and the Ladies and Gentlemen who had honored the company with their presence." His Excellency returned thanks, in a speech delivered with firmness, and marked with much neatness. His Lordship alluded in strong terms to the great resources of this country, if properly developed—urged upon all a spirit of unanimity and concord, which he would do his best ultimately to obtain, and after remarking the glorious termination of a work which united the *St. Lawrence* and the *Richelieu* within so small a distance, proposed the health of the Directors of the Company.

The Chairman proposed the health of WILLIAM D. LINDSAY, Esq., the active Commissioner under whose direction the work had so steadily advanced.

Mr. LINSDAY, in replying, asked for leave to introduce here the ceremony of presenting to Mr. CASEY, the Engineer, a gold medal, which had been subscribed for by the overseers along the work. Mr. M'MAHON, on behalf of his brother overseers, addressed Mr. CASEY in terms of eulogium, for his gentlemanly conduct towards them; Mr. M'MAHON's remarks which were somewhat extended, delivered with ease and fluency, and indicative of much sound sense and judgment, were repeatedly and deservedly cheered. Mr. CASEY, in accepting of this token of gratitude from those who had been under his superintendance, spoke a few words in reply, expressive of his satisfaction at the steady and active conduct of all connected with the work.

The Earl of GOSFORD now claimed a toast for Mr. CASEY, whose abilities had been extolled by his employers, and whose conduct had been approved of by those under his control. His Lordship also complimented Mr. M'MAHON upon his speech, and eulogised the general conduct of the laborers connected with the railroad.

It being time now to depart, the company proceeded to the cars, extremely well pleased with the entertainmen they had received. The return to MONTREAL we shall give in the words of the *Courier*:—

The locomtive in returning took four cars with it, and the other twelve were dragged back, as before, to Laprairie by horses. There would have been almost a surfeit of enjoyment, had nothing occurred to break in upon the pleasures of the day. It was pretty far advanced in the afternoon before the company got re-embarked on board the *Princess Victoria* for Montreal, and it unfortunately happened that, in consequence of a strong easterly wind, and the depth of the boat in the water, she grounded on leaving the wharf. When at length she was got clear and had proceeded a little way on her voyage, she was again detained by being compelled to lie-to, till a man who had fallen overboard was picked up. By this time it was so dark that it was considered dangerous to pass the rapids, and she returned to Laprairie. Upon landing, there was an immediate scramble among the passengers for beds, of which few, in proportion to the demand, were to be found. To diminish the *disagremens* of this mishap, and to extract even amusement from the misfortunes of so pleasant a day, a dance was got up at the Laprairie Hotel, which was continued to a late hour. Those who were unable to procure beds that could be slept in, had a fund of amusement for the rest of the night, in recounting to each other their adventures in search of such luxuries. About six o'clock yesterday morning, the *Princess Victoria* landed her valuable cargo in perfect safety, with every cause to make them have agreeable recollections of the opening of the Champlain and St. Lawrence Railroad.

The return trip of the locomotive on Thursday was completed in fifty-nine minutes, but yesterday, we learn, that, with four passenger and two loaded freight cars. it effected the journey in forty-five minutes and returned in thirty, over a road of fourteen and a half miles in length. A few repairs have to be made to the engine, and her regular trips commence on Monday next, on the return of the *Princess Victoria* from Quebec, for which she proceeded yesterday at ten. In noticing this fine boat, it may be mentioned that she was met by the *Eagle* near LANORAYE, six miles on this side of SOREL, and would be able to effect the forty-five miles in three hours, making on an average twelve hours for the whole route to QUEBEC.

REPORT.

TO THE GOVERNOR AND COUNCIL OF MARYLAND, AS TO THE ROUTE OF THE MARYLAND CANAL.

Annapolis, July 26th, 1836.

The undersigned have been appointed to ascertain "whether and at what expense with due supply of water a Canal be practicable from the Cheasapeake and Ohio Canal to Baltimore, by the valley of the Monocacy and Patapsco, or by a route diverging from the said Chesapeake and Ohio Canal, from the mouth of Seneca, exclusively within the limits of this State;" have the honor to report that under their direction two parties of Engineers have been engaged during much of the present

month making such surveys as might serve to form a correct opinion upon the questions submitted to them for investigation.

The attention of the undersigned was first directed to the supply of water for the summit level on "Parr Spring Ridge;" and a personal examination have satisfied them that the natural flow of the streams which have their rise in the Ridge, was entirely inadequate to the wants of a canal of even the minimum dimensions prescribed for the cross-cut canal, and that therefore it would be neceseary to collect into reservoirs the surplus waters of the winter and of the wet season, in order to meet the deficiencies of the summer and dry season.

To ascertain whether in this way by reservoirs "*a due supply of water*," for a summit could be had, we directed lines of level and of survey to be traced out, embracing all the areas of country which drain from a level higher than, or may be made available to, the several summits respectively.

For the commencement of our operations we selected a route as favorable as any, if not the most favorable of all—the one connecting the head waters of the Linganore with those of the western branch of the Patapsco, with the lower summit proposed by Brigg's in 1823.

The extent of drainage into the lower summit of the Linganore route from actual survey, conducted as above, is less than a surface of 20 square miles—an extent of country barely more than one-third of what we need, even if it would treasure up all the water of the winter and of the wet season.

The result of this minute and accurate survey is so decisive that in addition to a personal and careful examination of the country that can be commanded by a summit at any other point along Parr Spring Ridge, (having reference to the field notes of Brigg's survey of 1823, which may be fully relied on so far as accuracy of levelling is concerned,) we feel called upon to express at once fully and decidely our opinions and acdordingly we do so—a "*due supply of water" cannot be had on any line of Canal crossing "Parr Spring Ridge.*"

This opinion is sustained in the strongest manner by the experience of the Union canal of Pennsylvania, on whose works it has been necessary to resort to artificial means to collect a sufficiency of water for the summit. A reference to the Union canal, is unhesitatingly made, inasmuch as the Engineer on the part of the State has lately visited that work with the view of obtaining such information as might have a bearing on the subject under discussion—and we report that calculations of the supply of water furnished by a given extent of country, which can be made available through the natural flow of streams and the aid of reservoirs based upon the experience of the Union canal, sustain fully and unquestionably the opinion we have already expressed of the utter insufficiency of water to feed a canal of the assumed dimensions and capacity of the Chesapeake and Ohio canal passing through Parr Spring Ridge, at any point within the limits of the State of Maryland.

Other routes than across the ridge may have been suggested for a cross-cut Canal, exclusively within the limits of Maryland.

It has been thought for instance that the waters of the Potomac might be brought down on a high level from the mouth of Monocacy, up the Seneca valley, thence nearly parallel to Parr's Ridge, along its south western base and around its termination at Vansville, by a route that would avoid a summit and admit a continuous descent to Baltimore. It has also been suggested in like manner to take the Potomac water from the Greet Falls, from the Little Falls, or perhaps from some point higher up, and to pass along exclusively within the limits of Maryland, without a summit. All these plans we pronounce utterly impracticable, for we have proved them to be so by actual examination with the level.

A plan has been suggested for crossing Parr Spring Ridge, of which we have made no mention. It is to gather all the drainage of the Western side of the Ridge by running the canal up the Lingmore, thence along the Ridge and to pass through it at Westminister. This and all similar plans are more impracticable (if possible) than the direct route through the Ridge.

Our examinations have brought us to the conclusion that the most Northern practicable route from the Chesapeake and Ohio canal to Baltimore; and in fact the most judicious line, for such an extension of the Canal, is on or near the location traced by Dr Howard, in 1827, through the District of Columbia,—and as far as we are enabled to form an opinion, the estimate of cost submitted by Dr. Howard, on his plan was substantially correct.

We have spoken of the "due supply of water." We will now show what we consider to be that supply. Its amount depends on the leakage of the summit level and that portion dependent on it for its supply—on the leakage of the lock gates—on the length, breadth and lift of the locks, and to some extent on the trunk of the Canal, and lastly on the amount of tonnage which it is calculated to accommodate. In estimating the leakage of the Canal and lock gate, the minimum amount on a *well constructed* canal has been assumed or ascertained from actual observations on canals in our neighborhood.

As it regards the dimensions of the locks in *length and breadth*, and of the *depth* of the trunk of the Canal, the same dimensions have been taken as those adopted on the Chesapeake and Ohio canal, of which this should be considered as an extension. If otherwise—If the locks should be made *shorter* or *narrower*, or the trunk *shallower*, it would be as preposterous as to place an extension of a railroad with rails closer together or wider apart, so that the cars of the one could not pass on the other.

In regard to the *width* of the trunk and *lift* of the locks, the undersigned have considered themselves at liberty to vary from the similar dimension on the Chesapeake and Ohio Canal, when called to do so by a scarcity of water—to continue the comparison, it is like increasing the grades on a railroad by which the useful power of a horse, or of a locomotive engine, is diminished, or the capacity of the road lessened. In calculating the quantity of water required, the lift of the locks on those portions of the line dependant for their supply on the summit have been put at 4½ feet only.—The effect of this small lift may have as to loss of time in the transit of trade, and also the effect of narrowing (as we are compelled to do) such parts of a canal as are deficient in water, come properly under the head of the capacity of such Canals, when compared with other Canals of larger expanse.

The probable amount of tonnage, or the number of locks full of water that will bo taken daily from the submit is another very important element in estimating the requisite quantity of water.

Looking to the history of the inland navigation of the U. S.—To the Erie Canal with its 40 feet width and 4 feet depth, now in progress of enlargement to 70 teet width and 7 feet depth—originally with single locks, now in part with double locks, which will soon be the case along its whole line; considering that this enlargement has been called for by the public in less than 12 years after its completion; and when we look further at the great increase of the Western Trade, and its still greater anticipated advancement, we do not feel justified in [taking as] the basis of our calculations less than a double sett of locks in constant use.

With these elements of calculation, 3,800,000 cubic feet will be daily required for a due supply of water.

In reference to the extent of country which will furnish this quantity of water we have already stated that the entire drainage of all the surface which can be commanded on any one of the summits is insufficient, and now add that it will furnish but little more than *one third* of the water we deem necessary.

It may perhaps be said that in 1823 the Commissioners appointed by the executive of Maryland to survey the same ground pronounced on the practicability of the route of the Linganore across to the head waters of the Patapso, and that they speak with confidence of the supply of water. In answer to this we may reply that about the same time these surveys were made, the Union Canal was planned and commenced with reservoirs, then considered ample to supply the summit with water and to pass daily 100 boats. This canal has been finished and is now in use, with only 25 boats passing daily—with locks 75 feet long, 8½ feet width, and 4½ feet lift, their reservoirs for the three summer months furnish less than 1-10 of the water required. The greater part of the remaining 9-10 being forced up, with pumps, 96 feet into a feeder 3 miles long; a small portion acting as a regulator on the summit, is pumped up 32 feet. The undersigned believe that with scarcely an exception, in Great Britain, disappointment has followed where reservoirs

have been relieved on to collect and retain a sufficiency of water for active trade. We will add one other remark before dismissing this subject. It appears from an inspection of the Report of the U. S. Engineer, in 1826, on the the Chespeake and Ohio Canal, that more than five times the extent of country, and more than five times the quantity of water can be commanded on the summit of that Canal through the Alleghany Mountain than we collect on the summit through "Parr Spring Ridge."

Satisfied with the impracticability of the several routes *exclusively within the territorial limits of the State of Maryland*, submitted to our examinatian, from the entire insufficiency of water to feed the summit levels, we have not deemed it necessary to prepare detailed or even general estimates of their cost; but are satisfied that the entire cost of either of the proposed routes aforesaid, even if a sufficiency of water could be obtained, would not fall short of six millions of dollars, excluding the heavy damages to water rights and other property, inseparable from the construction of such a canal along the Valleys of the Monocacy and Patapso.

It is matter of regret to the undersigned that they have not been able to avail themselves of the experience and talents of Col. S. H. Long, the Engineer appointed by the City of Baltimore, whose occupations have detained him elsewhere.

They hope in a short time to submit the *details* of their field operations to be placed on record, to be referred to at any time hereafter, by those who may chose to examine minutely into the data on which their opinions are based.

GEO. W. HUGHES,
U. S. Civil Engineer,
on the part of the Maryland Canal Co.
CHARLES B. FISK,
Civil Engineer, on the part of the State.

From the Journal of the American Institute.

GENERAL TALLMADGE'S LETTERS.

The correspondence of General Tallmadge with the American Institute, continues to possess much interesting and useful matter. The letters from which we extract in our present number contain much valuable information on the culture of Silk, to which we beg to refer our country readers more particularly. His first letter is dated at Rome 3d, January last.

He says:—"I fear you may have misunderstood my last letter, and suppose I intended to speak of the particular Roman cement (so called) which is imported and used in our city. The Romans used two kinds of cement in making their walls; the one the common mortar, and the other the peculiar cement. The one is composed of fine materials, and used for the troughs of their aqueducts. An aqueduct near Tivoli, covered with stone, and laid and pointed with this cement, is now to be seen, after perhaps two thousand years, and is so firm that it will as soon break through the stone as the cement. I intended, however, to speak of the common mortar, used for brick or stone walls. Many of the monuments, as well as the piers and butments of bridges, were made with marble or cut stone as a casing, and the inside was filled up with fragments of stone, round paving stone or broken brick, filled in with common mortar, or, as I believe masons call it, grout. The casing, or cut stone, has, in most instances, by modern cupidity, been taken off; yet the inside remains standing, or, if fallen down, even yet continues unbroken, in large masses like rocks, and which now can only be broken with great labour. It is worthy of inquiry—how long the butment of a bridge, or any brick work, in our country, with the outsides or casing taken off, would stand exposed to weather and our climate? Do we not too often make such public works not only with insufficient mortar, but also often fill in their centres with common dirt and loose materials, fit only to receive moisture, so that the work soon falls down under the influence of our severe frosts?

This subject is worthy the consideration and correction of our legislature. Perhaps our corporation may more promptly give it their attention. The British parliament have set an example worthy of our imitation. They appoint a commission to investigate any subject of public interest, so that they can legislate more understandingly. The extension of our internal improvements, as well as other buildings, requires that they should be more permanently erected, and the end obtained by inquiry, or other means, will promote the interests of the state.

There is a growing attention on the Continent to the concerns of America, which have hitherto been unknown, or but little noticed. Many of the American newspapers are found on the Continent, and, although not always as discreet in their matter as might be desired, they often impart useful information, and are now much sought after here. The fame of our naval architecture, but more especially of our steamboats and railroads, has spread over Europe, and made our country more advantageously known, than all the other circumstances of our history. Our achievements in these points, and in domestic manufactures, are much spoken of, and furnish many inquiries, and tend greatly to throw light into Europe, and to liberalize its institutions. Steamboats are shortly to be put upon the Danube, and the other principal rivers of Europe, and public attention is universally turned to America, as greatly in advance on these important points.—Whatever has heretofore been the case, Americans are now as much respected and noticed here, as travellers from any other country—and our institutions are more inquired after. A file of the "New York American" is here, giving an account of the exhibition of the late fair of the American Institute, which has attracted considerable attention as an exhibition of the progress of mechanic arts. Although it is the principle of America to offer a full reciprocity in trade and manufactures, and only when this is refused to encourage her own by protecting duties, it is worthy of observation, that France and England are now furnishing a supply of books to prove the impolicy of this American protection, while the practical comment of this free trade learning is felt by travellers in crossing the boundaries of the governments and petty principalities, by repeated searches of their baggage, and the stoppage of articles of manufacture of other kingdoms, and which are in most cases totally prohibited. A bottle of Cologne, in a lady's trunk, is said recently to have incurred a fine of thirty dollars on crossing a dividing line; and all articles of jewelry, unless actually worn at the time, cannot pass with impunity from one Italian state to another; and above all, any Swiss or Italian manufacture of this kind must not enter France, the very source of free trade and anti-protection principles.

I have happened to see several of the *fairs* in England and on the Continent; they are different from ours, as intended not so much for exhibition of fabrics, as for actual sales of the articles by samples; their goods are exhibited in stores and booths, temporarily erected in the streets. It is essential that the predilection of foreign manufactures should be overcome in our country. From all the observation I have been enabled to make, I have confidence, that in most articles the manufactures of our city and country have arrived to such perfection, that they might now be exhibited, without fear of comparison, with like articles of foreign production.—Would it not be well, at some future fair of the Institute, to provide for an exhibition, in contrast of the foreign and domestic manufactures—and perhaps even to allow temporary booths, during the fair, to be erected for actual sales? This subject seems to be worthy of consideration. The people of Europe are divided into the governors and the governed, and the line of distinction is more strongly marked than you can well imagine; and it is almost incredible to notice, how little the arts and improvements of the present age have been applied, on the Continent, to the concerns and comforts of common life. The condition of society may be inferred from the fact, that there is scarcely a side-walk in the streets of any city on the Continent, saving perhaps some modern ones in a few places in Paris. It is said Russia has lately, and since the Emperor visited England, made side-walks in two streets of St. Petersburgh as an experiment. I have not seen one in any town on the Rhine or in Switzerland, or scarcely in Italy;—so little is the regard paid to the convenience of humble condition, while titled greatness can roll in carriages, protected by numerous attendants!—A like parallel could be shown in the absence of very many of the comforts of life so common to the American people. We have great cause to bless our happy lot, while we strive to select, from Europe, any benefits which may be transferred and added to our present stock. The charities of Europe, so much boasted of, are worthy of our study, and are generally more to be avoided than to be adopted. Those of the Continent are more in the nature of hospitals, than as almshouses for the poor. The anatomical museum of Edinburgh surpass-

es any that I have seen. The surgical preparations at Glasgow are excellent; but, as a whole, perhaps, London equals either, and certainly surpasses those on the Continent. Of Paris I do not speak, as I have not yet seen it. The medical preparations and the hospital at Rome, are very respectable. At Geneva great regard is had to the ventillation;—so too at Milan, which affords one of the best formed buildings I have seen, and where there is provision for twenty-five hundred beds, of which fourteen hundred were then occupied, in addition to out-buildings for contagious diseases. Florence has a respectable establishment with anatomical preparations in wax-work, more extensive than any I have seen, and with wonderful perfection. This is worthy of imitation. But at Florence is an institution, like to almost every other city on the Continent, and more extensive, for the reception of infants abandoned by, or without parents: windows are provided, by the doors, in which infants can be placed, and a bell rung, so that they may be received, and the person handing them in not be discovered. It is here against the policy to have any of the scrutinizing inquiry, so common in our country, after the parentage of infants, lest it might fix a stain upon monastic purity or titled excellence!—My friend, F. A. Tracy, visited this institution with me, and we were informed, by its principal officers, that they then had 7,000 infants under their care! And we saw so much as to credit the statement.—Begging, in Ireland, is almost universal: on the Continent it is a distinct profession, followed as a calling; and in many places it is greatly overdone, especially at Rome, and said to be worse at Naples. The result of my observations induces me to approve of the hospital charities—greatly to disapprove of those infant establishments, and very much to doubt the expediency of charities for the *healthy poor.* But, instead of leaving them to infest the streets, houses of correction should be provided, and as often as alms are asked, it ought to be followed by an inquiry, and the applicant either to receive care and ample provision for his wants, or be sent to a house of correction. London is now trying this experiment in her principal streets, and has affixed notices requesting persons not to give alms. Observation upon the Italian cities will show the pernicious consequences of street begging. The *cold victual* beggars in our city are a fruitful nursery of vice, and will soon grow into an uncontrolled fraternity.

I had intended to have written more, but have not time. We start for Naples in the morning.

The next letter, in order, is dated Naples, January 26, 1836.

"The last mail brought us the public prints from Paris, announcing the melancholy fire at New-York, on the 16th of December. It has produced a gloom upon every American face here, and even awakens a correspondent feeling in other foreigners. I have full confidence, however, that the elastic power of our national character will soon rise above this calamity; 'though severe and extensive—it remains for us to profit by the misfortune.'

I have now been nearly a year in European cities, and have not witnessed, or heard of, a *single fire!* The American Consul, here, informed me yesterday, he had not seen a fire in Naples in eight years!—The walls of the first and second stories of the houses are thicker than ours; and in this we should improve in our city. The stairs are uniformly of stone, and the roofs of tile, and, most generally, the window frames are of stone. The result is, the materials being less combustible, there are fewer fires and less destruction. The *tiles*, at Rome, are *flat*, with an edge raised on each side, nearly half an inch, and narrowed down, so as to lay into each other like shingles.—They are about twenty inches wide, and thirty long: a small rafter, under each edge or course, is laid in mortar; then a semi-circular pipe, laid in mortar, over the double edge or course. It is an excellent roof, and much better than any *tiled* roof I have ever seen with us. The same formed titles are now found in excavating Pompeii, with the addition, oftentimes, of a moulding or cornice for the eaves of the house. Since the improvements in making our brick, with anthracite coal, such large tiles might well be made for roofs: but, if tin, or zinc, is preferred, I do wish *cast iron rafters* could be used in all and either case. It would not increase the expense, but would add to the safety, and lessen insurance. If cast, one side flat and with an upright centre, it would make them light, and yet of sufficient strength, and afford a groove for the tiles to rest on; the double courses, thus, to be covered by the half pipe; and when pointed inside would be tight, not only as against water, but also wind or snow. The same rafters, with sides reversed, would suit a tin or zinc roof. I have before explained to you, I believe, from Dublin, the importance of cast iron for frames and rafters. The floors, in Italy, are uniformly of tile or stone; if we, however, continue wooden floors, we shall yet have accomplished much in adopting iron rafters, and thus reject every thing combustible in our roofs. By making stone stairs, and stone or iron window frames, much of the combustible materials now in use with us will be rejected, insurance become less, and fires more easily controlled. It was an ordinance of ancient Rome, that the *basement*, and *first* and *second* floors of houses, should be without wood, and with arches; and it is these arches which now support the ruins.

The climate here is delightful—like our best October. There is little, however, for inquiry, as to improvements useful for our country. The government, or the people, would not suit us, and we perhaps would as little suit them. You can have no idea of the wretched condition of the population, and the state of general intelligence in this city. That class of active, elastic, and intelligent people which occupies our streets, is unknown here. No mind, no information, no inquires or interchange, mark this people; servile grovelling for a miserable subsitence only is aspired after!"

His next letter is dated at Naples, 5th March, 1836.

"Since I arrived in this land of fame and fable, I have not been unmindful of the culture of silk, so justly a subject of great and growing interest to our country. I have visited several manufactories of silk. It is not the season for seeing the silk worm, but most of its progress in other respects I have been able to see. I have made many inquiries in hopes of obtaining useful information. Finizio is an extensive manufacturer of sewing silk; he makes about 3000 lbs. a week, which is most sent to the New-York market. He is an intelligent man, and I found him willing to answer my inquiries; as also were several other establishments, and which mostly confirmed his statement. The sewing silks of Naples are mostly made from the silk grown in *Calabria*, where the worm is fed principally upon the *black* mulberry, and which makes the strongest and best for sewing silk. Finizio stated that the worm fed on the black mulberry made the strongest thread; *that* on the *white* mulberry, finer and better for fabrics; *that* on the Chinese mulberry still finer and more delicate.—When asked if the cocoon from the Chinese mulberry required more skilful and delicate work to wind and work it, he said it did, and immediately produced two skeins, one of which he said was from the black mulberry, (from a bush, perhaps, eight or ten feet in circumference,) the other from a bush about four feet. The lesser bush, he said, was less liable to break the thread in winding from the cocoon, and was used in finer silks for fabrics The black mulberry produced a stronger thread, and would bear the larger reel, and was principally used in that business. The silk here is mostly made in the country by families in detail, and much of it reeled there, and in this condition it is brought to market.—For sewing silk it is doubled as often as required, and twisted as much. This process is wholly in a *dark room.* The silk is worked wet, and for this purpose, to preserve a uniformity, the atmosphere is kept damp, the daylight excluded, and the work carried on with small hand lamps. The machine wss turned by men harnessed like mules. I have since been out about twenty miles to the silk factory of the king, which is worked by water power, and by which the cocoons are also reeled. I stated to Finizio, as well as at the king's factory, that the Italian sewing silk was sold in the American markets by its weight, while the American sewing silk was sold by the skein; and that one pound of the Italian would have perhaps two hundred and fifty skeins, while one of the American silk would hhve about three hundred and fifty skeins. The cause of this dfference of weight, or why the American sewing silk has a tendency to curl or knot, they could not explain without a sample, but said the weight of sewing silk could be diminished or very considerably augmented in the *dyeing*, and that good dyeing required the silk to be well *boiled* in *soap*, after which it was put into an acid; and was there prepared for the process of the dye, according to the color, as desired. The gloss, or dressing, seems to be produced by beating and twisting on a post, which, with the manual labor put upon its finish, it is supposed prevents its tendency to knot.

I asked if the color of the cocoon, yellow or white, gave any difference of value, or indicated a sickly worm, and the answer was that the color was casual, and the value the same; that a selection of white or yellow cocoons from which to get eggs would probably produce a like color; and Mr. Finizio said he had some customers who had so selected and brought him *cocoons* entirely *white;* and that for white ribbons or fabrics, they commanded a greater price of from three to five per cent., though otherwise of equal value.

I have made many other inquiries and observations on this subject, but which in the limits of a letter cannot be detailed. The eggs are here in market during most of the year, and by being kept in a *grotto*, or cold

damp place, the worm can be produced as required. The sirocco, or hot south wind, is here the greatest enemy of the silk worm, and sometimes suddenly destroys so many of the worms as to require the reproduction of another class, from eggs in reserve.—They should be sheltered from this wind, and ventilation should be given them from above or by back windows. I think we have sometimes a like south, or south-west wind, which should be guarded against, and which our gardeners call a *red wind*, from a rust produced by it on peach, and apricot trees, which curls up and burns the young leaves, and often kills the trees, and is said to affect the mulberry trees in like manner.

The black mulberry tree is a native of our country, and is common in Dutchess county, especially in Fishkill. It is, on my farm, a common tree. It is as valuable for posts and timber as red cedar. If the suggestions of Mr. Finizio, and others, as to the black mulberry, are correct, as being better for *sewing silk* and more easily reeled, is not the matter worthy of attention? and especially in the first effort, and until skill and experience is obtained? The *black* mulberry can be immediately used, while a few years will be required to rear the Chinese, and obtain the silk for its more delicate work. My most excellent and lamented wife, in the few last years of her declining health, occupied her active mind in some experiments with the silk worm. She placed some of the eggs in the fall of the year, and left them, during the severe cold of the winter, in an upper chamber; and others she placed in a family room not affected by the frosts; in the spring season they produced the silk worm equally well; she put some eggs in the *ice house*, not on the *ice*, but on the *straw*, and in its atmosphere; and some time, I think, in July, they were brought out, and produced their worms in good condition. She fed one hundred worms on the black mulberry, one hundred on the white, one hundred on the Chinese, and one hundred on the black in their early stages, and, in the last stage, before making their cocoons, upon the Chinese;—all succeeded well. Those fed on the black, seemed to produce the strongest thread and most easily wound; the white the next, with but little difference: those fed wholly on the Chinese no ways different from those fed in the last stage, but greater difficulty to wind the Chinese than either those of the black or white. She had the publications made in our state, as well as those by order of congress on the culture of silk, as her instructions. The impulse of her mind was to assist in procuring a profitable family employment for children, for females and infirm persons; without which she considered that the noble system of our Sunday free schools and charitable institutions, was not carried to the full extent of their benevolence. The hope of this consummation affords a cheering prospect. A wide field is presented, in which the philanthropist, the moralist, and the political economist may jointly labor, and, in their efforts, greatly promote the public good. Whoever has seen the condition of the common people of Europe, and especially the idle beggars of Ireland and of Italy will appreciate the indispensable necessity of attention to this growing evil with us. It is a maxim of political economy that "demand begets supply," and experience has shown that every charity is over crowded. The towns of England are holding meetings, and resolving not to contribute to street beggary, but to give tickets on certain officers, who are to examine and afford ample relief to the afflicted, and send others to the houses of correction and confinement. The culture of silk will afford an additional and valuable employment, and should be connected with our charities; and employment of some kind should be provided in the houses of correction, which will be the most effectual charity.

But even as a new staple for the country, and a new article of production in common families, the culture of silk will be an invaluable acquisition. I have made every observation in my power, and I am fully convinced that the culture of silk will be found suitable to our climate, and well adapted to our country and people. Calabria, though south of Naples, is mountainous, and a much colder climate than ours. The Milan and Peidmontese silk is the best; and is much sought after in the London market. Those districts are in the north of Italy, and near the Alps. I think the production of the worm should be delayed until after the usual cold storm to be expected from the 15th to the 25th May. Our month of June would be the most desirable as a first establishment for them. If families can be induced to the growing of the cocoon, the women and children will soon produce as much from the mulberry trees about the house and along the fence, as the father can make on the clear profit of his farm. Thermometers or fires are not much used in Italy, the season giving the temperature required. The business must be simplified, and freed from too much instruction, to secure its success with us. The difficulty to extract reasons or information from the common people of the continent is so evident, and they so essentially differ from our American people in their aptitude to give reasons and explanations, that I say—do not seek or receive too much European instruction, but rely on the producible common sense of our people; this fund will not fail or be insufficient, and, with a little experience, I am sure of success in the culture of silk in our country. Induce to the growing of the cocoons, and the object will be accomplished. It is a very simple business. I shall continue my observations on this important and interesting subject, in my tour through France; but if our American merchants and dealers in silks from Italy and France, could be induced to introduce the culture of silk, and obtain from time to time information from their correspondents, they would be a host of strength in the business. I have found the *operatives* here rather a prejudiced and uncertain source for information. They work, but cannot tell the why or wherefore."

Our next extracts are from Gen. Tallmadge's letter, dated Paris, April 6th, 1836.

"In my last letter from Naples I believe I promised to say something more on the cultivation of silk. I have since travelled through Italy, and especially in the silk districts, and also through France, and have visited many of the manufactories in both countries, endeavoring to learn the details of this subject, now so interesting, and, I think, so essential to our country. The limits of a letter will, however, confine me to a few isolated remarks.

The weaving of silk after it gets into skeins, is like any other weaving of like character; it is the production of silk, and the habit of growing it, that must be acquired by our country; and it is in this view, a mine of boundless wealth, not second even to the production of cotton. The country which so lately surprised Europe by sending *eight* bales of cotton to its market, and now astonishes the world with its countless thousands, may soon exhibit a like wonder in the production of its silk.

In Calabria, which is in the south of Italy the black mulberry is principally used. In the rest of Italy the white mulberry, common to them and to France, is principally used. The north of Italy, that is between the Alps and the Appenines, produces the most and the best silk. In this region, and especially in Sardinia, near Turin, and at *Novi*, the English and French are competitors in market, to purchase their silk as the best in the world; and yet on the 9th of March, the snow was one foot and a half deep, and the streets of Novi blocked up like our Cedar street! In Calabria the silk is produced by the country people, in their families, and mostly reeled by them. There are very few factories for reeling in the Neapoliten kingdom. In Lombardy, and towards Venice, there are also establishments for reeling, yet the greater part is reeled by the families, in detail, and brought to market in the skein. In Sardinia the cocoons are mostly reeled in establishments. At Novi their reeling establishments are numerous:—I saw one, now erecting, which is a quadrangle *two hundred* feet square, and appropriated solely to reeling cocoons. They are purchased up from near Milan, and many miles distant. This is admitted to be the best silk in the world. The *red* mulberry is here principally used, and is known as the Calabria mulberry. It is described as having a dark fruit; the tree is like our *black;* and when I called it *black* mulberry, I was corrected, and told the *stain of the fruit* was *red*, and not *black*, and which gave the character of the tree. The French in addition to the *white* mulberry, have a *dwarf* white, much liked, and getting into use; but, it must be remembered, there is not in France, and scarcely in Italy, a fence, and they do not graze their fields as we do. With our habit of pasturage, the dwarf would be inadmissible. The *Chinese* mulberry is unknown in Italy. I found only a few young engrafted trees, but no experiments there, to be relied upon, to establish its superior utility. In Italy, and in France, the mulberry is generally planted near the houses, along the road sides, by division fences, and often like an open orchard. The trees are formed like a middle sized apple tree. Its shade does not injure the land. The tree in Italy is usually made to sustain a grape vine, and the field is cultivated for wheat and other crops. There is less discrimination here than you would imagine in the kind of mulberry. The French have made experiments, especially on the *Chinese;* and the opinion seems to be, that the *Chinese* mulberry will bear to have its leaves twice picked off, and thus produce two crops of silk in one year, As yet, however, there is not much use made of the Chinese mulberry, even here, and the grower of silk cannot answer as to its virtues;—but the answer is often given to me, that, as to the *quality* and the *quantity* of the silk, it is the *same* as any other mulberry; and that the quality of the silk depends on the treatment of the worm, and the care and skill in reeling. They pay less attention to the *kind* of mulberry on which it is fed than we expect. They have also *white*, and use it. *Habit* directs more in Europe than with us, and therefore I urge that our people make experiments for themselves. They should neither take nor reject any thing too quickly upon European experience. Climate and circumstances may produce a different result, and the alleged experiments of Europe may have been incorrectly or inadequately tried.

It is a peculiar and important circumstance in favor of the adaptation and fitness of our climate to the culture of silk, that, with us, the silk worm is produced at the beginning of warm weather, in May and June, by natural temperature of the season, while in Europe, and especially in Italy and France, it is produced only by artificial temperature and means. This fact is a volume in promise for our country. Fires and a thermometer are not used in the south of Italy to secure an equal temperature in the rooms of the worms, nor much used in the north of Italy, unless in the region of some snow capped mountain, or where other circumstances produce sudden inequalities of temperature. It is the same as to the south and north of France.

The books already published, by congress and our state, give the best, and indeed all the instructions which can be given on the subject; and with these, as guides, let the safe and unerring common sense of our people make experiments for themselves: and, I venture to say, the time is not far distant when America will produce silk in abundance from practical information and science, while other countries will continue to do it from habit.

On the continent, and particularly in Italy and France, when about to get out, or transplant, trees or vines, it is the usage to dig the hole about four feet square, and from two to three feet deep; and after thus breaking up the ground, it is left some months to the operation of the air, and to frost. Sometimes manure is mingled with the dirt; and when the tree is set out, the hole is filled to a level. The tree, under such circumstances, takes much firmer root, grows better and holds its upright position.

Grape vines are set out on this principle; but, more commonly, a ditch, or small canal, will be dug, three or four feet wide, and two or three feet deep, and thus open, be left exposed to weather some months. Roots, or cuttings are then planted, and the dirt filled in partially, so as to leave them to take root at least one foot below the level of the surface of the land. As the summer drought comes on, the dirt is hoed about them nearly to a level. The vines are treated upon the same principle. In the spring the ground is hoed away from the stock, so as to break off and prevent the growing of the side and upper roots; course manure is often placed in the hole, about the stock, and in the dry season the dirt is hoed over and about the stock from time to time nearly to a level. The object and effect of this treatment of the vine is, by inducing the growth of the deep and lower roots to prevent those side and upper roots from running near the surface of the earth, and which, in the spring and wet seasons, produce an excess of growth, and in the dry and summer season fail to sustain the vine, and leave the fruit to wilt and wither, or become imperfect. It is thus the roots of the grape vine are made to run so low in the ground as to allow of cultivation, for a garden or for a wheat crop, without the spade or plough reaching any of the roots of the vine. An equality of growth, in the wet or dry season, is thus in a degree secured; and the uniformity insures the maturity of the grapes. May not this delightful fruit yet be naturalized with us?

The implements of husbandry, in either Italy or France, offer not much for the American farmer. Their lands are mostly cultivated with the spade and manual labour, and when the plough is used, it is the old fashioned plough, on a pair of wheels.—Their crops and their cultivation are so different from ours, that very little can be learned from them useful to us. Silk, wine, and wheat, are their staple productions, and to an almost incredible extent; so it is in France, where the manner of cultivation, and implements of husbandry, are much the same. Wheat is now so abundant in Italy and France, and the price so low, that I found them the other day, at Marseilles, shipping wheat for the New York market! and they would do the same from all parts of Italy, but for their lack of commercial enterprise. Our farmers are now sheltered by a protecting duty, otherwise their crops would moulder in their barns; and even New York be furnished with bread from a foreign market. They have felt secure in their production, and have not regarded, as necessary to themselves, the system of protection for our domestic products. Should peace continue a few years longer in Europe, such is its surcharge of labor, and power of production, that every product of American agriculture will find foreign competition, even in our own markets at home. The wheat, both in Italy and France, greatly surprised me;—the quantity is immense, and greatly beyond my belief till actual observation; and I have travelled eight or nine hundred miles in France, and have no where found sour, dark, or *imperfect bread*. Can we do and say the same in our own country? The bread of France certainly has a decided superiority over ours.

The agriculture of France is in fine condition, and secon only to that of England. It has every abundance and the people appear prosperous and happy.—The *olive* is a valuable addition to the production of Italy and France. Our climate will not, perhaps, favor the tree, at least in the northern states; yet it is of so much value it should be encouraged.—The *olive* can be successfully engrafted on the *ash tree*, and thus, perhaps, it might be acclimated with us. Some such trees, engrafted on the ash, are said to be growing at *Pistoia*, about twenty miles from Florence. There is no inducement, in France or Italy, thus to engraft the *olive*, but the hint is certainly worthy the attention of our nurserymen and of our country.

Marseilles is a delightful city. It has the air and activity of New York, and partakes in a like commercial prosperity. The air of liberty and enterprise in the people appears in strong contrast on coming from Austria and Italy, where the mental and bodily energies of man are, but too certainly, drying up under the jealousy and despotism of absolute monarchies. The harbor of Marseilles gave a zest to our feelings in the exhibition of several American vessels, and which even the ladies of our party readily distinguished from others by their peculiar grace and beauty. Our country, in its vessels, certainly has an unrivalled excellence. I spent a day in the examination of the *Toulon* navy yard and fleet. It is an extensive naval depot, abundantly provided and pretty well arranged. It is, in one sense, the penitentiary or state prison of France. It has four thousand convicts, sentenced to hard labor; and they are allowed to solicit and receive gratuities from visitors. It has several guns intended to fire *bombs* on *a direct line*; these were shown with some evident exultation; four are allotted to each of the larger vessels. They are well understood by our naval men. There was not any thing else novel or different from other naval depots; and all was of an order and scale from which we have nothing to learn for our service. I was on board the *Monte Bello*, equipped and ready for sea; she mounts 120 guns; her upper decks are so much drawn in as to allow only of carronades, and on slides, for her upper tier. I am sure my national feelings do not lead me into an error, when I say that either our Franklin, or Delaware, seventy-four is equal in force and strength. I was there before our affairs with France were known to be adjusted, and was received and admitted as an American, and treated with kindness and attention.

Great efforts are made in France to advance the condition of its agriculture. It is ascertained that the increased use of the *potatoe* has diminished the consumption of wheat for bread. The raising of the *beet-root*, for the production of sugar, has, as one of its principal objects, the supplying a new production for the benefit of the farmer.—For the same reason the growing of *madder* is much encouraged, and the production of the *beet* and *madder* come in great relief to agriculture, and are made new sources of public wealth. Our farmer certainly merit the like fostering care and assistance.

I have before mentioned the use of the natural current of the rivers and principal streams of the continent as a water power for manufacturing objects, and I have no doubt but the current in the East river, at New-York, may be used for the same purposes. At *Lyons*, a water wheel is thus turned, and works a forcing pump which drives up the water of the pier about three hundred feet to a reservoir in a public garden; it there forms a *jet d'eau* and falls into a marble basin, which serves as a fountain in case of fire, and its overflow washes the streets. It is attended and worked by one man, and, but for the economy and simplicity of the whole machinery, it might be recommended for adoption at New-York and some of our public squares be thus ornamented and made useful.

The elastic power of our people in rising up from the disaster of the late fire, is cause of wonder and admiration. Their physical energies, and manly efforts in support of commercial credit, have commanded the observation and commendation of Europe.—Our affair with France awoke attention, and the attitude assumed by our country excited admiration and surprise. America is now advantageously known on the continent. Respectable and intelligent Europeans no longer ask where America is, nor inquire the costume and court language of this new people. In every society or circle an American citizen finds demonstrations which afford cause for exulting satisfaction, and increased love of his country. The fame of our success, in naval architecture and steam power, in agriculture, commerce and manufactures, in increasing wealth and universal prosperity, has gone abroad, and the subjects of monarchs are inquiring if there is not some secret magic in the free institutions of America, which works such mighty wonders."

CULTURE OF SILK IN FRANCE, &c.

Since the foregoing was put in type, we have been favored with the perusal of a letter addressed to a member of the Institute, from General Tallmadge, dated Paris, April 12. 1836. As it contains some further suggestions in relation to the culture of silk, we have asked and obtained permission to make extracts from it. He says:—

"I have in part anticipated your request in relation to the culture of silk, and have written by the previous packet—as also from Naples. In my last letter, when speaking of the planting and culture of the mulberry tree, I fear I omitted to add that pro-

prietors of land often cultivate the mulberry tree with a view to profit from the leaves.—It is common in France and Italy, to sell the leaves to families, who rear the worms, at a fixed rate; but it is more usual for indigent families to plant a certain number of trees. They furnish the leaves, feed, and take care of the worms, and return to the owner of the land one equal half of the cocoons produced, which is his share of the income, and a most convenient one it is, to be produced from the trees along the road side, and in places which do not injure his agriculture; and this kind of tenating is of immense benefit to the industrious poor."

"I am proud of the sample of silk sent me in your letter, as made in America by the power loom and have shown it to several.—The patent law of England and France allows its benefits to *aliens*, while our law is confined to citizens or resident aliens. You can therefore get a patent here at pleasure. The French are, like all Europeans, slow in acquiring new habits, or making any changes in their pursuits. From this cause in practice, the different mulberries are not heeded. They have white, from habit, and do not yet use the Chinese mulberry. We have more of the Chinese growing than France and Italy together.

"I have taken pains to obtain from the government some recent information from India, not yet published; also some recent papers from the National Institute, which, if received, shall be sent out. I attend the public institutions, and especially the weekly meetings of the National Institute and the Agricultural Society, and am much pleased.

"The science and information from the National Institute is important, and from the superior intelligence and adaptation of our people, I am sure we shall in America first practice, and reap benefits from this science. Our advancement is matter of astonishment to Europe, and it is often said to me that we keep a-head of them in all experiments reducible to practice."

In a note it is added that—"The program of the agricultural meeting, containing reports on the proceedings of the last year, I will send by some private conveyance—the medals were given out in my presence.—Our Institute need not blush."

We republish the following letter for the purpose of spreading all available information on the subject—and also with the design of correcting a slight inaccuracy in a late number, in regard to the species of beet employed. We have always felt the importance of this branch of manufacture to our country, and have sought for information from various sources. We are now happy to have it in our power to state, that we shall shortly receive from one of our friends in Europe, a detailed account of the process and machinery, embracing the latest improvements.

From the Boston Advertiser.

BEET ROOT SUGAR.

We have already published an interesting letter from Mr. Isnard, on the subject of the manufacturing of the Beet Root Sugar. We now publish another letter on the same subject, addressed by him to the President of the Agricultural Society, in answer to some inquiries made by the officers of that society, which will be found deserving of notice.—*Daily Advertiser.*

At a meeting of the Board of Trustees of the Massachusetts Society for promoting Agriculture, held 9th April, 1836:—

The President sent to the board a letter of introduction from Gen. Dearborn to him, (of the French Consul, Mr. Isnard,) with a view to the introduction of the Sugar Beet, and the mode of extracting the sugar.

Voted, That the subject be referred to the President and Mr. Gray.

A copy of the record.

BENJ. GUILD, Sec'ry.

In accordance with the above vote, the committee therein named, have had an interview with Mr. Isnard; and the following interesting letter upon the subject of the manufacturing of sugar from the white, or sugar beet, so called, has been received from him. The committee learning that this subject has of late created conversation amongst the farmers and others, have been induced to give pulicity to Mr. Isnard's letter, previously to submitting it to the board of Trustees, whose meeting stands adjourned to the 14th inst. Those of the Trustees to whom said letter has been communicated, approve of its immediate publication.

Sir,—As you have expressed a wish that the cultivators of this country might be generally informed of the principal observations made in France upon the culture of the sugar beet, and also wha benefits they might derive by the making of sugar; and for my own part being desirous of fulfilling the promise I made to the public, in my first communication on the above subject, to give further information when called for; I have now the honor to transmit to you the following, which appears to me sufficient for the present, being ready at any time to enlarge on the subject, if required.

The variety of beet to which the sugar manufacturers now give the preference, is the white beet, (*Beta alba,*) imported into France from Germany; next to it is the yellow beet, (*Lutea mojor.*) The first ought to be preferred in this climate, as it stands better against frost and rotting. This variety must not be confounded with another very similar, called in French *Disette*, Scarcity Root, (*Beta silvestris,*) also white, though very often striped red and white; this last is a great deal larger, more watery, but deficient in sugar.

The choice of the best beet will not suffice; care ought to be bestowed on the cultivation, in order to enhance and to perfect its saccharine principle, and even facilitate the several processes for obtaining the sugar.

Deep light, rather sandy, but rich soil is requisite to raise an abundant crop of beet of good quality. Beets raised on a field newly manured have proved to contain salts detrimental to sugar, and which increase the difficulty of obtaining it. Good pasture land, not marshy, broken up and planted with beet, produces the most saccharine roots. The transplanting has been discontinued as more expensive, less certain, and the young plants so transplanted producing roots less perfect in shape, a matter of some consequence, owing to the subsequent mechanical operations, those roots are to be submitted to; and also owing to the aptness of the plant so transplanted to rise out of the ground while growing, which causes a great loss to the sugar manufacturer, since it has been proved by analysis that the portion of the root so exposed to light and air, is far from being so rich with sugar as the part which is under ground; hence the necessity of hoeing and earthing up the roots. Seeds ought to be laid in rows at two feet apart, that distance will allow us to perform the weeding, the hoeing and the earthing up easily, by means of a proper hoe or plough, drawn by a horse, now generally used in France.

The gathering offers nothing particular; care ought to be taken not to hurt the roots; they should be deprived of their small fibrous roots, and also of all the green part of their top to which the leaves adhere.—The stowing of a large quantity of beet deserves the greatest consideration, in order to prevent their heating; for if they vegetate the saccharine principles enter into new combinations, and sugar can no longer be obtained with the same profit.

In Germany the leaves are carefully dried and used as a fodder for cattle. In France the leaves not immediately used are left on the ground as a manure.

The expenses attending the cultivation of one acre of land planted with beet, will vary according to circumstances; every farmer is to judge for himself.

The quantity of beet gathered on one acre will also vary even from 300 to 500 bushels. A respectable farmer of this country has assured me, that 600 bushels would not be considered an extraordinary crop on a rich soil, and with proper management. Nothing in this remark ought to surprise us, for admitting the roots at 2 feet apart, 11,000 roots will be gathered on an acre. The average weight of each may be 3½ lbs. In fact many will weigh as much as 8 lbs. In the following calculations I take for granted 350 bushels as the average crop of one acre, a bushel of beet to weigh 60 lbs.

As to the benefits which a farmer will derive by the cultivation of one acre with beet for the making of sugar, they can be stated as follows:

800 lbs. good Muscovado Sugar valued at 8 cents per pound,	$64
50 gallons of Molasses, good for distillers, at 16 cents per gal.	8
4 tons of Pumice, a good food for cattle, $3 per ton,	12
1 ton of dry leaves, or their value as manure,	5
Total,	$89

Owing to the want of skill and experience, I admit at only 4 lbs. the quantity of sugar obtained, though 5 lbs. is generally obtained, and even some manufacturers obtain as much as 7 lbs. of sugar for every 100 lbs of beet. From this amount ought to be deducted about $5 for sundry ingredients for manufacturing purposes; also the cost of one cord of wood for fuel. The several operations will be performed by the farmer at his leisure time. The expenses

for tools, apparatus, &c. &c., can be valued at about $120, but should the works be enlarged so as to work a double or greater quantity, these expenses would by no means increase in the same ratio.

Should a company be formed to carry on conjointly the cultivation and the manufacture of sugar on a large scale, other benefits would be derived—1st. By the improving of a large tract of land. 2d. By the refining of the sugar at a trifling additional expense. 3d. By the fattening of cattle. 4thly. Getting the most of sugar at the least expense possible, by being enabled to secure the service of competent superintendents, and by making use of labor-saving machines moved by steam engines; all of which I am ready to demonstrate on application made to me.

In my first communication on this subject, I have stated, that the pumice of beet was a better food for cattle than beet in their natural state; to this assertion objections have been made; allow me, sir, to support my position by a few observations more, inasmuch as they will impart a more correct knowledge of the benefits that can be expected by some new improvement in the process of making the sugar of beet.

By chemical analysis 100 lbs. of beet root prove to contain 85 to 90 lbs. of water, 6 to 11 lbs. of sugar, 1 to 2 lbs. ligenous substance. Pectic acid, albumic, salts, earth, together 2 to 2½ lbs. The greater the proportion of water, the less is the proportion of sugar. The average quantity of juice obtained from 100 lbs. of beet is about 70 lbs.; the weight of the pumice left is 30 lbs. The quantity of sugar extracted from 100 lbs. of good beet by those who are skilled in the process, is now 7 lbs.; but from 1 to 2 lbs. of it is mixed in the molasses; consequently the pumice is proportionably more rich in saccharine principle than the beet. In its natural state the beet holds 85 per cent of water; the juice obtained from it holds 63 lbs. of water; then 22 lbs. of water remain in the 30 lbs. of pumice; consequently in less proportion than in the beet. This is not all, in the pumice the water is *almost solidified*, as it has been observed, by the pectic acid, which is combined with it, and contributes in a great measure to render the pumice so nutritious; if added to this, that the pumice is easily chewed and better digested, it is not surprising that cattle relish it more than the common beet, and thrive exceedingly well when fed upon it.

The following is fact: the first year I manufactured sugar in France, I offered the pumice for sale, for what milkmen were pleased to give; they soon finding the benefit derived from it, offered more for it than for common beets. Wishing to ascertain what price they were willing to pay for it, I asked as much as one half more than the price I paid for common beet (all by the weight) and yet found a sale for it. They said that 100 lbs. of pumice went further than an equal weight of beet; that they were saved the trouble of washing and cutting them; that when feeding cows with pumice they could save the dry food they were obliged to give them, when feeding them with beet.

Should these observations, for which I beg your indulgence, be in any way deemed beneficial for the promotion of this new branch of agricultural industry in this country, they are, sir, at your disposal for whatever circulation you may be pleased to give them.

I have the honor to be,
With the highest respect, sir,
Your most obedient servant,
MAX. ISNARD,
French Vice Consul for Boston

To the Hon. L. WINTHROP.

Boston, April 15, 1836.

AGRICULTURE, &c.

THE BANIAN TREE.

This tree which is also called the Burr tree, or the Indian Fig, is one of the most curious and beautiful of nature's productions in the genial climate of India, where she sports with the greatest variety and profusion. Each tree is in itself a grove; and some of them are of an amazing size and extent, and, contrary to most other animal and vegetable productions, seem to be exempt from decay. Every branch from the main body throws out its own roots; at first, in small, tender fibres, several yards from the ground; these continually grow thicker, until, by a gradual descent, they reach the surface, and there stick in, they increase to large trunks, and become parent trees, shooting out new branches from the tops. These, in time, suspend their roots, and receiving nourishment from the earth, swell into trunks, and shoot forth other branches; thus continuing in a state of progression, so long as the earth, the first parent of them all, contributes her sustenance.

A Banian tree, with many trunks, forms the most beautiful walks, vistas, and cool recesses, that can be imagined. The leaves are large, soft, and of a lively green; the fruit is a small fig, when ripe, of a bright scarlet, affording sustenance to monkeys, squirrels, peacocks, and birds of various kinds, which dwell among the branches.

The Hindoos are peculiarly fond of the Banian tree; they consider its long duration, its outstretching arms, and its overshadowing beneficence, as emblems of the Deity, and almost pay it divine honors. The Bramins, who thus find a fane in every sacred grove, spend much of their time in religious solitude, under the shade of the Banian tree; they plant it near their temples or pagodas; and in those villages where there are no structures erected for public worship, they place an image under one of these trees, and there perform a morning and evening sacrifice. The natives of all casts and tribes are found recreating in the cool recesses, beautiful walks, and lovely vistas of this umbrageous canopy impervious to the hottest beams of a tropical sun. These are the trees under which a sect of naked philosophers, called Gymnosophists, assembled in Arian's days, and this historian of ancient Greece presents a true picture of the modern Hindoos. In winter, he says, the Gymnosophists enjoy the benefit of the sun's rays in the open air; and in summer when the heat becomes excessive, they pass their time in cool and moist places, under large trees, which, according to the account of Nearchus, cover a circumference of five acres, and extend their branches so far, that ten thousand men may easily find shelter under them.

On the banks of the river Narbuddy, in the province of Guzzarat, is a Banian tree, supposed by some persons to be the one described by Nearchus, and certainly not inferior to it. It is distinguished by the name of Cubbeer Burr, which was given it in honor of a famous saint.—High floods have, at various times, swept away a considerable part of this extraordinary tree; but what still remains, is nearly two thousand feet in circumference, measuring round the principal stems; the overhanging branches, not yet stuck down, cover a much larger space, and under it grow a number of custard, apple, and other fruit trees. The large trunks of this single tree amount to three hundred and fifty; and the smaller ones exceed three thousand; every one of these are constantly sending forth branches and hanging roots, to form other trunks, and become the parents of a future progeny. The Cubbeer Burr is famed throughout Hindoostan not only on account of its great extent, but also of its surpassing beauty. The Indian armies generally encamp around it; and at stated seasons, solemn Jattaras, or Hindoo festivals, to which thousands of votaries repair from every part of the Mogul empire, are there celebrated. It is said that seven thousand persons find ample room to repose under its shade. It has long been the custom of British residents in India, on their hunting and shooting parties, to form extensive encampments, and spend weeks together under, this delightful and magnificent pavilion, which affords a shelter to all travellers, particularly to the religious tribes of the Hindoos.

It is generally filled with greenwood pigeons, doves, peacocks, and a variety of feathered songsters—with monkeys, which both divert the spectator, by their antic tricks, and interest him by the paternal affection they display to their young offspring, in teaching them to select their food, and to exert themselves in jumping from bough to bough. This tree affords not only shelter, but sustenance to all its inhabitants, being covered amidst its bright foilage with small figs, of a rich scarlet, on which they all regale with as much delight as the lords of the creation on their most costly fare, in their parties of pleasure.

This tree, which is doubtless one of the most singular and magnificent objects in the vegetable kingdom, appears to be a world in miniature, in which thousands both of the human beings and of the inferior tribes that traverse the earth and air, may find ample accommodation and subsistence. What a striking contrast does it present to the forests of trees, or mushrooms, which are perceived by the

aid of the microscope, in a piece of mouldiness—every plant of which is several hundred times smaller than the point of the finest needle! Yet both are the effect of the agency of the same all-wise and omnipotent Being. And what an immense variety of gradations is to be found in the vegetable world, between these two extremes—every part of the vast interval being filled up with flowers, herbs, shrubs, and trees of every color, form, and size, and in such vast multitudes and profusion, that no man can number them.

THE ICE TRADE BETWEEN AMERICA AND INDIA.

The arrival of the Tuscany with a cargo of ice from America forms an epoch in the history of Calcutta worthy of commemoration, as a facetious friend remarked, in a medal of *frosted* silver. In the month of May last we received a present of some ice from Dr. Wise at Hugli, (whose efforts have been so long directed to the extension of its manufacture by the native process,) as a proof that the precious luxury might be preserved by careful husbandry until the season when its coolness was the most grateful, little did we then contemplate being able to return the compliment, with a solid lump of the clearest crystal ice at the conclusion of the rains! nor that we should be finally indebted to American enterprise for the realization of a pleasure for which we have so long envied our more fortunate countrymen in the upper provinces; nay, even the beggars of Bokhara, who in a climate at times more sultry than ours, according to Lieutenant Burnes, "purchase ice for their water, even while entreating the bounty of the passenger." Professor Leslie with his thousand glass exhausters, and his beautiful steam-air pumps, tantalized us with the hopes of a costly treat, and ruined poor Taylor, the bold adopter of his theory; but Science must in this new instance, as on many former occasions, confess herself vanquished or forestalled by the simple practical discovery, that a body of ice may be easily conveyed from one side of the globe to the other, crossing the line twice, with a very moderate loss from liquefaction.

We are indebted to Mr. J. J. Dixwell, the agent of the proprietors, for the following interesting particulars relative to the Tuscany's novel cargo, and the mode of shipping ice from America for foreign consumption.

The supplying of ice to the West Indies and to the southern States of the Union, New Orleans, &c., has become within these few years an extensive branch of trade under the successful exertions of its originator, Frederick Gudar, Esq., of Boston, with whom S. Austen, Esq., and Mr. W. C. Rogers, are associated in the present speculation.

The ponds from which the Boston ice is cut, are situated within ten miles of the city; it is also procured from the Kennebec and Penobscot rivers, in the state of Maine where it is deposited in ice-houses on the banks and shipped from thence to the capital. A peculiar machine is used to cut it from the ponds in blocks of two feet square, and from one foot to eighteen inches thick varying according to the intensity of the season. If the winter does not prove severe enough to freeze the water to a convenient thickness, the square slabs are laid again over the sheet ice, until consolidated and so recut. The ice is stored in warehouses constructed for the purpose at Boston.

The shipping it to the West Indies, a voyage of ten or fifteen days, little precaution is used. The whole hold of the vessel is filled with it, having a lining of tan, about four inches thick, upon the bottom and sides of the hold; and the top lifts covered with a layer of hay. The hatches are then closed, and are not allowed to be opened till the ice is ready to be discharged. It is usually measured for shipping, and each cord reckoned at three tons; a cubic foot weighs 58¼ lbs.

For the voyage to India, a much longer one than had been hitherto attempted, some additional precautions were deemed necessary for the preservation of the ice. The ice hold was an insulated house, extending from the after part of the forward hatch to the forward part of the after hatch, about fifty feet in length. It was constructed as follows:—a floor of one inch deal planks was first laid down upon the dunnage at the bottom of the vessel; over this was strewed a layer, one foot thick of tan; that is, the refuse bark from the tanners' pits, thoroughly dried, which is found to be a very good and cheap non-conductor: over this was laid another deal planking, and the four sides of the ice hold were built up in exactly the same manner, insulated from the sides of the vessel. The pump, well, and main-mast, were boxed around in the same manner.

The cubes of the ice were then packed or built together so close as to leave no space between them, and to make the whole one solid mass: about 180 tons were thus stowed. On the top was pressed down closely a foot of hay, and the whole was shut up from access of air, with a deal planking one inch thick nailed upon the lower surface of the lower deck timbers; the space between the planks and deck being stuffed with tan.

On the surface of the ice, at two places, was introduced a kind of float, having a guage rod passing through a stuffing-box in the cover; the object of which was to denote the gradual decrease of the ice, as it melted and subsided bodily.

The ice was shipped on the 6th and 7th of May, 1833, and discharged in Calcutta on the 13th, 14th 15th, and 16th of September, making the voyage in four months and seven days. The amount of wastage could not be exactly ascertained from the sinking of the ice-guage; because, on opening the chamber, it was found that the ice had melted between each block, and not from the exterior only, in the manner of one solid mass, as was anticipated. Calculating from the rods, and from the diminished draught of the ship, Mr. Dixwell estimated the loss on arrival at Diamond Harbor, to be fifty-five tons, six or eight tons more being lost during the passage up the river; and probably about twenty in landing.—About one hundred tons, say three thousand maunds, were finally deposited in the ice-house on shore; a lower room in a house at Brightman's Ghaut; rapidly floored, and lined with planks for the occasion.

The sale has not, we believe, been so rapid as might have been expected, amounting to no more than ten maunds per diem, although Mr. Rogers has fixed the price at the low rate of four annas per seer, one half of the price estimated for the Hugli ice, which was calculated to be somewhat cheaper in proportion than saltpetre. The public requires to be habituated to it, and to be satisfied of the economy of its substitution for the long-established process of cooling. There may also be some doubts of the best mode of preserving so fleeting a commodity; but on this head we cannot but advise an imitation of the methods pursued on a large scale on board of the Tuscany. For the application of the ice to the purposes of cooling ample directions have been given in the "Gleanings of Science," vol. iii. p. 120. A box or basket, or tin case, with several folds of blankets, or having a double case lined with paddy chaff, or any non-conducting substance, will preserve the ice until wanted; and for cooling water or wine, the most effectual method of all is to put a lump of the clear crystal into the liquid. The next best is to spread fragments upon the bottles laid horizontally, and have them wrapped in flannel for a couple of hours.

So effectual was the non-conducting power of the ice-house on board, that a thermometer placed on it did not differ perceptibly from one in the cabin. From the temperature of the water pumped out, and that of the air in the rim of the vessel, Mr. Dixwell ascertained that the temperature of the hold was not sensibly affected by the ice. Upon leaving the tropic, and running rapidly into higher latitudes, it retained its heat for some time; but after being several weeks in high latitudes, and becoming cooled to the temperature of the external air and sea, it took more than ten days in the tropics before the hold was heated again to the tropical standard.—*London Mechanics' Magazine.*

SPECIFICATION OF THE PATENT GRANTED TO JOHN BIRD, OF BIRMINGHAM, FOR AN IMPROVED METHOD OF MAKING AND COMPOUNDING PRINTER'S INK, PAINTS, AND OTHER PIGMENTS. SEALED OCTOBER 15, 1835.

My improved method of making and compounding printers' ink, paints, and other pigments is as follows: I take a certain portion of mineral earth or matter found in great abundance on my estate at Dinas Mowddwy in Merionethshire, in North Wales, and other places; which mineral earth or matter, I first wash clean from every portion of slate or other debris, and which after such washing becomes a very fine black impalpable powder if dried, or a very fine paste if wet. This black deposit is a compound prepared by nature consisting of the following substances, and in the following proportions or some like proportions viz., silica 46, alumina 42, and coaly matter 12.

In order to make printers' ink, I take as large a portion of this prepared compound as I deem necessary, and mix and grind it up with boiled oil, or prepared oil, usually used in the making of inks, which when so prepared, is my improved method of making and compounding printers' ink. To make ink used in copper-plate printing, I adopt the method now in use, substituting the above-mentioned compound, in lieu of Franckfort black, or what is usually designated by that name. I then, in order to make and compound paints and other pigments, take in those proportions I find necessary of the above matter, and mix and compound it with oils, spirits, or any other substance requisite for making paints and other pigments, under which last description I include the making of blacking.

In the manufacture of ink, blacking paints or other pigments, I do not confine myself to any particular quantities of the ingredients above-mentioned, but take any quantities thereof, which are found most desirable.

I claim no exclusive privilege for the use of any other matter in making and compounding inks, paints or other pigments, except the use of the compound above described, and for the use of the said compound, and for mixing it in any way, or in any proportion convenient for the making inks, paints, and other pigments, I do hereby claim the exclusive privilege. In witness whereof, &c.

Enrolled April 15, 1836.

From the Journal of the American Institute.

THE DANFORTH, OR CAP SPINNER.

This machine was invented in 1828, by Charles Danforth, a native of Massachusetts, and is probably the greatest improvement on the throstle that has been made since the days of Sir Richard Arkwright. Mr. D. resided at the time in Rockland county, N. Y. He had been employed for a number of years as an operator of cotton machinery, and having had experience on the common throstle as well as the Waltham dead spindle, he was aware that the two greatest impediments in these modes of spinning, were the difficulty of making the flyer exactly balanced, and the drag of the bobbin by the strength of the yarn. He thought if any plan could be contrived to wind the yarn on the bobbin without the use of the flyer, it would enable him to run the bobbin very fast. After some reflection it occurred to him that a bobbin running on a fixed spindle, and circumscribed by a smooth stationary polished ring, suspended from or fixed to the top of the spindle, might produce the desired result.

He accordingly proceeded to make the experiment. He first permanently secured a throstle spindle in the frame to prevent its turning; and after cutting the curls from the prongs of the flyer, rivetted to them a smooth ring which passed round the bobbin. He then turned a groove in the lower head of the bobbin, for the driving band to run in, and having put all together, and put the bobbin in motion, he fixed up his thread, and filled a bobbin without any difficulty.

It was perceived in this first attempt, that the tension on the yarn while spinning was very light, and the yarn wound soft on the bobbin; it was therefore thought that the principle would be good for spinning weft, which requires to be slack twisted. He therefore constructed his first machines for weft, and after making various experiments, fixed on the present mode of making and supporting the stationary ring, which is a cap similar in shape to an inverted tumbler, with a polished steel ring on the bottom, having a conical socket in the top, made to fit a small cone on the top of the spindle.

The spindle is of sufficient length to admit the bobbin to traverse its length on it, and is secured to the spindle rail at the bottom. It was found that the bobbin, which is of wood, running at the rate of 7000 revolutions per minute, on a fixed spindle, was apt to get dry, make a loud noise, and cause the bobbin to wear:—to obviate this difficulty, a warve was made, with a tube on the top of sufficient length to pass through the bobbin, on which the bobbin is placed and revolves with it; this warve takes the friction off the bobbin, and as it is made of metal, is durable, and runs without noise.

Mr. D. has patented his invention in this country, and caused patents to be taken in England, and other European states.

This mode of spinning has now been thoroughly tested, both for warp and weft, and is found to be capable of producing full 40 per cent. more yarn, on counts or numbers, from No. 14 to 50, than any other mode heretofore known. It is generally approved of by the spinners who have tried it, and has gone into use, both in this country as well as Europe, more rapidly than any other improvement in spinning has before been known to do.

The principle is such, that instead of making the thread drag the bobbin, the bobbin is made to drag the thread, and the resistance of the atmosphere, together with the slight friction on the lower edge of the ring, produces that retardation necessary for winding the yarn on the bobbin, in consequence of which the tension on all the threads is perfectly uniform, and at the same time delicate, giving a great uniformity and elasticity to the yarn.

This machine requires much less power to drive it than the common throstle.

They are made and sold by Messrs. Godwin, Clark & Co., at their shop in Patterson, N. J., who are the proprietors of the patent, and manufacturers of all kinds of cotton and woollen machinery.

SPECIFICATION OF A PATENT FOR A DOFFER FOR WOOL CARDING MACHINES. GRANTED TO STEPHEN R. PARKHURST, PROVIDENCE, RHODE ISLAND, OCTOBER 10th 1835.

To all persons to whom these presents shall come, be it known, that I, Stephen R. Parkhurst, of Providence, in the county of Providence, and State of Rhode Island, and Providence Plantations, have invented a new and useful doffer, with corresponding rolls, for the wool card, called a finisher.—Instead of a continuous cylinder, this doffer is composed of a set of wheels, or pulleys, of equal diameter with the common doffer, covered with a card in the same way, of three or four inches thickness at the rims, to revolve like the common doffer, placed upon their shaft, an inch, or an inch and a half, apart, and a small angle and parallel with each other, and making such an angle with the shaft as that the spaces between may be fully compensated in their revolution, and the whole surface of the main cylinder be passed over by them; and their rims, or outer surfaces, must be parallel to to their shaft, so as to conform to the surface of the main cylinder. Next, there is a set of pulleys, which I call division rollers; these may be about four inches in diameter, for a common doffer, of the same thickness with the spaces between the different rims, or pulleys, of the doffer, placed upon their shaft at the same angle, turned by a belt, or gear placed before the doffer, with their shaft a little lower than the shaft of the doffer, and so placed that their outer edges will be a little within the rims of the doffer, for the purpose of keeping the wool on the different parts, or wheels, of the doffer, entirely separate, as it is taken off by the top rolls, hereinafter described. The next are a set of pulleys, or wheels, or rims, which I call the top rolls; they are equal in number to the different rims of the doffer, four or five inches in diameter; they may be a little less in thickness than the width of the different rims of the doffer, so that the division rolls may revolve freely between them, placed so as to revolve in contact with their correspondent rims of the doffer, for the purpose of taking the wool from it, and so placed as that they will so bear upon the shaft of the division rolls as to be turned by it. A comb, if necessary, may be attached to this doffer, to clear the wool from it. The wool taken from the doffer by these top rolls, kept in separate laminæ, or flakes, by the division rolls, drawn over the shaft of the division rolls, may be passed through a tube, or a belt, and then run on a spool, or spools; or by a flyer properly rplaced, it may at once be twisted into a thread. By regulating the feed of the card, and the speed of the division rolls, the size of the roping, and of thread, i. e. the fineness of them, may be regulated, or adjusted, to suit the work required.

I claim as my invention, and not before known, the doffer before described, together with the top rolls, and division rolls, to correspond with it.

STEPHEN R. PARKHURST.

From the London Repertory of Patent Inventions.

SPECIFICATION OF THE PATENT GRANTED TO HENRY BOOTH, OF LIVERPOOL, FOR CERTAIN IMPROVEMENTS IN LOCOMOTIVE ENGINES AND RAILWAY CARRIAGES. SEALED JANUARY 23, 1836.

My improvement applicable to railway carriages I declare to be a new mode of connecting the carriages together, by which is effected an increased steadiness and smoothness of motion at high velocities, and which consists in an improved connecting apparatus, by the action of which the buffers of the separate carriages of a train held in contact with each other, so as to prevent that independent lateral and serpentine motion, which railway carriages moving at high velocities assume when they are attached together in the usual way by a simple draw chain.

Description of the Drawing.—Fig. 1, shows the mode in which railway carriages have usually been attached to each other by a simple chain, the buffers of one carriage not coming in contact with those of another, but each carriage being allowed, when moving onwards, a lateral oscillating motion.

Figs. 2 and 3, show the improved mode of connection for which I claim my patent. A, is the connecting chain attached to the draw bar of each carriage, and consists of a double working screw (working within two long links or shackles,) the sockets of which are spirally threaded to receive the screw bolts which are fastened together by a pin and cotter—so that by turning the arm or lever, Z, of the said screws, the connecting apparatus is lengthened or shortened at pleasure, to the extent of the long links or shackles above alluded to, in which they work. This screw chain being placed on the hooks, or turned up ends of the carriage draw bars (D), the buffers (B) of each adjoining carriage being first brought close or

nearly close together, the lever (z) is turned round a few times till the draw bars (D) are drawn an inch or two beyond their shoulders, on the face of the carriage frame (c), stretching the draw springs (to which the draw bars are attached), to the extent of a fourth or fifth part of their whole elasticity; and by that degree of force attaching the buffers of the adjoining carriages together, and giving by this means, to a train of carriages, a combined steadiness and smoothness of motion at rapid speeds, which they have not, when the buffers of each carriage are separate from those of the adjoining carriage. w, is a weight to keep the lever in a vertical position and prevent the unscrewing of the chain when in action.

Now I do not claim as new the separate parts before described of the buffers, screw chain, or draw-bars, attached to a draw spring, but I claim the combination and joint action of those parts as described, and the consequent close, but elastic attachment of the carriages to each other, which constitutes my improvement applicable to railway carriages.

And my improvement applicable to the locomotive engines which draw the railway carriages, I declare to be a new mode of checking the speed of the engine, or stopping it altogether, which is effected by introducing a throttle valve, slide, or damper, into the exhausting steam pipe of the engine, commonly called the blast pipe, which is usually placed in the chimney, in front of the engine; and which throttle valve may be most conveniently introduced where the two exhausting pipes are united into one, below the place where the pipe is contracted in area for the purpose of producing a blast to the furnace. From the throttle valve must proceed a rod or long handle extending through the chimney to the back part of the boiler, so as to lie within convenient reach of the engine-man, who by moving the said handle, can close the slide or throttle valve, either partially or altogether as may be required. And the throttle valve need not be altogether steam tight, but should be made to work freely in its place. The engine-man when he wishes to stop or slacken the speed of his engine, closes or contracts his throttle valve without shutting off the steam in its passage from the boiler to the engine. The pistons, by that means, are speedily, but not suddenly or violently checked, and the driving wheels of the engine no longer revolving, or revolving very slowly, the engine is soon brought to a stand. Now I do not claim as new, any particular kind of throttle valve, which may be left to the judgment of the engineer, provided it be so constructed that when open the steam way be not contracted, but may allow the steam to escape freely as if no valve or damper were introduced. But I claim the introduction of a throttle valve, or damper, into the exhausting steam-pipe of a locomotive engine, by closing or contracting which the engine-man can check or stop his engine at pleasure. In witness whereof, &c.

Enrolled March 21, 1836.

SPECIFICATION OF A PATENT FOR A MACHINE FOR HULLING COTTON AND OTHER SEEDS. GRANTED TO JOHN AMBLER, JR. CITY OF PHILADELPHIA, NOVEMBER 26TH, 1835.

To all whom it may concern, be it known, that I, John Ambler, Jr. of the city of Philadelphia, in the State of Pennsylvania, have invented an improved machine for hulling and cleaning cotton and other seed which I denominate the Metallic Cotton Seed Huller, and that the following is a full and exact description thereof.

Upon an iron shaft, revolving horizontally, I place two, or any other convenient number of steel or iron disks, or circular plates of metal, so as to run with perfect truth upon the shafts; disks of eighteen inches in diameter, I have found to answer the purpose perfectly well. By means of a pointed chisel I raise teeth, in the manner of rasp teeth, on each side of these revolving disks, or I groove, or roughen them in any other manner calculated to produce the intended effect. The disks, as they revolve, pass through the flat bottom of a hopper, by which they are surmounted, projecting above the said bottom about one third of their diameter. Steel plates, cut like the disks, are placed on each side of them; the upper edges of these plates are on a level with the bottom of the hopper, and they extend down to the lower part of the revolving disks, covering about one-fourth part of the face thereof, this having been found sufficient to effect the hulling, perfectly.—These latteral plates are attached to adjustable sliding bars, or fixed in any other way which will admit of their distance from the disks being regulated according to the kind of seed to be hulled. It has been found best not to increase the opening between the plates and disks at the upper edge, but to preserve their parallelism throughout, so that but one seed can find its way between them at a time.

The seeds and hulls fall upon a sloping skreen, or riddle, which is made to shake, and to carry the portion which does not pass through the riddle to a revolving picker, placed at one end of the frame; this picker, and the hollow segment within which it revolves, are set with teeth in the manner of a picker for wool, and serve to separate the matted portion of the hulls, cotton, and seed, so that the lighter portion may be driven off by a revolving fan placed at the lower part of the machine for the purpose of cleaning the hulled seed.

The riddles, screens, shakers, fan, &c. which I employ, do not differ from such as are in common use for cleaning grain and other seed, and do not, therefore, require to be particularly described, as they make no part of my invention, and may be variously modified, or used separately from the hulling apparatus.

What I claim as my invention, and wish to secure by letters patent, is the hulling of cotton, and other seed, by means of revolving disks, or plates of steel, or other metal, made and operating substantially in the manner herein before set forth.

JOHN AMBLER, JR.

Journal of the Franklin Institute.

Specification for a Patent for an improvement in the Rearing of Silk Worms; Granted to GAMALIEL GAY, *Poughkeepsie, Dutchess county, New York, Oct.* 6, 1835.

To all to whom these presents shall come, I, Gamaliel Gay, of the town of Poughkeepsie, in the county of Dutchess, and state of New York, send greeting.

The hurdles for rearing and feeding silk worms upon, are, or should be, made on a horizontal, four-sided frame, of convenient width and length, and bottomed with cane, or twine, either reticulated, or having interstices between each slat of the cane, or thread of twine; which meshes, or interstices, should be of such dimensions that the silk worm will lie and feed upon them, and the litter of the worms fall through.

Now, be it known, that I, Gamaliel Gay, have invented, and applied to use, a revolving apron, for receiving upon it, and removing, the litter of the silk-worms, which falls through the hurdles, as above mentioned. The specification of which new and useful invention, for receiving and removing the litter of silk worms, as follows:

The revolving apron for a single hurdle, is constructed by placing in a frame, or otherwise at, and immediately under each end of the hurdle, a roller, or cylinder, in length equal to the width of the hurdle; over these cylinders, or rollers, extending from the outside of the periphery of the one, over and around that of the other is affixed an endless apron of cloth, or other flexible substance, equal, at least in width, to the width of the hurdle. This apron being drawn tight around the rollers, and the ends fastened together, is made to revolve around both rollers, by turning them by a crank affixed to the axle of one of them, or by otherwise revolving the rollers. The endless apron being thus constructed, receives the litter from the hurdle as it falls through, which litter, by causing a semi-revolution of the apron, is removed from under the hurdles, and caused to fall in a heap at one and either end of the hurdles, and may be suffered to fall from the apron either upon the floor, or into a vessel placed at, and partly under, the end of the hurdle, and below the outer periphery of the roller.

In case two or more hurdles be placed in tiers, one above the other, the same apron may be used, in which case an endless and separate apron is required for each hurdle; but the best method, the most convenient and least expensive form of apparatus, and which I claim as a constituent part of my invention, is constructed as follows. Let there be rollers, or cylinders, affixed under each end of each hurdle, the same as in case of a single hurdle; to one roller, below the lower hurdle, attach one end of an apron, of the kind and proportionate width first above specified; let this apron pass under the opposite roller, over the roller next immediately above that, under the roller next immediately above the first roller to which the apron is attached, over the next above roller, and under the next opposite one; and so on according to the number of hurdles in the tier, until the apron reaches the last roller to which the apron should be attached, after adding to the length of the apron at least the length of one of the hurdles, which should be rolled upon the last mentioned roller. The apron thus passing under each hurdle, receives all the litter falling from each, which litter is discharged, part at one end, and part at the other end of the hurdles, by turning the first mentioned roller so as to wind over and around it a quantity of the apron equal to the length of the above hurdle, which winding causes an equal quantity of the apron to unwind from the roller to which the other end of the roller is attached; after the litter is thus discharged from the

apron, the apron is, in part, to be again wound round the upper roller, as first above mentioned, so as to remain until the litter is again discharged.

What I claim as my improvement, and wish to secure by letters patent, in the rearing of silk worms, is the application of a revolving apron, or aprons, placed under the hurdles upon which the worms are fed, for the purpose of receiving and removing the litter falling from them; and this I claim, whether the same be made exactly in the way described, or in any other, operating substantially on the same principle, and by which a similar effect is produced.

GAMALIEL GAY.

Household Manufacture of Sugar.—A remarkable proof of the facility with which beet-root sugar manufactories may be established is presented at this moment at Wallers, in the department du Nord. Four of the villagers, by advancing 50 francs each, have formed a joint capital of 200 francs, and with this they produced between 40 and 50 lbs. of sugar, of rather inferior quality, a day. They employ curry-combs to rasp the beet-roots, which they put into a napkin-press to extract the juice, and then boil the syrup in common culinary boilers.

GRAIN.—The Richmond Enquirer says that the wheat crop generally turns out even worse than was expected. There is straw enough; but the heads are withered, and yield comparatively few grains. We are assured that some of the farmers will not make seed wheat—others have ploughed up their fields without reaping—many will not make half crop; others, not a third or fourth. The ravages from various causes, the fly, the wet, smut, freshet, &c., &c., are more or less felt by almost all. The complaint extends to both sides of the mountains in Virginia. But the corn looks well, and the oats are very fine.

The Baltimore American of Friday last publishes a letter from Gloucester Court House, Va., dated July 9, which states that the crop of wheat is so very indifferent that doubts are entertained whether a single bushel of the first quality can be obtained in the whole county. The average will not be more than equal to the fourth of a crop, and that fourth the poorest stuff that can be well imagined: that many of the farmers do not consider the crop as worth the trouble of harvesting:—and that the corn crop is very unpromising.

The Alexandria Gazett has the following notice of the crops in the counties of Virginia mentioned therein:

We learn from a gentleman who has recently visited the counties of Fairfax, Prince William, Fauquier, and Loudoun, that the wheat crop in the three first named counties will be from half to two thirds of an average one, Loudoun not so good. In Frederick county the crop is represented as very indifferent, and in Jefferson, Berkely, and many other counties beyond the Blue Ridge, it is said to be almost a total failure. The rye crop is generally very indifferent. Of the corn it is too early to judge, as much yet depends upon the weather—at present the corn, though short, looks in a flourishing state. With seasonable weather and the absence of early frost it may partially remunerate the farmers for their loss in the wheat and rye crops. The oat crop is an abundant one.

We conversed on Tuesday last with a gentleman of Martinsburg, who assured us that in many fields in that section of country the seed would not be gathered.

JOURNAL OF THE AMERICAN INSTITUTE.—We certainly owe an apology for having so long delayed to notice, and call attention to, this very interesting and valuable periodical. It was commenced in October last, by the Managers of the American Institute, and it has, as we are informed, and as it certainly deserves to do, progressed steadily in its course of usefulness. We wish it, and all other periodicals devoted to useful information, continued and abundant prosperity.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engag d by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicableextent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.

Rochester, May 22d, 1826. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined Iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany.

N. B.—Also furnished to order, Shapes of every descrption, made from Salisbury refined Iron. 4—ytf

MILL-DAM FOUNDRY.

TO BE SOLD OR LEASED the above well known establishment, situated one mile from Boston. The improvements consist of,

No. 1. *Boiler House*, 50 feet by 30 feet, containing all the necessary machinery for making boilers for *Locomotive* and other steam Engines.

No. 2. *Blacksmith's Shop*, 50 feet by 20, fitted with cranes for heavy work.

No. 3. *Locomtive House*, 54 feet by 25, used for putting together Locomotive Engines. Several of the best Engines in use in the United States have been put in this establishment.

No. 4. A three story brick building, covered with slate, 120 feet by 46, containing two water-wheels, equal to 40 horse power; Machine Shop, filled with lathes, &c.; Pattern Shop; Rolling Mill and Furnaces, capable of rolling 4 tons of iron per diem, exclusive of other work; three Trip Hammers, one of which is very large; engine for blowing Cupola Furnaces, moved by water-wheel; one very superior 12 horse Steam Engine, which could be dispensed with; and a variety of other machinery.

No. 5. An Iron Foundry, 80 feet by 45, with a superior air Furnace, and two Cupolas, Core oven, Cranes, &c. fitted for the largest work. Attached to the Foundry is a large ware-house, containing Patterns for the Castings of Hydraulic Presses, Locomotive and other Steam Engines, Lead Mill Rolls, Geering, Shafts, Stoves, Grates, &c. These were made of the most durable materials, under the direction of a very scientific and practical Engineer, and are supposed to be of great value.

No. 6. A building, 65 feet by 36, containing a large stack of chimneys, and furnaces, for making Cast Steel. This building has been used as a boarding-house, and can accommodate a large number of men.

No, 7. A range of buildings, 200 feet long by 30, containing counting room, several store rooms, a Brass Foundry, room for cleaning castings, a large loft for storing patterns, stable for two horses, &c. &c.

The above establishment being on tide water, presents greater advantages for some kinds of business than any other in the United States. Coal and Iron can be carried from vessels in the harbors of Boston, to the wharf in front of the Factory, at 25 to 30 cents per ton. Some of the largest jobs of iron work have been completed at this establishment; among others, the great chain and lift pumps for freeing the Dry Dock at the Navy Yard, Charleston.

The situation for Railroad work is excellent, being in the angle formed by the crossing of the Providence and Worcester Railroads. The Locomotive "Yankee," now running on the latter road, and the "Boston," purchased by the State of Pennsylvania, were built at these works. With the Patterns and Machinery now n the premises, 20 Locomotives, and as many tenders. besides a great quantity of cars and wagons. could be made per annum.

For terms, apply to
THOS. J. ECKLEY, Boston,
or to ROBERT RALSTON, Jr. Phila.

Boston, April 21, 1835. j25—4t

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River
and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are r served for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

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STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

JAMES G. KING, President.
21—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, AUGUST, 13 1836. [VOLUME V.—No. 32.

CONTENTS:

NEW-YORK, AUGTST 13, 1836.

Owing to delay in preparing the wood cuts, the article on the "Thames Tunnel," commenced in No. 14, has not been continued until this No.

Other articles of great length, have also prevented the insertion ot portions of it.

UTICA AND SCHENECTADY RAILROAD.

We congratulate the public in general and all lovers of fine scenery in particular, upon the opening of this road. On Monday, August the first, a large party of gentlemen, the Vice President among the number, left Albany by the Hudson and Mohawk Road, in a train of cars between two engines, as far as the summit, from which we descended with one. After a short delay at Schenectady, the party were seated in twenty cars, ten of which, taken by each locomotive, soon began to whirl away.

The company have erected a bridge over the Mohawk, of considerable length. In the bank beyond, a deep cut is being made for the direct line of the road, which meanwhile follows the cut for the Saratoga road.

Throughout the whole length the grades are very moderate, and the journey can be performed in a very short time. Owing to some delay on this occasion, we did not reach Utica until half past two, or three o'clock.

The Uticensians have probably never received so many visitants in one hour's time—the town seemed literally to overflow with people.

The depot at Utica, as well as that at Schenectady, is most admirably arranged, the car-houses, work-shops, &c., being so situated, that each has the best location for its own use, and at the same time, the relative position of the buildings is perfectly symmetrical.

We returned on Tuesday, leaving Utica at 8 o clock, with about 300 passengers—this being the first regular trip upon the road.

From the length of the train, and some other circumstances incident to an untraveled road—such as stiffness of machinery and cars—we did not arrive at Schenectady until half past two, though we are confident that with the same number of passengers the trip can be made in less than four hours. In fact, the train that left Utica on Monday afternoon at 4 o'clock, arrived at Schenectady at 8 o'clock: making about 3 hours running time. Notwithstanding this delay, having left Utica on Tuesday, at 8 A. M., we arrived in New-York on Wednesday, at half past 5 A. M.—time actually employed in going, 19½ hours.

From the nature of the location of this road, it is mostly an embankment—keeping the bottom lands, and still elevated above the highest freshets that ever occur.

Almost every one is familiar with the fine scenery of this most beautiful valley, but we have never seen it to such advantage as on the day of our return on the railroad. The rapid presentation to the eye of striking points in the view, strongly reminded us of a moving panorama.

The rich scenery around Utica first presented itself, with its hills gradually meeting in advance of us, and with the rapid motion it was not too difficult to imagine that they were closing in upon us. The village of Herkimer next comes to view, and from this point, there is a fine view up the valley of the West Canada, seeming to give an earnest of the beauty of Trenton falls.

The valley now narrows, the road having crossed the stream by a fine bridge. The hills now seem to shut out all ingress, and one unacquainted with the spot is puzzled to find how the canal, river and railroad are to penetrate. A point is turned showing the village of Little Falls, its mills appearing as if washed by some mighty freshet into the bed of the stream.

The tourist having his doubts for a moment dispersed, is again confined by another embrace of the hills, and directly in the midst of them, with hardly the appearance of an oulet either way.

At this place the road itself is an object of great interest, at one moment passing through a space of rock, and at the next, hanging to the side of the bank by the firmness of its own structure.

The road now leaves the gorge, and crosses the plain, the character of the scenery remaining similar, until at the Nose, where another pass charms the eye by its surprises.

We consider that the construction of this road reflects great credit upon the Directors, Engineers and Superintendant. Mr. Young, assisted by Messrs. Higham & Lee, has the credit of having completed one of the most essential routes in our chain of railroad.

The cheapness of the road is in agreeable contrast with other works in the same region.

It was necessary, in compliance with an act of legislature, to purchase the turnpike, for which the sum of $64,000 was given. Including this, machinery, eight locomo-

tives, depots, &c., the cost per mile is $20,000; while the Mohawk road cost $60,000 per mile.

Nearly $4000 were received on the first day—proving that this will become one of the most useful roads in our State. One most happy result from the completion of this road will be its effect to accelerate the western road, completing the continuous line of railroad from Albany to Buffalo.

We understand that Mr. Davison, who has acted as superintendant to the entire satisfaction of all parties, has resigned, while the services of Mr. Young are retained.

D. K. MINOR :—

Sir—In the Railroad Journal of the 16th ult., is an article from the New-York American, over the signature of "M," from which the following is an extract:

"The *Ship or Steamboat* canal surveyed by E. F. Johnson, Esq., between Utica and Oswego, is estimated for a canal of 90 feet width of surface and 8 feet deep, and has 180½ feet of lockage; the distance is 92½ miles, and the aggregate estimate is $1,131,959, which is at the rate of only $12,237$\frac{71}{100}$ per mile. I wish to inquire if whether there may not be some error in this estimate? and if it be possible to construct a Ship canal of these dimensions, at a less sum than $12,500 per mile? This estimate is but little more than one half the cost of construction of the Chenango canal with wood locks, is less than half the cost of the construction of the Utica and Schenectady railroad, and if I am rightly informed, about one fourth of the cost of the railroads that lead in three directions from the city of Boston."

Had the writer of the preceding examined Mr. Johnson's Report and the Reports upon the Chenango canal with the attention which an honest minded man would have done, before calling in question, in so public a manner, the accuracy of Mr. Johnson's estimates he would have found,

1st, That the route on which the estimate was made from Utica to Oswego, comprised *fifty seven* miles of *Lake and improved River* navigation, leaving but *thirty five and two third miles of artificial canal, ten and a half miles only* of which was *new canal*.

2nd. That the total amount of lockage upon the Chenango canal was, between 1000 and 1100 feet, being nearly or quite six times the total amount of lockage on the proposed canal from Utica to Oswego.

3rd. That the locks upon the Chenango canal are not "*wood locks*," but are built *principally of stone*, a portion being laid in cement and the remainder dry wall, with a timber and plank lining to the chambers: the dimensions of the walls not being materially different from what would be required for an entire stone lock.

4th. That some of the locks upon the Chenango canal are built entirely of stone laid in Hydraulic cement.

5th. That the cost of timber for the locks, bridges, acqueducts and other structures upon the Chenango canal, is much greater than the cost of the same material on the proposed route from Utica to Oswego.

6th. That owing to the peculiar relative situations of the two canals in question, the number and cost of road and farm bridges upon the Chenango canal, exceeds what is required upon the route from Utica to Oswego, for the same purpose. It is true that the erection of farm bridges was not contemplated upon the latter route, being incompatible with the character of the navigation, but damages were entered in the estimate for their omission, which would more than cover the cost of their construction.

7th. That the expense of constructing necessary Reservoirs, Feeders &c., for the supply of the Chenango canal, constitutes a *prominent* item in the cost of that work, and that it is distinctly stated in Mr. Johnson's report pages 31 and 47, that this item of expense on the poposed canal, from Utica to Oswego, was not embraced in his estimate; surveys for the purpose were contemplated, but "want of time and other circumstances prevented their execution."

The cost per mile from Utica to Oswego of that portion which is *actually* canal, including lockage, will therefore far exceed $12,237$\frac{71}{100}$, the amount stated in the communication of "M."

On page 24, of Mr. Johnson's report, will be found the following. "In calculating the quantity and value of labor and materials, I have endeavored to give each their full value, so that should the canal be constructed *before any important change shall take place in the current value of those articles*, the cost will not differ materially from the result as stated in the estimate."

The recent extraordinary advance in the price of provisions and labor, and in the value of land and materials, will render it proper to augment proportionately, the sum total in his estimate, and when so augmented the cost will be *less* than that of any navigable communication which can be found in the United States of equal extent, dimensions and importance.

In conclusion, I will add, that the Ontario and Hudson canal when opened, on a scale equal to, or larger, than that contemplated, will, in connexion with the proposed Niagara canal be found of more importance to the commercial interests of the States, and Territories west, and the States east, than any other navigable communication which can be found between the Atlantic and the Lakes. UTICA.

August —— 1836.

The following article, from the New-York Express, may be of service to some of our readers. Every one who visits New-York should understand, and be governed by it, when using a Hack.

HACKNEY COACHMEN.

The difficulties constantly increasing between the Hackney coachmen of this city and our citizens, as well as strangers, together with their numerous and enormous impositions, make it our duty to let the public see what they ought to be paid. The coachmen forget that in the end they lose money by these impositions, for the dearer the fare is, the less the demand will be for coaches, and the greater the liability to imposition, the less inclined people will be to put themselves in a condition to be imposed upon. The fares now demanded are higher than in any city in England, where every thing is so dear, and far higher than in any city upon the continent: but the fares fixed by law, we copy below, as taken from the Corporation laws, and we advise our readers to cut out and lay by the article for the purpose of using it when occasion demands.

Five dollars are often demanded for taking strangers from one hotel to another, when the hotels are full, but the privilege of keeping the carriage *all day*, and of going to and returning from Kingsbridge, costs but five dollars. Passengers, under the Corporation laws, can go to Harlem and return, with the privilege of remaining three hours, for five dollars.

The price to 86th street, for one passenger, remaining one hour, and returning is two dollars, and for every additional passenger fifty cents.

The price for one passenger to 61st street, and remaining three quarters of an hour and returning, $1 50; every additional passenger, 37½ cents.

To Fortieth street, remaining half an hour and returning, $1; every additional passenger 25 cents.

To the new Alms house and returning, 75 cents, and for every additional passenger and returning, 37½ cents.

To conveying a passenger any distance exceeding a mile, and within two miles, 50 cents; and for every additional passenger, 25 cents.

To conveying a passenger any distance not exceeding one mile, 25 cents; and for every additional passenger, 25 cents.

The Hackney coach for the hour with one or more passengers, with the privilege of going from place to place and of stopping,—costs for the first hour $1, for the second hour 75 cents, and for every succeeding hour 50 cents.

The Hackney coachman has no legal right to demand or to receive any pay for the conveyance of a passenger, unless the number of the carriage and the rates of fare are fixed upon the carriage.

There is a penalty of $10 for asking a larger price than the law entitles the coachman to. A penalty of $10 is also inflicted upon the driver of a coach, when on any of the public stands, or whilst waiting for employment, when tendered his fare, if he refuses to carry any person or persons to any place or places on the island of New-York.

Every driver or owner of a Hackney coach or carriage, is under a legal obligation to carry upon his coach with his passenger one trunk, or other article used for travelling, without compensation therefor, and for every article more than one, he is entitled to 6 cents, for one mile, and if more, to 12½ cents.

We have been applied to frequently for information in regard to the progress of the "Water Works," both by citizens and others, taking an interest in an undertaking of such magnitude. During a recent visit to Philadelphia, we felt jealous of our fellow citizens, where we beheld the pure and sparkling water poured over the streets in every direction, and tempering the heat of an otherwise insupportable day.

The following is the first official report, that we have seen published since the commencement of the undertaking. We hope that the difficulties may be removed forthwith, and that we may safely enjoy the pleasure of the introduction of that purest of all streams, the Croton—in anticipation at least.

BOARD OF ALDERMEN.

August 1, 1836.

The following communication was received from the water commissions, which was laid on the table, and 500 copies ordered printed.

J. MORTON, clerk.

—

To the honorable the common council of the city of New York.

The water commissioners beg leave to lay before the common council a brief statement of the situation and progress of the great work they are engaged in, commencing at the date of their first entering upon the duties of their office, and continuing down to the present period. They have deemed this expose necessary, both for the information of the citizens generally, as well as that of your honorable body; the first being the source from whence the means are derived, and the second the legal check upon any improper use of those means.

Under the temporary act of the legislature, passed the 26th of February, 1833, the commissioners were only authorised to examine the feasibility and expense of supplying this city with pure and wholesome water, and by the authority given them by this act, they appointed Canvass White and David B. Douglas, esquires, civil engineers, to ascertain whether any of the streams or rivers, in the county of Westchester, would afford such supply, and the practicability and expense of introducing it. Mr. White, however, was prevented by sickness from performing his portion of the work, and it devolved on Mr. Douglas to make the necessary examinations. He reported to the commissioners on the first of Nov. 1833, that the Croton was the proper source; the quantity ample, the practicability of introducing it undoubted, the cost about five millions of dollars, and the time required about five years. He furnished them at the same time, with a large map of the country designating the several trial levels he had run, and the line finally fixed upon for the aqueduct from the Croton to the Harlem river, and from thence to the several reservoirs on the island of New York. On the 12th of November, the commissioners reported these facts to the common council, with such observations as the subject appeared to call for from them.

The act of the legislature, under which the commissioners are now organised, was passed the 2d of May, 1834. This act authorised a re-examination of the whole subject; directed the commissioners to agree upon a plan for introducing a sufficient quantity of pure and wholesome water in the city, and to report the same to the common council.

In the month of July following, the Common Council passed an ordinance appropriating $500 to defray the expenses of re-examining the subject and the commissioners immediately thereafter engaged David B. Douglas and John Martineau, Esquires, civil engineers, to make the necessary surveys and levels of the whole route from the Croton to this city. Mr. Martineau completed his work, and presented his report on the 25th January, 1835, and Mr. Doughlas on the first of February next thereafter—both reports were accompanied with maps and drawings in elucidation on the subject.

The report of the commissioners was presented to the Common Council on the 16th of February, 1835, and in the month of March thereafter, the plan proposed by the commissioners was approved and ordered to be submitted to the electors at the ensuing election for charter officers, in April; and it was adopted by the electors by a large majority of eleven thousand three hundred and sixty-seven votes.

In the month of May following, the Common Council passed an ordinance instructing the commissioners to proceed with the work, and authorised the creation of a public stock or fund, to defray the expense of carrying the said plan into effect.

On the 2d day of June thereafter, the commissioners appointed David B. Doughlas, Esq. their chief engineer, and directed him to organise a proper corps of engineers as soon as practicable. He reported as necessary to form said corps, 5 engineers, including himself, 5 rodmen, and 7 laborers and chainmen, who were duly appointed by the commissioners. The party, consisting of 17 persons, proceeded to the field of operation, and commenced work on or about the 6th day of July, 1835. They were directed first to run and stake out a line around the reservoir, to be formed by damming the Croton; the line to include one rod of land above that which would be overflowed by the backing up of the water of the river, and George W. Cartwright, Esq. was engaged to survey the land that would thus be overflowed, and to furnish the commissioners with maps of the quantity belonging to each individual.

They were next directed to stake out the line of the aqueduct from the Croton to the Harlem river, and also the width of the land required for building said acqueducts and culverts, and forming the necessary excavacations and embankments.

The commissioners are not authorised to use any of the land necessary for the works until it is acquired either by purchase or by appraisers appointed for the purpose by the chancellor. It was, therefore, important that they should be put in possession of proper maps of the land, both of that necessarily to be overflowed, as well as that on which the acqueduct was to be built, in order that they might inform the owners of the quantity wanted, and be prepared to negotiate with them for its purchase.

The quantity of land to be overflowed was furnished the commissioners by Mr. Cartwright, in the month of November, 1835, and they immediately commenced negociations with the owners for its purchase. They were enabled to purchase of the land around the Croton reservoir, two hundred and forty-one acres forty-four hundreths, and there still remain to be purchased or to be acquired through the intervention of commissioners, two hundred and fifty-four acres forty-eight hundreths.

The engineers spent the whole summer of 1835 at field-work, and did not leave that work until about the eighth of January, 1836. A party was then formed for office duty during the winter, consisting of eight persons, including the chief engineer.

The necessity of possessing the maps of the land, on the line of the acqueduct, was repeatedly urged on the attention of the engineers, but they were not completed when the time arrived for the party again to take the field, which was on the 11th of April, 1836. The whole line of acqueduct has been resurveyed during the present summer, being the fourth survey and level of the line under the direction of the present engineer, and as a reason why the maps were not prepared at an earlier day, we are informed by Mr. Douglas that some important improvements had been made in the course of the aqueduct, that would shorten the distance, and lessen the curves, and it was therefore only on the 11th of June, 1836, that we were put into possession of a portion of the aforesaid maps, and the remainder of them was furnished on the 17th of the same month.

The number of persons composing the engineer corps, now consists of seven engineers, including the chief, eight rodmen, and four chainmen and laborers, making a total of nineteen persons.

During the session of the legislature of 1836, a very strong remonstrance was presented to that honorable body by some of the inhabitants of Westchester, against the provisions of the act, authorising the necessary land to be taken by commissioners, and complaints were also made to the water commissioners, by others, that the act of the 2d of May, 1834, did not sufficiently secure their rights. The first complaints proposed,

1st That the legal possession and the use of the land should remain with the original owners, after being paid for by the corporation.

2d. That if the land was not used for the aqueduct, after being paid for, it should revert back to those from whom it was obtained.

3d. That provision should be made to prevent trespasses on the property of the inhabitants.

4th. That the persons through whose land the aqueduct passed, should have the

right to use the water, by allowing reasonable compensation for it.

5th. That the judges of the county courts should act as appraisers, instead of commissioners appointed by the vice chancellor.

The second complainants contended that the corporation ought to be prohibited from using the land required under the act for any other purposes than that of supplying the city with water, and should it not be used for said purpose, that it ought to revert to the person from whom it was taken, he paying back the sum received for it.—That necessary fences should be erected and sustained by the corporation, and convenient passes made under and across the aqueduct, where it intersects the land of an individual owner.

The remonstrance to the legislature by the first complainants, was effectually opposed by the commissioners, and no order was taken on it by that honorable body; but the complaints of the second appeared to the commissioners reasonable, and an act was accordingly passed on the 26th of May, 1836, embracing the aforesaid provisions, to which the commissioners could see no objections.

The commissioners were in hopes that the passage of the aforesaid act, would convince the people of Westchester that they were anxious to secure to them every right and privilege that could be reasonably required. It appears, however, that there are still dissatisfied persons among them, as by the proceedings of a meeting lately held at Tarrytown, it is said, a remonstrance in the form of resolutions was passed, which, among other inadmissible demands, declares in substance that the taking of their lands will be resisted and carried up to the supreme court of the United States, unless the corporation will agree to indemnify the citizens of Westchester from all damage they may sustain by taking their lands, together with all such other damage as may accrue to them now and hereafter; intended no doubt to include any loss they may sustain by theft or other crimes committed by persons employed on the works. If this is not the meaning, why is it that they oppose the act of 1834, which provides compensation for all damage sustained in taking the land or water or affected thereby? The 13th section declares that "In case of disagreement between the commissioners and the owners of any property which may be required for the said purpose, *or affected by any operation connected therewith*, as to the amount of compensation to be paid such owner, the vice chancellor of the first circuit may, upon the application of either party, nominate and appoint three *indifferent* persons to examine such property, and to estimate the value thereof, *or damage sustained thereby*."

How in justice more can be required than what the law provides, the commissioners are unable to perceive. If the corporation agreed to the demands made in the resolutions said to be passed at the meeting alluded to, it would in effect, as the commissioners view it, amount to the proclaiming of a premium for the commission of crime; for how many men would be found, under such circumstances, scrupulous about taking from another, what they wanted, if they knew they were not to be prosecuted for it; or how many of the people of Westchester are there who would take the trouble of prosecuting for any losses, when in order to be indemnified, they would only have to present their bills to the city comptroller for the payment of such loses?

The citizens of New-York, it is admitted, will be greatly benefitted, but at a very heavy expense. They are not the only portion of the community, however, who will reap advantage from the project. The city of New-York is the principal mart of these United States, and those who send the produce of their farms to this market for sale, or who come there for the purpose of purchasing domestic or foreign produce, will enjoy, as well as our own citizens, the benefit of a plentiful supply of an element of the first necessity, from the use of which they can feel assured that no injury will ensue to the constitution or the health of the partaker.

The county of Westchester is more particularly interested in this matter than any other portion of the State, except the city, and that in several ways.

First, by the increase of the population and prosperity of New-York, she is insured a good and unfailing market for all the surplus produce of the county.

Second, the land required for the work is chiefly of second rate quality, the price paid for it will be liberal, and will produce a greater income to the owner than what would be realized from its cultivation; and

Third, the large amount of money that will be expended in the county, will naturally tend to increase the trade of the place, and thereby not only benefit the farmer, but the merchant and mechanic also.

The unfortunate prejudices engendered by the proceedings alluded to, have prevented the commissioners from bringing any farther negociation for the land required to a favorable issue, and they have accordingly applied to the vice chancellor for the appointment of commissioners to take by appraisement some pieces of land belonging to James Griffin, James Palmer, Zophar Palmer and Joshua Purdy, lying in the vicinity of the site for the Croton dam, which application has been acceded to, and the business is believed to be in a progressive state.

It will be seen from the above that the principal obstacle now in the way of proceeding with the work is the difficulty to be overcome in obtaining the necessary land. The commissioners, however, are still in hopes that after the proper explanations shall be made to the inhabitants of Westchester, most, if not all these difficulties will be removed.

At a meeting of the commissioners on the 23d of July, 1836, the chief engineer was required to furnish them with plans and specification of the Croton aqueduct, the several tunnels throughout the line of aqueduct, the several embankments on said line, the several culverts on the said line the Croton dam, the piers and bridges for crossing the Harlem river, &c. with proper descriptions of the materials to be used, the manner in which they shall be worked together, and other necessary information preparatory to the making of the contracts: which he has promised to furnish as soon as practicable and the commissioners are in hopes that if they succeed in obtaining the land, to estimate the value of which commissioners have been appointed, and shall receive from the engineers the necessary plans and specifications, they will still be enabled to place some part of the work under contract before the close of the present year.

All which is respectfully submitted.

STEPHEN ALLEN, BENJAMIN M. BROWN, WILLIAM W. FOX CHAS. DUSENBBRRY, SAUL ALLEY,	Water Commissioners.

Office of the Water Commissioners, August 1st, 1836.

From the Albany Argus.

THE GEOLOGICAL SURVEY OF THE STATE.—It will be generally recollected that the legislature at the last session, made provision for a geological survey of this state, including an account of its botanical and zoological productions. This important measure was to be executed under the direction of the Governor, by competent persons to be appointed by him The outlines of a plan for this work, together with a specification of the objects to be embraced in it, were submitted to the legislature in an able and excellent report, made to that body by Gen. Dix, as Secretary of State. This plan has, with some inconsiderable alterations, been adopted by the Governor. The State is divided into four districts, and one principal geologist and an assistant assigned to each, instead of two geologists, as suggested in the report made by Gen. Dix.

It was supposed that it would be necessary to have a draughtsman for each district, but it is believed that a change in this respect can be advantageously made. The geologist and his assistant will be able to execute all the ordinary drawings, and the services of only one draughtsman will be required to execute the more difficult parts of this branch of the work. An accurate, minute and uniform analysis of the minerals, including mineral waters, and of the various soils of the State, has been deemed of great importance, and will be of evident utility. To ensure the best result in this respect, and to prevent the repetition of the same labor to some extent at least by each geologist, this department of the work has been committed to one person. The Governor has, we believe, taken great pains to secure to the State the services of persons in all respects well qualified for the duties assigned them; and has almost completed the list of appointments.

John Torry, M. D, Professor of Chemistry and Botany in the College of Physicians and Surgeons, New-York, &c., is appointed Botanist, and is to execute the botanical department of the survey.

Lewis C. Beck, Professor of Chemistry and Botany in the New-York University, &c., is appointed Mineralogist and Chemist, and has charge of that branch of the work which relates to the chemical analysis of the minerals, soils, &c.

James E. De Kay, M. D. author of numerous papers on the Geology and Zoology of the United States, has charge of the Zoological Department.

William W. Mather, for several years Professor of Mineralogy and Geology in the Military Academy at West Point, is appointed principal geologist to execute the survey of the first district. His assistant has not yet been selected. The first district is composed of the following counties—Suffolk, Queens, Kings, Richmond, New-York, Westchester, Rockland, Putnam, Dutchess, Orange, Sullivan, Delaware, Ulster, Greene, Columbia, Rensselaer, Albany, Schoharie, Schenectady, Saratoga and Washington.

Ebenezer Emmons, M. D., professor of natural history in Williams College, has been appointed principal geologist for the second district. James Hall, instructor in the Rensselaer School at Troy, is appointed the assistant. This district contains the counties of Warren, Essex, Clinton, Franklin, Hamilton, St. Lawrence and Jefferson.

Timothy A. Conrad, author of a work on the "Fossil shells of the Tertiary formations of the U. S.;" Monograph of the American Uniodeæ, &c. is appointed principal geologist for the third district; and Geo W. Boyd, M. D., curator of the N. Y. Lyceum of natural history, is appointed his assistant. This district includes the counties of Montgomery, Herkimer, Oneida, Lewis, Oswego, Madison, Onondaga, Cayuga, Wayne, Ontario, Monroe, Orleans, Genesee and Livingston.

The fourth district includes the counties of Otsego, Chenango, Broome, Tioga, Cortland, Tompkins, Seneca, Yates, Steuben, Allegany, Cattaraugus, Chautauque, Erie, and Niagara. Lardner Vanuxem, late professor of chemistry and mineralogy in Columbia College, South Carolina, has been appointed principal geologist for this district. The assistant has not yet been selected.

The following is a copy of a circular which the Governor, has furnished to the persons employed in the survey:

Albany, 25th July, 1836.

Sir—I take the liberty to introduce to you one of the gentlemen employed in executing the geological survey of the State, directed by the legislature at the last session. The importance of this measure in respect to our general prosperity, and particularly to the interests of the people in those sections of the State which are supposed to contain mineral productions, or in which valuable discoveries may be made, will, I trust, secure to them a favorable consideration in every place to which their duties may lead them. I confidently anticipate a readiness on the part of the inhabitants in every section of the State, to render to the persons engaged in this work, such assistance as will facilitate its execution.

The assistance which the geologists will be desirous of receiving, will, I presume, relate principally to information concerning localities which are interesting as connected with the objects of the survey—to the collection of specimens—and to the facilities which they may require in conducting the more difficult part of their researches. Those who are disposed to contribute in any manner to the accomplishment of this useful work, will no doubt be willing to confer with the public agents as to the manner in which they can best carry into effect their good intentions.

It may be that in the course of their researches, these agents will wish to extend their examinations beyond the surface of the earth. This will, in some instances at least require labor which it will not be in their power to perform. The legislature made no provision for an expenditur for such purposes, and unless those who may be immediately interested, should be willing to bestow the labor required in such cases, the advantages that might result from such examinations cannot be attained at present.

A careful and complete geological survey of the State, including a minute and accurate analysis of its minerals and soils, together with an account of its botanical and zoological productions, such as was designed by the legislative, is an undertaking of much labor, and although executed in the most economical manner, will be attended with great expense; but both of these, however, will be considerably diminished, if the gentlemen engaged in carrying this measure into effec should receive, as I hope, they will, the co-operation of public spirited individuals in various parts of the State.

Permit me to solicit from you such facilities in the prosecution of this undertaking, as you may find it convenient to grant to those who have been employed in executing it.

I have the honor to be, with great respect, your obedient servant,

W. L. Marcy.

From the Cultivator, for August.

PLANTING.—No. II.

Of the soils and situations most proper for planting, the treatise which we are consulting, "*Useful and Ornamental Planting*," particularizes—

1. Exposed waste lands, and those that are steep, rocky and precipitous. The loss to individuals, and to the nation, by such large tracts of land lying utterly unproductive, is incalculable.

2. Lands of better quality, which are unproductive by reason of their exposure to bleak winds. Cases are cited, where lands altogether unproductive before, have been brought to produce good corn and pasture, merely by a judicious disposition and arrangement of belts of trees to shelter the ground, and thereby ameliorate the climate.

3. Where the local soil and climate are good, a scarcity of timber exists, or is likely to exist soon, for the periodical wants of agricultural and manufacturing operations Here the planting may be confined to the angles of enclosures, belts on the exposed borders of the farm, as to the north, north-west and north-east, the bleak points of the farm-buildings, the borders of permanent divisions, and the highway side.

Every soil and climate are naturally adapted to the growth of particular species of trees. These indications of nature should be consulted, and trees growing naturally on similar soils in the neighborhood, or under a like temperature, should be selected. The work before us gives the analysis of various soils which had been planted as woodland, and indicates the trees which have flourished best upon each. On a sandy heath soil, containing but three parts in 400 of clay, incumbent on ferruginous stones, the Scotch fir, (*Pinus sylvestris*,) birch and beech succeeded well, and the last best when the subsoil was a deep sand. A poor sandy soil, seven parts in 400 of clay, was found congenial to the growth of the pine, larch, sycamore, &c. A sandy loam, with nine parts in 400 of clay, grew the larch and fir tribes luxuriantly, and also the beach. On a light sand, incumbent on clay, the oak and chesnut did well, and the elm tolerably so. A clay loam, on a clay subsoil, brought the oak to the highest state of perfection. On a damp clayey soil, incumbent on clay, the oak, elm, ash and horn-beam, attained to great perfection, and the tulip tree (whitewood,) grew free when the ground was trenched. A rich alluvial marsh soil, containg 32 parts in 400 of clay, and 40 of vegetable matter, is said to be capable of growing all kinds of trees, at least the following were found to thrive extremely well, viz. willow, alder, (some of the European species of these, grow to trees,) elm, sycamore, ash, locust, birch, oak, horse chesnut, Spanish chesnut, horn-beam, lime, &c.

In selecting trees for a plantation, reference should also be had to quickness of growth and value of product. Where it is exempt from the borer, these qualities are found eminently combined in the common locust, (*robina pseudo-acucia*,) with the further advantage, that it multiples rapidly by its roots. The oak, ash, beech, maple, walnut, baswood, plane, chesnut, elm, and many other native decidius trees, are readily propagated by seed, and afford profitable timber and wood. Of the coniferous trees, the seeds of several species of pine, larch, and fir, indigenous and exotic, may be readily procured. The Scotch pine and larch are particularly of thrifty growth, and are useful in the arts and on the farm.

The relative growth of several kinds of trees, during 17 years after planting, is shown below, as ascertained on a plantation of the Duke of Bedford, in England, upon porous soil. The measurement was meant to indicate the medium size, individual trees being found much larger. The last column of figures shows the height at which the several kinds are usually planted out, from nursery beds, in Great Britain.

	Girth or circumference at 2 feet from the ground.	Do. do at 7 feet.	Height in inches when planted.
Poplar,	41 inches	37 inches	18 to 36
Larch,	37 do	32¼ do	6 to 24
Pine,	32¼ do	25¼ do	6 to 20
Elm,	32 do	26 do	9 to 30
Silver fir,	28¼ do	25 do	8 to 20
Spruce,	27 do	22 do	
Chesnut,	27 do	22 do	12 to 30
Birch,	25 do	20 do	9 to 30
Sycamore.	24 do	20 do	6 to 30
Beech,	23 do	21 do	6 to 20
Oak,	23 do	13 do	6 to 30
Ash,	20 do	17 do	6 to 20

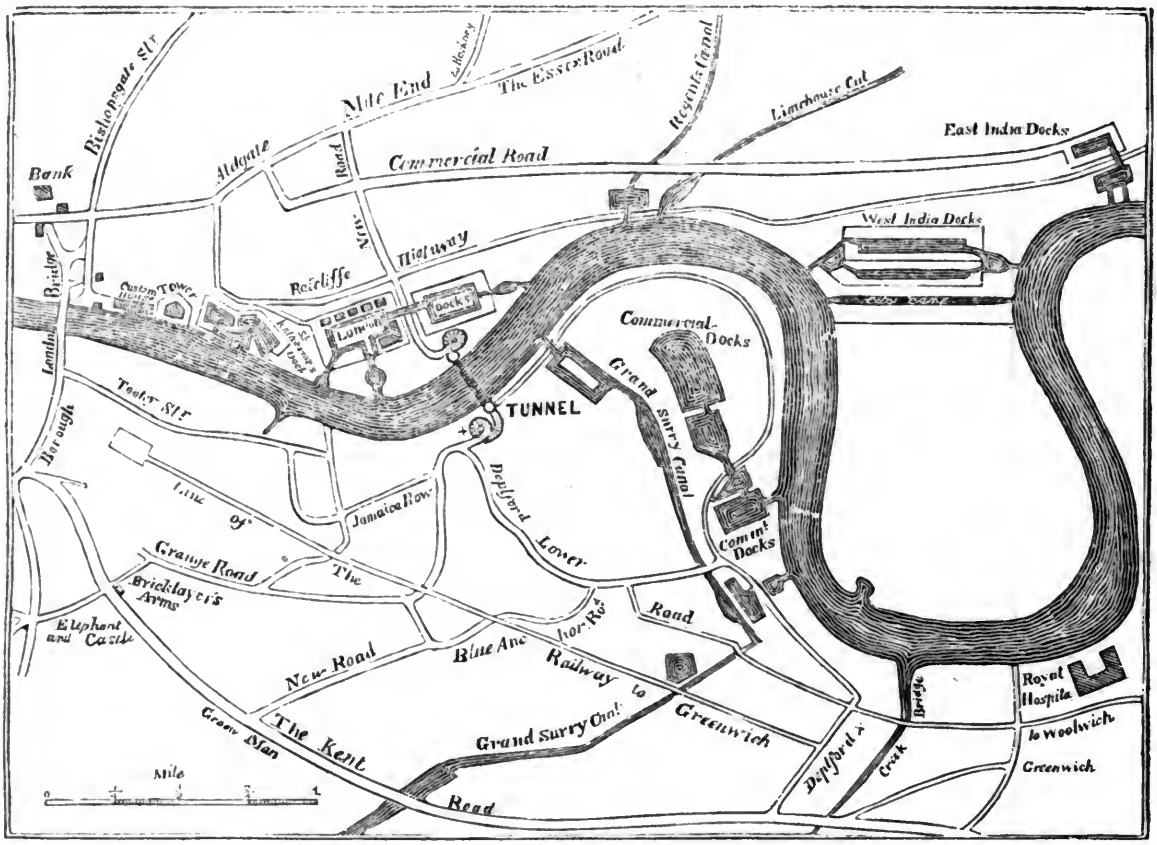
INTRODUCTION TO A VIEW OF THE WORKS FOR THE TUNNEL UNDER THE THAMES FROM ROTHERHITHE TO WAPPING.

(Concluded.)

The annexed plan will show the situation of the Tunnel with reference to the main roads leading to it.

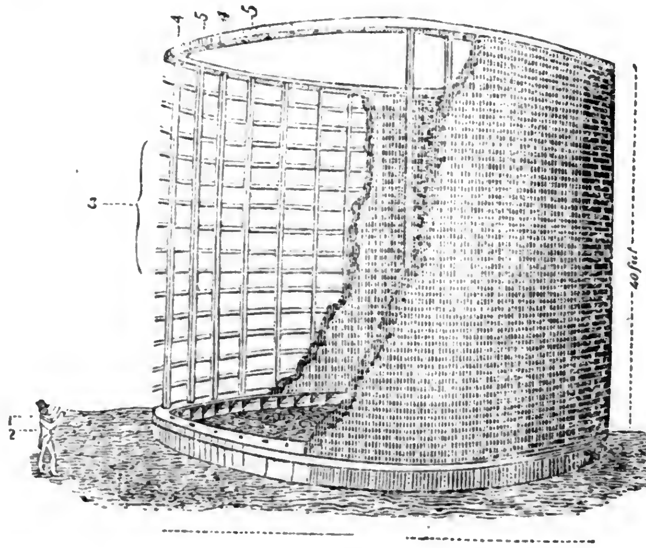
The distance from
- London Bridge along Tooley Street is 2 miles.
- The Great Kent Road - - - - - - - - 1½
- Greenwich Church by Deptford Creek 2¼
- Mile End Turnpike - - - - - - - - - - 1¼
- The Bank of England - - - - - - - 2

To facilitate the access to the Tunnel for the large population in its immediate neighborhood, it is intended to make the carriage descents circular, and they will not exceed in any part the slope of Ludgate Hill, or Waterloo Place, Pall Mall.



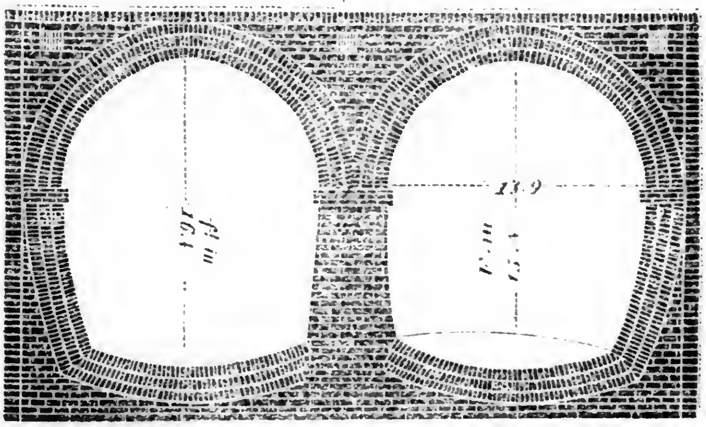
The shaft, from whence the Tunnel works are carried on, was built at Rotherhithe in the form of a tower, 50 feet in diameter, 40 feet in height, and 3 feet thick, at about 150 feet from the edge of the wharf, and it was sunk into its position by excavating the earth within. In the annexed sketch the brick-work is supposed to be broken open, to show its construction, and the numbers below refer to the different parts of that "tower," which now forms the shaft, and is intended finally to be occupied by an easy double flight of granite steps, for the use of foot passengers through the Tunnel.

1.1. The wooden rings or flat curbs.
2. The iron curb.
3. Hoops or laths binding together the uprights.
4.4. Iron rods enclosed in wood } screwed tight to the top and
5.5. Wooden rods - - - - - - } the bottom curb.



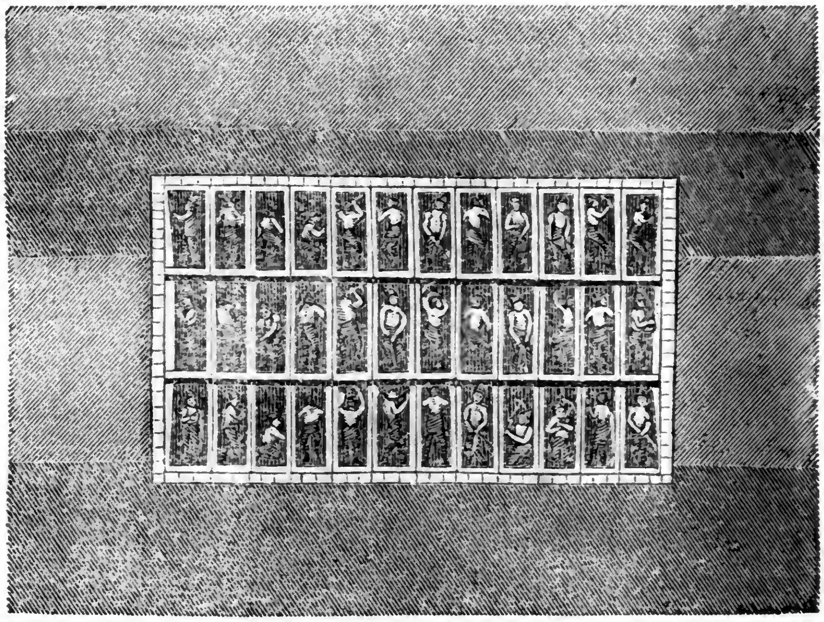
A transverse section of the Tunnel is here given, showing the dimensions of the mass of brick-work, which is all firmly set in cement.

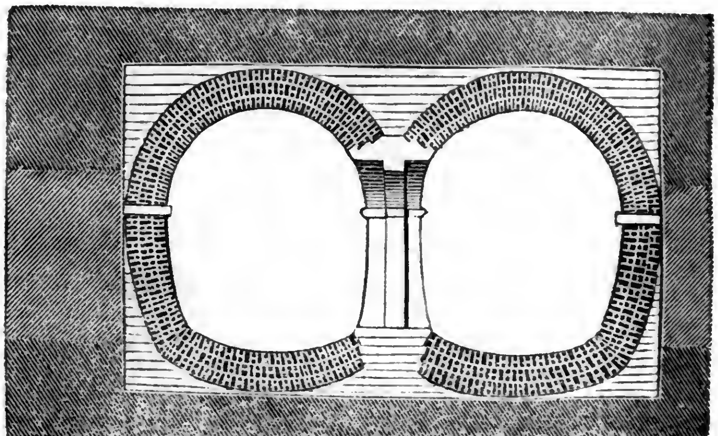
It must be observed, that the middle wall is, for greater security while in progress, built quite solid; but for convenience, light, and general effect, a succession of arches are opened in that middle wall, so as to admit of frequent communications between the two carriage ways.



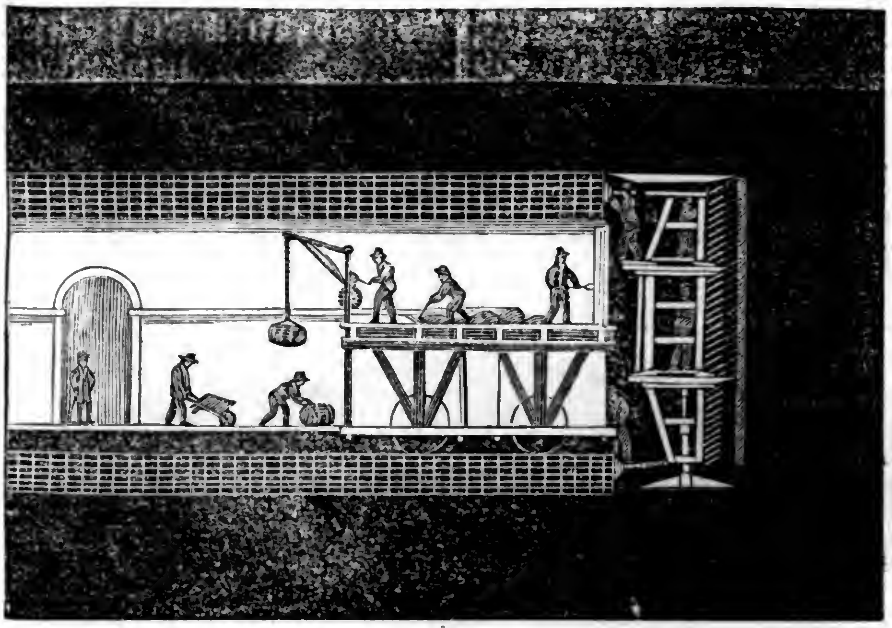
This view exhibits the workmen in the iron shield, with a transverse section of the archways which they build during their operations, showing us how they appear along the archways.

The dimensions of the excavation under the river are 38 feet wide by 22 feet 6 inches high; the whole area of which is constantly covered and supported by the iron shield in 12 divisions, which are advanced alternately and independently of one another; they have each three floors, or stages, forming a succession of scaffolding and cells for the miners and bricklayers during their operations.





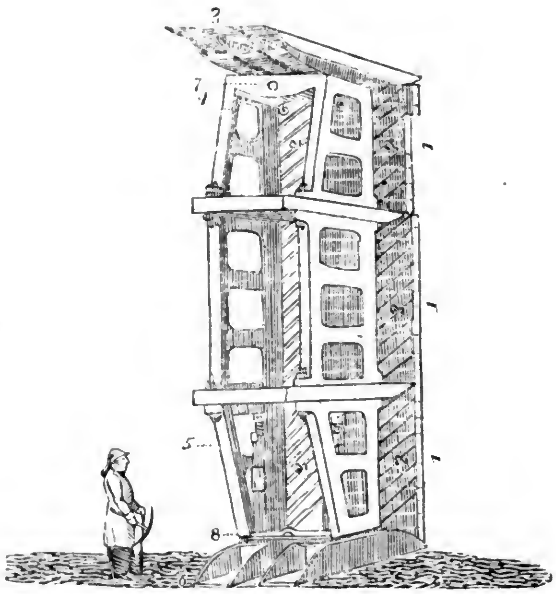
A longitudinal section of about 40 feet of the Tunnel, with a side view of the shield, and the miners as well as bricklayers at work. This sketch represents also the moving stage, with two floors, used by the miners to throw thereon, for removal, the earth they excavate; and where the bricks, cement, and other materials, are placed in readiness for the bricklayers. Towards the head and foot of the shield is also shown the position of the horizontal screws, a pair of which being attached to each of the divisions, and turned so as to press against the brick-work, are used to push each division forward.



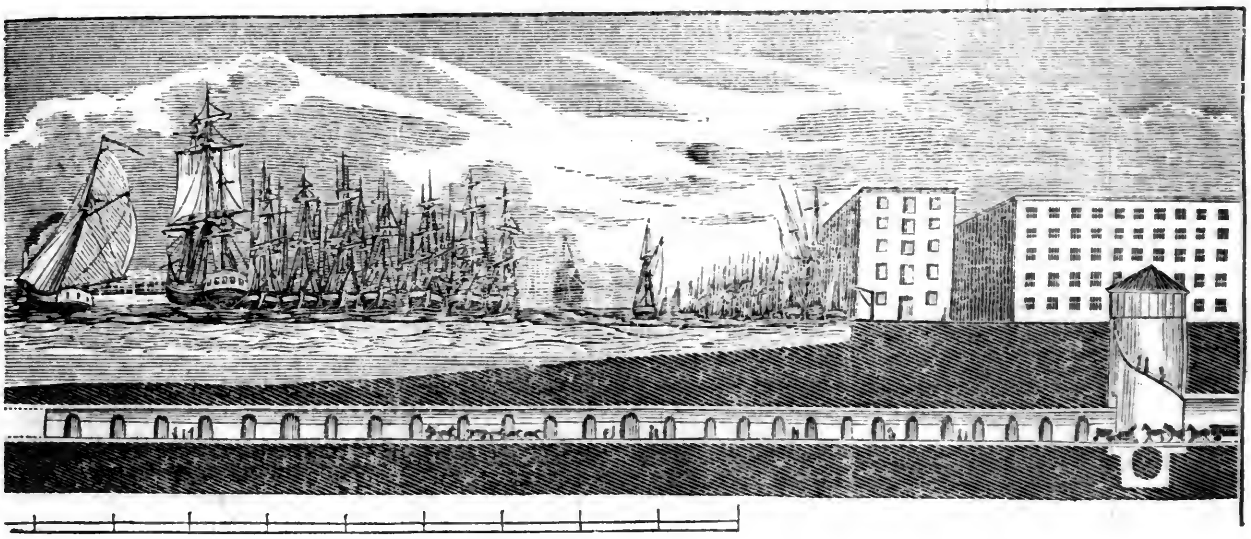
The divisions of the shield are advanced separately and independently of each other, by the means pointed out in the foregoing sketch: each division, as is attempted to be shown in the annexed design, has boards in front (known by the technical name of poling boards) supported and kept in position by means of jack screws, which are lodged against the front of the iron frame; these boards are in succession taken down while the earth in front of each is excavated, the first board being always replaced before a second is removed; thus forming a constant firm buttress. The several parts will be better understood by reference to the following numbers.—

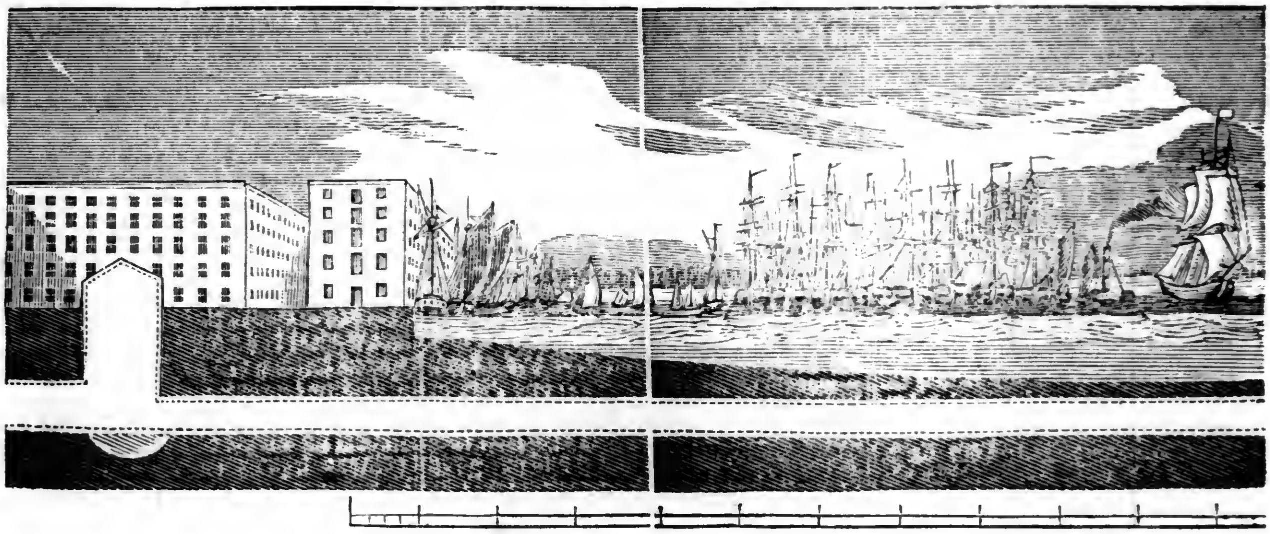
1. Poling boards.
2. Jack screws.
3. The "top staves" covering the upper part of the excavation, till the shield is succeeded by brickwork.
4. Screws to raise or depress the top staves.
5. "The legs," being jack screws fixed by ball joints to the shoes 6, upon which the whole division stands.

7 & 8. The sockets, where the top and bottom horizontal screws are fixed to force the division forward.



This transverse section of the Thames, with a longitudinal section of the Tunnel beneath it, shows the progress of the work to the extent of 600 feet from the shaft at Rotherhithe towards Wapping, with the openings provided to afford free communications from one archway to the other; the proportion of the work remaining to be executed, so as to complete the communication with Wapping, may also be here observed.





☞ The following is only one of many cases we heard, of farmers purchasing seeds when the venders know nothing about what they were selling.

SEED.

We have heard that for a year or two past, some of our farming friends have been horridly imposed upon in their seed. Cabbage and English Turnip seed having been sold them for Ruta Baga. One of our friends will this year lose from two to three hundred dollars in his crop, as he intended to have three acres of Ruta Baga, but they have proved to be English Turnips! Men who deal in seeds should be held responsible, especially when they purchase their seeds of Tom, Dick and Harry and then sell them as genuine. We only say at present that the seeds were not purchased at the Agricultural Ware House of Mr. Harlow. But unless some satisfactory explanation shall be given, we shall caution our readers against purchasing seed at the establishment where these were obtained.—Bangor Farmer.

Canajoharie and Catskill Rail-road.—We understand that there is a determination to crowd this important work to a speedy completion. This road aside from its general advantage, will be of essential benefit to the section of country through which passes, and when finished must add greatly to the prosperity of our neighboring village of Canajoharie—its northern termination. In this age of improvement, when capital and enterprize, public and private, are so much for the country, we rejoice that Old Montgomery is in a fair way to participate largely of the benefits of contemplated as well as existing works.

The "*Medina & Darien Rail Road,*" says the Herald is completed as far as Akron, Erie County, a distance of 16 miles, and several cars running on it. The road will shortly be completed to Richville, Genesee County, in all twenty miles, where it intersects the Batavia and Buffalo road.

AGRICULTURE, &c.

From the Southern Agriculturist.

AGRICULTURAL EDUCATION.

In one of our past numbers of this journal, we intimated our intention of preparing a series of essays on the subject of Agricultural Education. Though long delayed, the pledge has not escaped our memory, and we have been anxious, on more than one occasion before, to undertake and fulfil it. Our journal, however, has been well occupied with other matter, and whatever may have been our desire upon this point, we have not had, until now, the necessary opportunity for the execution of our task. The time has come, however, when we may make our promise good, and we proceed accordingly to a consideration of the subject, under the four following heads:—

1. The present and defective character of Agricultural Education in South Carolina.
2. The causes to which its defects are attributable.
3. The probable remedies for such defects, and
4. By whom such defects are remediable.

Our views on these topics must necessarily be discursive. They present too large a surface for very ready and effective concentration, and if we glimpse at them only, as they severally come up before our minds, it is quite as much as in reason, we may be expected to do.

South Carolina, from its first settlement as a French, and subsequently, as an English province, has been essentially and almost entirely agricultural. The laws of nature imperatively made her so. The spontaneous and liberal productions of the soil, designated to the most ignorant mind the purposes for which she seemed to have been intended; and the Indian, when our ancesters first discovered the banks of May River and Port Royal, was accustomed to plant his two grains of maize in one spot, precisely as our planters do at the present moment.* Her resources, from the first, seemed to be entirely those of agriculture and the chase. In all the usual objects of Spanish and French adventure, she seemed utterly wanting. Gold and silver seldom rewarded the greedy European who sought it on her borders; and the only gifts of the savages to their strange visiters, were their baskets of grain, and the free bounty of fruits and flowers. Laudonniere, the French explorer, was not unmindful of these things. Instead of doing as the Spanish would have done, and as they were in the constant habit of doing with the Indians, marching upon and burning their towns, and murdering the simple people for their scorched pearls and flattened breastplates of gold, he planted his little colony alongside of them, and set his men to labour in a like pursuit.† He may be said, however imperfectly, to have commenced our agricultural history; though it may be somewhat mortifying to us to discover that we have not greatly improved upon the current plans of that period, in planting, even to this very day. Nature has continued to be abundant, and we have been content to receive her gifts, very much as the savage did then, without requiting her for them. She has spared us one necessity in disarming or providing for all the rest—that of taking care of ourselves.

Such have been her gifts, and such always has been the prolific abundance of our soil and State. Our prosperity has been derived entirely from our agriculture, imperfect as it has ever been; and without any visible improvement in our arts of management, labour, or experiment, we have presented, through the agency of a productive soil and atmosphere, the appearance of a people which has always continued to improve. All our interests, whether they affect our gain, our society, our politics, local or foreign, take their complexion from our agricultural pursuits, and are prompted by them. All professions in our country are moved by those of the planter. In his success, they succeed—in his losses, they suffer. In his fate, the fortunes of merchant and mechanic, lawyer and doctor, freeman and slave, have their governing principle, and his importance is to be estimated by their dependence upon him, not less than by his own individual character and influence in the community. His successes determining, in great measure, theirs, does it not follow that in proportion as he is weak or enlightened, they will falter or succeed. In proportion as he is intelligent and industrious, will be their hopes of fortune, and their capacity for enterprise. In proportion as he is skilful and reflective, will be their skill, their reflection, their readiness for adventure, their elevation of pursuit and character—their virtue and their patriotism. The intimate connexion and close dependance of all pursuits upon those of agriculture, are happily comprised by Lord Bacon in a simple and brief sentence, in which he sums up the whole history of national prosperity: "There are three things," says he, "which one nation selleth to another—the commodity as it is yielded by nature, the manufacture, and the *vecture* or carriage; so," says he, "if the three wheels go, wealth will flow in as a spring tide." He places the three things in their proper order.—The planter first, the manufacturer next, the shipper third; and the sentence might very well be stuck over the door of every cotton and counting house in the country.* But there is yet a greater than planter, manufacturer and shipper, whom Bacon has not classified with the rest. He must be set before them all. He is *Labour*—a huge, heavy-handed giant, striking like a blind Cyclops, imperfectly and uselessly, until Art, a gift from Heaven, which should be protected, if not worshipped by man, comes to his aid, and directs his efforts, and makes him equally important to agriculture, to mechanics, and to commerce.—Through him they all triumph, without him not one of them could succeed.

We have labour—has art duly prompted and directed his industry? This is the question. Surely, these are truths—undeniable truths—which we have been uttering. Have our people learned them—do they believe them—have they adopted, and do they toil in obedience to the precepts which they teach? How far has South Carolina recognized, and how closely has she practised upon them? Let us ask the question. Let us look into the truth.

It is humiliating to know that we have made no such inquiries—we have been too regardless of these truths. Not sufficiently content with the bounty of providence to forbear complaint, we have yet been too well satisfied with what she has given us, to have laboured at improvement. We have left undone a thousand things which should have been done, and we need not wonder, if there should come a time, when the wholesome truth comes home to us, and the stern rebuke of heaven places our present diminution of the goods of fortune to our own account; charging us with a neglect of our proper duties of self-instruction and self-devotion to our own and the general interest of the country. Look back at our agricultural history and enterprise, and how gross are its defects. What have we learnt?—What do we know?—Where are we now? Are we a solitary year in advance of the first settlers in the matter of Agricultural Education. We fear not. What are our improvements; and what is the estimate which we are accustomed even now to put upon agricultural knowledge? Is it not regarded as the merest matter of common place industry and effort, which calls for an overseer, not a guide—a spy rather than a teacher; which needs no art to prune, no precaution to provide against the vicissitudes of the season, no reflection to devise new improvements, or convert into proper channels, the well known and the old? Is not such the estimate commonly put upon agriculture—the very first of the arts—mingling the necessary with the useful, the useful with the grateful, the grateful with the elegant, the elegant with all others? There are very few persons who consider it a profession, requiring any intellectual exercise whatever, and, compared with its sister arts, we may venture to affirm, that, although the very highest in importance, it is yet the very lowest in point of rank. True, we honor the planter as one who is a good citizen—who has wealth and the influence which wealth produces—who is frank in his intercourse with men—who is hospitable to the stranger, and who gives to our society a character and temper, which we would not willingly see exchanged for any other. But there is little more. When we have said this, and said in addition—he cultivates so many acres, owns so many slaves, hunts as fearlessly as Nimrod,

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* See Laudonniere's Voyages.

† The narrative is quite an interesting one which describes the mutiny of his men who desired to explore the neighboring places for gold, preferring piracy and robbery to the wholesome cultivation of the fields. They stole his boats and made away with them, but were punished in the end. The ringleaders were caught afterwards, and hung by him.

* The words of Bacon have been rhymed as follows:

"Let the earth have cultivation,
Let its products have creation,
Bid the seas give circulation,
And you build the mighty nation."

And yet, unless you give the people education, they would be knocking out one another's brains with their own working implements.

drinks of the best wines that the Champagnes of France produce, as deeply as Mynheer Van Dunk, and with as perfect impunity—that he entertains his friends with a grace that even gives a charm to his entertainment—lives up to his income, yet keeps out of debt; travels like a prince, and never challenges the bill—when we have said all this, we have said all. His virtues and vices, his toils and his pleasures are, alike, set down, and the Agricultural Society may foot them up at pleasure. To him it matters not much what is the precise character of the soil which he cultivates—he asks not the history, he observes not the constitution of the plant from which comes all his revenue.—It is not his concern upon what principle of mechanics his workmen, his horses, mules and oxen, apply their labor; nor does he deem it his part to know by what particular tenure he holds his lands—or upon what great principle, his rights, as a citizen, are maintained. He is too apt to avoid all trouble and concern on these topics. Public opinion expects from him no knowledge on any of them, and he may live in total ignorance of the whole history of his own country, past and present, yet, in no wise offend the judgment of those who move around him. Let him but pay his taxes, he may vote—let him but speak civilly, he is a good citizen—let him but show a whholesome warmth on the subject of his public relations, he is quite as pure a patriot as any in the republic.

Nor, in public and national respects only, may he live in utter ignorance, and live without offending popular opinion.—Contract the sphere of your observation, and see him at home. He may be totally uninformed of those matter which more immediately pertain to his own plantation and its government—sometimes, indeed, he may be even found to despise them, as unbecoming in him to notice, or unworthy of his esteem. And this course of conduct, though in such exceeding bad taste, would call for no rebuke from the general feeling, and would, indeed, rather accord with, than revolt, the public opinion. We are somehow strangely given to regard all labours which employ time, and compel exertion, as inconsistent with a proper gentility.—Noble blood will not trade in merchan lize—can it be expected that noble blood will sow and reap, and devise modes and means by which the arts of sowing and reaping shall be strengthened and improved? There must be a revolution in our thoughts, in our habits of thinking, before we can hope for improvement. Our planter, himself, must make a change—he must not wait for the spirit of enlightenment—he must go forth and seek it. Public opinion must keep pace, and go with him in such a pursuit, for, whatever may be the achievements of the individual, he will inevitably fall back into old lethargies, unless stimulated by the belief that the world around goes with him—that all are stirring in the same fields, and that if he does not push forward inflexibly, fearlessly, thoughtfully, he will be left behind in the grand march of enterprize, alone—stagnating and stiffening—where he stands.

The exertion must come from the planter and the planter only. The movement of other craftsmen will never move him.—He must move himself. With us, he is the man who gives the tone to public sentiment. Why? He is the great proprietor known to the country. The capital of our State exists in the soil, and the serfs who work it. They are his. He wields that capital, and that capital makes our feelings, our opinions, our character. To plant is to engage in the highest craft known to our people. It is the object of ambition with all. It would not be so if the influence of the planter were an iota less in business and society.

How does he employ this influence? Let him ask himself the question Could he make it greater—could he employ it in making a better population among our inferior classes, and what should be the aim of the moral man in his direction of the vast moral power which he certainly may wield over our society, and through it over our institutions? There are other questions which it may serve him beneficially honestly to analyze, and justly to resolve upon Why is his influence less now, than what, under a proper direction of his energies and thoughts, it might become? The evil and the error is with him. He has himself to blame--none other. The man who places a low estimate upon his own pursuits, cannot surely complain that others receive him at his own valuation. He has suffered the mechanic to regard his craft with more respect, and to direct more of heart and mind to the promotion of it, until he learns to love the toil which gives him strength and power. You may see the mechanic with his badges of plane or hammer upon his apron—you will never see the plough drawn upon the panel of a planter's coach. He boasts of his negroes and his hands. Does he take up the hoe and plant himself—does he regard them, as such old and long tried friends might well be regarded, with respectful veneration? We fear not. He will avoid the subject, and is sometimes apt to disparage it. He has not availed himself of that beneficial and blessing Providence, which has given him a mind able to direct the sinews of labour--he has suffered it to lie waste and fallow, until, through neglect, it has grown as bald and barren as the soil which he has impoverished by the opposite extreme of too much use. Had he used the soil less, and the mind more, and used both of them differently, they had, both of them, been more valuable at this moment. It is truly melancholly to think that these are truths which we are writing It is sad that the planter—he who owns three-fourths of the State's wealth, and all of its political power—who pays more than one-half of its revenue—should be at the same time of so little real public importance. Why will he not consider these things. Why permit the subject to remain uninvestigated. Why not provide a noble answer, in a new design of a proper and masculine exertion?

We shall now seek to show that this degrading condition of things has arisen necessarily from the defective character of our Agricultural Education—if that can be styled education which fits our people for any thing but what they are to become, and any pursuit but the one which most directly lies before them.

What is the education of our young planter—or rather, what is the education of him who is to become a planter? Is it ever adapted to the end in view—is it ever calculated for his pursuit? Is it not radically defective, as it lacks all connexion with the pursuits of his future life, and as it is rather apt to lead his thoughts away from a consideraiton of it into far and foreign channels.

Let us take an example. There is a planter whose resources are such as will enable him to give his children, what is is styled, by a frank republican courtesy, a liberal education. The boy, as soon as he is old enough, is bundled off to school.—The neighboring city receives him, and from the hands of indulgent but watchful parents, he is transferred to the always uncertain care, and the doubtful management of strangers. He goes to be schooled—not with reference to his pursuit as a future agriculturist, but simply with reference to his importance as the son of a wealthy planter. The distinction is wonderful between the education which a poor and a rich boy receives in the world, at school and out of it, when the difference of their condition is known to those about them. It is frequently ruinous to the one—it is often a blessing to the other; but the vanity of a parent would be apt to insist that his son should be treated with a reference to his own importance, and this vanity blinds him usually to the true interests of the boy.—The son, himself, very soon learns to exact rigorously the defference commanded by his father's income; and under circumstances such as these, his education,—that course of preparation which is to bring his native mind into activity, inform it with all necessary and existing knowledge, and counsel it for the labor which in future life it is to take, and the patterns and purposes which his pursuits will require him to adopt—under these circumstances, which prompt self-conceit, stubbornness, and a total want of all method—his education is begun.* He goes to the city, and, in most cases, is suffered to choose his own lodging house, his guardian, and his associates. His caprices take the place of the experience of others, and his first lessons of obedience are fully begun by his having his own way at the beginning. He attends a regular, or, not unfrequently, an irregular teacher, and is himself a most irregular pupil.—He goes through his recitations or not, and as his parent does not often examine, he is not often dissatisfied with the reports of son and tutor. The teacher does not often inquire what shall be the pursuit and profession of the youth. Indeed, he is not often permitted to do so. Nothing can be more arbitrary or so little adapted to the wants or capacity of the boy, as the course of instruction which he put upon. He is required to conjugate Greek and Latin verbs, and a passing glimpse at Greek roots,

* Refer to Gillie's Greece for an excellent summary of the Laconian methods of education.

is all that is ever taught of roots at all to the future agriculturist. He manages, by dint of *driving*, *drilling*, and possibly occasional *dressing*, (all of these italicized words to be used in the technical, school, and not in a plantation, sense) to make his way after a lapse of years into and through the easier authors of antiquity. Without appreciating any of their beauties, and in half the number of cases without comprehending their meaning, he proposes to be, and is, by the courtesy of Professors, ready for admission into college. College! That mysterious institution which is to convert the block into the classcal shapes of ancient models, and imbue the tough and insensate clay with the creative fires of Prometheus. By this time his moral faculties have all become admirably fitted for his admission into walls so sacred. He is free to licentiousness. Rudeness is manliness—obtrusiveness, proper spirit, and violence the only genuine show of high mindedness and a glorious southern fervour. With no parental eye to watch over, to guard his education—his morals and his manners are alike the creatures of his sudden and forward impulses. He has no masters but these last—he has no motive but the indulgence of his long unbridled passions. From college, if not expelled for turbulence and brutality, he passes on to graduation. His education is complete, and he may now choose from all the professions which surround and invite him. Nobody can doubt that he will succeed admirably as a Divine, a Doctor, or a Lawyer—fewer still are there who will venture to deny that he will make a first rate Agriculturist. He, himself, has no doubt upon the subject. He can chop logic with his master, discuss all manner of subjects, quote an occasional passage in the Greek and Latin, blunder over Euclid, and moderately fracture the head of Priscian. He is prepared for life and all its purposes. He is ready to encounter its vicissitudes—his ambition, which is boundless, gives him daring enough to engage in any vocation, and he begins the world, perfectly well educated after the fashion of the time, and destined to add another to the long generations before him, which have lived and died, and left no sign at their departure. He can do nothing for the craft which he adopts—it must degenerate in his hands. He cannot raise his caste—he may impair and possibly degrade it. His country derives no good from his patriotism—an education like his makes an egotist only. Society suffers in his connection, for he subjects it to his caprices.

The cause of this is obvious enough, if we would but see. His education, faulty in all respects, is entirely and doubly so, as it has had no manner of reference to his possible pursuit in life. From the beginning he has been toiling in the dark. Through the whole course of his tuition, though his tutor has probably never forgotten that he was the son of a planter, he has probably never kept the fact in mind that the boy was to become a planter also. Agriculture, its condition, its elements, its instruments, its uses, and connexion with all other topics, has never been insisted upon. It was the very last subject, indeed, which he was likely to hear of at school. If his own mind from previous bias and association, exhibited any tendancy towards the subject, he would in all probability find himself discouraged from any investigation of its principles, and among his city mates, his chance would be great, if he showed any large disposition that way, of being laughed at, for what they would be apt to call his inflexible rusticity. When he assumes the robes of manhood and begins to look about him—confident as he has been before about the universality of his genius he now begins to have misgivings. He is a planter and he is called upon to apply his education to his business. What a discovery is that which shows him, not merely the utterly unprofitable character of his education hitherto, but shows him that he is to begin anew—that now, for the first time, he is really to commence his schooling. What connection had his college education with agriculture—how did it expound its laws—how, explain its principles—how, illustrate its practices and unfold its history? He is now to commence with the elements of his education, when he is engaged in the more serious business of his life. Its doubts and difficulties are all before him, yet he is now to prepare himself for that field of enterprize, in which the self taught adventurer is already reaping wealth, and establishing character.

But we must give way to other matter, and leave our disquisition over to another day.

From the Maine Farmer.

A DISH OF "SCRAPS, ODDS AND ENDS."

MR. HOLMES:—Brother Carolus *thinks* we must "convince" farmers "that the course pursued by our fathers and grandfathers in relation to husbandry, is not the best course"—and he then enumerates a number of particulars, of the truth of which it is necessary to convince them of. That is true, brother Carolus—but how shall we go to work? You say, and say truly, "it would seem that many believe the exercise of the mental and physical powers have no connection in the business of husbandry, that our fathers and grand-fathers *thought* all that was necessary for mankind to *think* on the subject, and that nothing remains for us but to *work*, *work*, *work*, without even *thinking* we have the power to *think*."

Now, if I understand the subject aright, so far as writing and reading are concerned, it is in vain for us to *think* of getting people to *think closely* on any subject, unless we can get their attention *closely* fixed upon it. We must interest their feelings. How is this to be done? I answer, by addressing them in such a way as to touch the master springs of human actions. These, though there is a general likeness in human nature, are infinitely diversified. One person likes a short pithy story; and indeed, in this particular there is much uniformity—another is pleased with the solution of some obscure problem, or a long chain of reasoning and argumentation on some favorite topic—another has a relish for poetry, music or painting, &c. For want of attending to these truths some men who have excelled in knowledge in the arts and sciences, have labored almost in vain. Neither their oral or written addresses contain what, in a mental point of view, is well represented by the electric fluid in the world of matter—a living energy—a vitality of thought and feeling, which sets all the elements of the mind in motion. But to apply this subject to agricultural papers and writers, let no one suppose me to mean, that it is necessary every correspondent of the Maine Farmer should be possessed of this exquisite feeling—this fire of the soul—this flow of pathos and sensibility. This is not necessary. People love variety. The appetite of the greatest epicure is palled by his seasoned dishes. The fact is, people love variety, and variety they will have. And one thing we must remember—Man is a bad animal to drive. I frequently think of what a very respectable Quaker once said to me, "Joseph, don't thee know hogs are the most like other folks of any animals in the world.—Gratify their appetites and they will follow almost any where."

But when a man's feelings are once deeply engaged in the pursuit of any calling, he is then prepared to listen to the relation of facts and reasonings on the subject; and what would be insufferably tedious to uninterested feelings, is delightful and pleasant to his more ardent ones. And these views afford a lesson to all the correspondents of the Farmer. Do not think because you cannot write with that fire of thought and feeling which almost makes the ink smoke as it flows from the pen, that your communications are devoid of interest. I do not recollect a single communication in the Farmer, relating to the theory and practice of agriculture, which has been uninteresting to me, and which I have not read more than twenty times over. And to those who have the talent of pleasing, either by a polished, or the happy application of a more common every day style, it calls upon you, in the most emphatical manner, to awake from your slumbers. Oh, Ichabod, awake!

RAISING PORK.

Carolus says, we "must convince farmers that three good cows are better than half a dozen poor ones; and so of all other stock." I once was acquainted with a fact, which illustrates the truth of this sentiment. In the town of Fairhaven and State of Massachusetts, something like twenty years ago, there lived an old gentleman, a neighbor of mine, who was remarkable for raising good pork. One year in particular I remember he bought two pigs in the spring (for I never knew him to winter any swine) and killed them the same autumn or beginning of winter. I cannot tell exactly their age when killed, but my reccollection is very clear, that they were not much over ten months if any. One of them weighed three hundred and eighty pounds or something over, and the other fell short a few pounds, say five or six, of the weight of his mate. These were barrows. Some two or three years after, his son after his decease, killed a sow, about the same age, that weighed 320 lbs. She was a small

boned hog, but I thought quite as fat as those killed by the old gentleman.

I can say but little how they managed with their swine, but can state one fact which, perhaps may enlighten the reader as much as the whole story, could he hear it. I saw the son one day feed his, and as he then had leisure he gave his sow a little at a time, as long as she would eat, and left a little, which he scraped out clean and put back in his pail. The food at that time was a very nice pudding made of boiled potatoes, mashed and minced with meal. My inference from this fact is, it was his principle to cook the food, and then give them as much as they would eat and no more.

The old gentleman sold one half of one of his hogs for 12 1-2 cents a pound without salting. Assuming this price as the value of each pork in that market, at that time, and allowing his two hogs or pigs to weigh 750, the two were worth when killed $93 37 1-2. Now had these two swine weighed only 200 each at the age these were killed, they must have been good meat, but we could not allow them to have been worth at that time, in that market, more than ten cents a pound. This would only have made them worth $40, and the excess gained by extra care in feeding, &c. $53 37 1-2.

From the Maine Farmer.

DAIRYING.

The first and very important measure is to provide a sufficiently large and convenient dairy house, whether the object be butter or cheese. It should be proportioned to the number of cows, and be sufficient for performing all the necessary operations without embarrassment.—"Much attention must be paid to cleanliness in every thing that relates to it, such as the shelves, floors, and different implements which are made use of, by daily scalding, scrubbing, rinsing, and drying, in order to prevent any sort of acidity taking place; for without due regard in these respects, it is impossible that the produce can be of superior quality, or such as will keep sweet and good for any length of time. Cleanliness is the least indispensable part of good management." "A Farmer may have the most valuable breed of cows, and they be fed on the richest pastures, but unless cleanliness prevail in the dairy, his butter or cheese will never stand high in general estimation."

This building should be placed over a cool spring, and trees planted round it for shade. Where there are no springs, the house should be built near the dwelling house, and an ice house close to it. All the utensils connected with the dairy, must be kept perfectly clean. The milk pans may be of any convenient width, but not to exceed *four inches in depth.*

"The milk should be strained *into the pans as soon as possible* after it is taken from the cow, and with as little *agitation as possible*, and where the dairy is large a pail full, as soon as milked, should be strained into the pans. Great loss is sustained by agitation and cooling, and this mode more particularly enables the owner of the dairy to separate the good milk from the bad. Without such attention the whole of his dairy products may be greatly depreciated by the milk of one bad cow." The quantity of butter must depend on the quality of the milk, as well as the management of it; it is therefore important to separate the inferior quality of milk in the first instance, as it secures the best quality of butter: and the inferior may be converted into the use that is found most profitable. There is not only a difference of milk in different cows, but a *differance in the same cow.*—For a more perfect view of this subject, the reader is referred to the Maine Farmer for 1st July.

The following is the opinion of Dr. Anderson, a contributor to the Bath Papers on agriculture. "The writer is satisfied from experience and attentive observation, that if in general, about the first drawn half of the milk is separated, at each milking, and the remainder only set for producing cream, and if that milk is allowed to stand to throwing, the whole of its cream, even till it begins sensibly to taste sourish, and if that cream is afterwards carefully managed, the butter thus obtained will be of a quality greatly superior to what can be usually obtained at market, and its quantity not considerably less, than if the whole of the milk had been treated alike. This therefore is the practice that is thought most likely to suit the frugal farmer, as his butter, though of a superior quality, could be afforded at a price that would always insure it a rapid sale."

THE DEGREE OF HEAT PROPER TO RAISE THE MOST CREAM.—The precise heat has not been fixed by experiment, but "from the trials that have been made on this subject, it is believed, that when the heat, is from 50 to 55 degrees in Fahrenheit's Thermometer, the separation of cream from milk proceeds with the greatest regularity, and in the most favorable manner. When the heat exceeds 60° the operation becomes difficult and dangerous; and when it falls below 40° the operation can scarcely be carried forward with any degree of economy or propriety."

ON THE PROPER TIME FOR SKIMMING MILK.—It is the opinion of some of the English writers, "that for *very fine butter* the milk ought not to stand more than 6 or 8 hours; for *ordinary good butter* 12 hours or more."

SKIMMING.—This requires a dexterity that can be acquired only by practice, but it must be well done, for if any part of the cream is left, the quantity of the butter will be diminished, and if part of the milk is taken, the quality will be the worse for it.

THE MODE OF KEEPING CREAM.—When the cream is separated from the milk, it ought to be put *immediately* into a vessel by itself. No vessel can be better adapted for this purpose than a neat made wooden barrel, in size proportioned to the extent of the dairy, open at one end, with a lid exactly fitted to close it. Close to the bottom, should be placed a cock, for drawing off, from time to time, any thin serous part of the milk, that may have generated, which, if allowed to remain, acts on the cream, and greatly diminishes the richness in the quality of the butter. The inside of the opening should be covered with a bit of close fine wire, to keep the cream back while the serous is allowed to pass; the top of the barrel should be inclined a little forward.

ON THE TIME OF KEEPING CREAM BEFORE CHURNING.—Epping butter is in high repute for its superior quality, and "the cream is seldom kept above 3, or at the furthest 4 days, but always till there is a certain degree of *acidity* in the cream either *natural or artificial,* as without it they cannot ensure a good churning of butter; some keep a little old cream for this use, otherwise a little rennet:"—

In Suffolk in a large dairy, with a high character for making butter of a superior quality and where the butter was to be sent *directly* to market, the cream was churned the second or third day, but when it was to be salted, it was kept a day or two longer, or till it had acquired a certain degree of acidity. The reason assigned was, "that butter from the freshest cream was better and pleasanter to the taste, but that which was kept longer would take the salt better."

From the result of the experience in England, and experience and observation in this country, it is well ascertained, that *acidity* in the cream is absolutely necessary before butter can be produced. It is for this reason that it is difficult to produce good butter in winter. Heating the cream with warm water is a common practice, and it is a long while before the butter is produced, and is usually white, hard, and bitter, with very little taste. The writer has in times past mixed, in winter and spring, used a small quantity of vinegar which has never failed to produce of a good effect. But the Epping practice of using rennet is recommended. If acidity in the cream is necessary, and this is acquired by standing, the following course is suggested to prevent the churning of *new* and old cream at the same time.

If the dairy is large and cream is churned three times in the week four vessels to hold cream should be provided and two day's cream put into one, say Monday's and Tuesday's, and churned after the acidity has taken place, and the amount of the acidity must be regulated by experience.—An extract from Dr. Anderson will close this head. "The separation of butter from cream, only takes place after the cream has attained a certain degree of acidity. If it is agitated before the acidity has begun to take place, no butter can be obtained, and the agitation must be continued until the sourness is produced, after which the butter begins to form. In summer, while the weather is warm, the beating may be continued until the acidity is produced, so that butter may be got; but in this case the

process is long and tedious, and the butter for the most part, of a soft consistence, and tough and gluey to the touch. If this process is attempted during the cold weather in the winter, butter can scarcely be in any way obtained, unless by the application of some great degree of heat, which sometimes assists in producing a very inferior kind or butter." The judicious farmer should not attempt to imitate such practice, but allow his cream to remain in the vessel for keeping it, until it has acquired that proper degree of acidity that fits it for being made into butter with great ease, and by a very moderate degree of agitation; by which process only very fine butter can be prepared.

Churning.—The process of churning is necessary to force out the serous fluid from the cream in order to produce butter. This is done by agitation and in a churn. There are various kinds of churns, but the best churn is the one that will preserve the proper temperature, or the same temperature that is in the churn and cream when put into it. In warm weather cold water for some time is to be put into the churn, and in cold weather scalding water, and also putting hot or cold water in the cream according to the season. As it is important to preserve the same temperature while churning—the best churns are those which are used in an horizontal position—such as stationary barrel with dashes to move in the inside. A small churn is in use on this principle, and answers a good purpose, as a hole of sufficient size from one half an inch to an inch, may be made on the top, to let out the warm air produced by the agitation of the cream, and to admit the cool air. A barrel churn of this kind has been used, when 36 to 38 lb. butter was made twice a week. An extract from Dr. Anderson is given to show great care is needed in churning.

"In the process of churning greater niceity is required, than most persons are aware of, a few hasty irregular strokes may render the whole of the butter of scarcely any value, and, but for this circumstance would have been of the first quality."

Making up the Butter.—It is not necessary to describe the common mode of preparing the butter for market, when taken from the churn. The object is to take from the butter all the serous liquor—which is done by letting it off, and washing the butter by the change of water until it is pure, and not discolored. The advantage of the churn above recommended is going throuh this process without the use of the hand—and working the butter after it is separated from the serous liquor. Even the salt may be worked in, in the churn. If butter worked in a barrel churn where was put ½ an ounce of sugar, salt petre and salt to a pound of butter into the churn and when well worked it was put in thin layers in firkins with another ½ onuce of the above spread on each layer. This butter was sent to the West Indies, and a firkin was kept until the vessel returned with lumber from a Southern port, and was in prime order.

It is agreed by all good butter makers "unless the milk is *entirely taken away*, the butter will infallibly spoil in a short time, and if it be *much worked* the butter will become tough and gluey, and it should be salted *as soon as the milk is removed*."

C. V.

From the Genesee Farmer.

OMITTED DEPREDATORS, BY OBSERVER.

Mr. Tucker—I perceive that a correspondent of your valuable journal has been furnishing you some papers on those beasts, birds, and insects, that detract so largely from the profits of the husbandman; but there are two of the most prominent ones he seems to have overlooked, and the object of this paper is to bring them before the readers of the Farmer, that their just deserts may be awarded. The first of these nuisances and pests of the farmer, is the Dog. Altogether they are most worthless and useless. Take them from the highest to the lowest, from the mastiff to the lap-dog—puppy, whelp, hound, and cur-dog—all should by the farmer be placed under the ban of proscription, and banished from the premises. To use a common phrase, they all cost more than they come to; and if they are sometimes found useful, such instances are the exception, not the rule. That the dog has exhibited at times noble qualities, I do not deny; but the question with the farmer is one of profit and loss, and if he keeps a dog he should keep him for the same reason that he keeps a horse or an ox, because he is profitable. But, says one, "I cannot do without a dog; I must have one to drive hogs from my door, my yard, or my sheds; I must have one to keep my own creatures and those of my neighbors' out of mischief; to watch my house and barn and keep off thieves and vagrants." Well, then, keep a dog, but let me tell you that if you rely on a dog fence, neither your dog or yourself will find the business of keeping creatures out of mischief a sinecure. No, kill your dog, and instead of relying on him, put up your fence as a farmer should—do not leave rails off, or your fences down, to invite cattle to be unruly; kill your dog, and my word for it, unless your experience should be very different from mine, the two barrels of soap you may annually make from what your dog would eat—that is, if he is properly fed at home, and not left to prowl over the neighborhood and steal his living—will more than pay for all you will have stolen from you. It is a fact which will not admit of dispute, that the dogs in this State will kill more sheep, and in this way injure the farmer more than all the wolves to be found in our limits, and to reward the killing of which, much money is and has been annually paid; and more human lives yearly fall before that incurable and frightful malady the hydrophobia, than have been lost by wild beasts since the settlement of the country. I say then, let the dog law of the state be strictly and rigorously enforced, and if a man will keep a dog, or half a dozen of them, to vex and injure his neighbor, let him pay for what he considers such a privilege; and when they are caught trespassing, let the penalty of the law in its length and breadth speedily overtake the depredator.

The other instance of omission on the part of your correspondent to which I have alluded, is in case of an animal that perhaps cannot be better described than in the words of the celebrated Lawrence, who is in his Theory of Life, gives the generic and specific characters thus, viz: "Order, bimanum (two handed); genus, homo; the species, single, with several varieties: characters, erect stature; two hands, teeth approximated and of equal length; the inferior incisors perpendicular; chin prominent; rational, endowed with speech, unarmed, defenceless." Had the learned professor added, "wonderfully addicted to theft," the description would have been complete. The very frequency of this animal's depredations have contributed mainly to the impunity it enjoys. Straddling and shock-headed—idle and vicous in the extreme—it lazily passes the hours of labor, coiled up in the sunshine, or otherwise inviting repose; but no sooner does darkness come on than it rouses its energies, and commences all manner of depredations.—Omniverous in its tastes and habits, nothing comes amiss; and in its tastes and habits, nothing comes amiss; and in its predatory excursions the most incongruous articles are gathered into its receptacle of plunder. Pork from the barrel, butter from the larder, grain from the granary, corn from the field, hams from the smoke-house, fowls from the roost, clothes from the drying-line, melons from the bed, and all kinds of fruit from the tree, are appropriated to their use as inclination may dictate, or opportunity offer. They have been observed to be particularly fond of new things, and in some sections of the country the propagators of rare and valuable kinds of vegetables and fruits, find it difficult to preserve enongh from their ravages to furnish a specimen of the kind and quality. A few years since I called on a friend very nice in such matters, and where a number of gentlemen happened to be present. He was showing us his fruit orchard, and among other rare specimens, exhibited to us a new plum, which he valued very highly, and which then had several nearly ripe and beautiful looking on the tree, the first it had borne. While describing the reported qualities of the fruit to us, a bare-footed and wild looking animal of this depredating kind approached; and listening to what was said, no sooner had we left the tree to taste a delicious peach, than with a most mortifying dexterity he seized on the valued plums, which speedily disappeared in his capacious gullet, leaving the owner to wait another year for the uncertain privilege of fully testing the qualities of his own fruit. All good citizens should unite to check at once the operations of the light fingered pilferers; and as the law is fortunately in this case on the side of the honest man, nothing seems to be wanting but active co-operation, and a vigorous enforcement of its salutary provisions.

METEOROLOGICAL RECORD

For the month of February, 1836, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10′ N. Long. 91° 59′ W.,) by P. G. Voorhies.

FEBRUARY.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	32	48	36	calm	clear	heavy white frost
2	30	52	51	..	..	. . .
3	36	60	59	..	..	. . .
4	34	49	46	..	..	. . .
5	40	64	61	..	cloudy	. . .
6	41	61	42	..	..	. . .
7	41	68	61	..	..	. . .
8	33	61	60	..	..	. . .
9	47	62	60	..	..	rain in the morning and all day
10	56	70	65	..	..	rain and heavy thunder—storm all day and night
11	58	70	62	SE	..	Red river rising
12	65	60	58	S	..	rain all day and all night
13	64	62	52	N	..	rain in the morning and clear at noon, Red River on a stand
14	40	63	46	calm	clear	
15	42	68	65	..	..	Red River falling
16	38	64	56	..	..	
17	57	74	68	..	cloudy	light showers all night
18	59	69	59	..	clear	
19	50	71	68	..	..	
20	53	74	67	..	..	cloudy in the evening
21	56	68	64	..	..	
22	60	68	61	S	cloudy	rain all day, clear at night
23	57	69	59	calm	clear	
24	57	72	66	..	..	
25	56	51	50	SE	..	cloudy evening, rain at night
26	50	48	50	NW	cloudy	
27	36	50	51	NE	..	drizzling rain all day and all night
28	40	48	45	..	clear	
29	55	69	71	calm	cloudy	drizzling rain in the evening

Red River fell this month 4 feet 5 inches—below high water mark 9 feet 3 inches.

METEOROLOGICAL TABLE

For the month of March, 1836, kept at Avoylle Ferry, Red River, La., (Lat. 31° 10′ N., Long. 91° 59′ W.) by P. G. Voorhies.

MARCH.

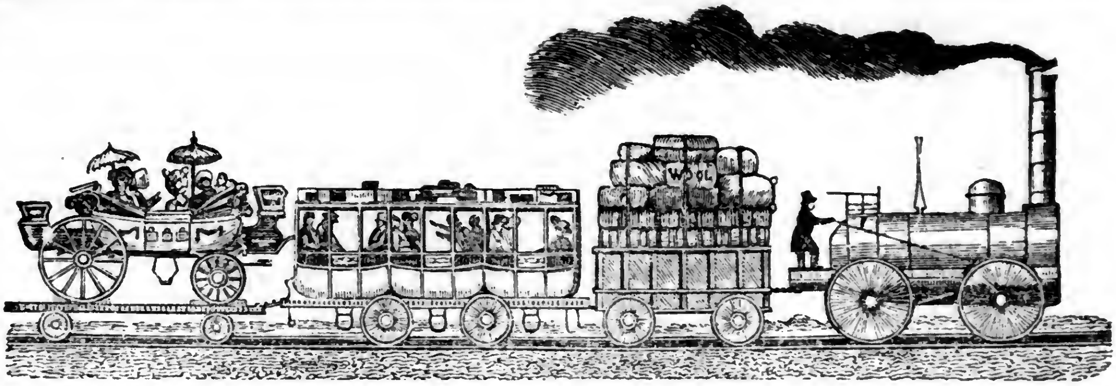
Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARS.
1	56	50	43	SE	cloudy	high wind from the north at night
2	32	54	43	calm	clear	heavy white frost
3	32	59	53	..	..	. .
4	34	61	50	S	..	. .
5	43	67	56	calm	..	. . cloudy at noon
6	59	69	68	S	cloudy	high wind from south-east all night and heavy rain
7	57	62	47	N	..	rain all day
8	41	61	52	calm	clear	Red River rising
9	46	62	47	S	cloudy	heavy thunder and rain at noon and all night
10	33	49	47	W	clear	heavy white frost—high wind all day
11	33	64	75	calm	clear	heavy white frost
12	43	69	64	SE	..	high wind from the north-west in the afternoon
13	59	71	68	SW	cloudy	high wind all day
14	61	72	65	S	clear	. .
15	66	78	75	SE	..	. .
16	67	80	78	S	..	. very high
17	69	79	72	..	cloudy	rain and heavy thunder at noon
18	58	68	62	calm	..	rain all night, Red river on a stand
19	60	64	52	..	..	drizzling rain all day and all night
20	46	47	46	..	..	. .
21	48	52	47	..	clear	
22	41	50	45	..	..	
23	34	48	45	SE	..	
24	44	56	48	..	..	
25	48	58	46	calm	..	
26	45	61	57	..	..	
27	43	60	58	..	..	
28	48	71	68	..	..	
29	65	68	70	..	clondy	drizzling rain all day
30	64	74	76	..	..	
31	64	70	66	..	..	rain at noon

Red River rose this month 1 foot 6 inches—below high water mark 7 foot 9 inches.

CLOVER LEYS.

It will undoubtedly be remembered that innumerable experiments have proved that clover leys, turned under, make an admirable dressing for a crop of wheat the next year. Clover, if we mistake not, is a biennial—that is, lasting but two years, after flowering and going to seed the second summer, the roots begin to decay, and ultimately die out and leave the soil for the Herd's grass, or other plants which may be sowed with the clover. Hence it will be well, in order to make the most of the roots as a dressing for wheat, to plough them under as early in the season after haying as can conveniently be done. By the following spring the sod has become decayed, and in a good state to promote the growth of the future crop.

Anderson recommends that Cows be milked three times a day in summer when full fed. If a Cow is not milked dry each time, the quantity diminishes; and if milked dry, the best milk is obtained. The first cream which rises is the best.



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, AUGUST, 20 1836. [VOLUME V.—No. 33.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 20, 1836.

NOTICE TO CONTRACTORS.

PROPOSALS for excavating and embanking the Georgia Railroad from the upper end of the work, now under contract, to Greensboro', a distance of 34 miles, will be received at the Engineer's Office, at Crawfordville, on the 21st and 22d days of October next.

—ALSO—

At the same time, for the Branch to Warrenton, 4 miles. And if prepared in season, the Branch to Athens, length 37 miles.

J. EDGAR THOMSON, Civil Engineer.

33—t22o

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County. State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE.

33—tf.

MECHANICS WANTED,

AT Fort Schuyler, Throgs Point, Masons for laying large stone in a sea wall, Carpenters, a Millwright, and a steam Engineer and Machinist.

Apply at Fort Schuyler, or at Governors Island.

August 12th, 1836. 2t—33

WANT OF WORKMEN.

We hear from every direction of the want of good workmen. At the fortification at Throg's neck, Masons can get very good wages—see advertisement.

We learn from our friends in Georgia, that good workmen can get high wages, and spend the winter in a very pleasant climate.

All necessary information to applicants, will be given on application at this office.

The following communication on Locomotive Engines is thankfully received, as will be every other one on the subject.

LOCOMOTIVE ENGINES AND INCLINED PLANES.

CITY HOTEL, New-York, Aug. 1, 1836.

DEAR SIR—In reading over No. 27, Vol. 5, of the Railroad Journal, I observed a communication headed Baltimore and Ohio Railroad Experiment, and signed W. L., Civil Engineer, Schenectady.

This publication, I beg leave to observe, gives us rather an unfavorable view of those valuable experiments, and from observing this and some other little misrepresentations, in the Civil Engineer Department, between theory and practice, I have been induced to make the following feeble effort to represent facts in a clear light.

The formula given by W. L. for the computation is correct, but the friction of the wagons he has taken at $\frac{1}{400}$ part of their weight, this must be entirely too small a value for the friction. By the late valuable experiments of Pambour on Locomotive Engines and Railroad Wagons, we get the value of the friction of Railroad Wagons at 8 lbs per ton, assuming this as the friction in my calculation.

The following is a comparative view of the result by the two values of the resistance.

Weight of Engine $8\frac{1}{2}$ tons, load exclusive of the Engine, drawn up an Inclined Plane, ascending 1 ft. in 20 ft., was $12\frac{1}{4}$ tons.

FORMULA.

$$R = W + \frac{b\,x}{a}$$

The letters R W b a and x represent the values written after them beneath.

Let R = the load on a level road excluding Engine.

Let W = the load on an inclined road, excluding engine. } drawn up.
Let x = the gross load on an inclined plane. }

Let a = denominator of a fraction expressive of the inclination.

Let b = denominator of a fraction expressive of the friction.

Then by substituting these respective values for these letters, and reducing the equation, I find the load on a level road to be $302\frac{3}{4}$ tons. This load the Engine will be able to draw at the same velocity she drew at $12\frac{1}{4}$ tons up the Inclined Plane at 1 in 20. Mr. W. L. has his load for a level $427\frac{1}{4}$ tons, the difference rests in the different values taken for friction. If the whole weight of the Engine rests on her working wheels the power of adhesion, in favorable weather, would enable her to draw $378\frac{1}{2}$ tons on level, and that, at the velocity she drew the former load on the Plane.

By having $6\frac{8}{10}$ tons weight on her working wheels, she would be able in the like weather to draw $302\frac{3}{4}$ tons the load. I have computed to equalize the given performance, consequently she must have had $6\frac{8}{10}$ tons on her working wheels, else she could not do the above stated work.

But there is nothing impossible in the statement. Certainly Mr. W. L. must have known that $\frac{1}{400}$ was too small a value for

the resistance of the rail, and it has been probably used to distort a comparative view of the loads for a level and ascending roads. The other parts of this publication I have partially examined, but on not finding data to base any calculation on, either in it, or the original, signed C. R. W., I have been induced to make a short table of the different loads to suit sundry grades. Thus taking the Engine $8\frac{1}{2}$ tons, and friction 8 lbs per ton.

Ascent in feet per mile.	Load in tons.	Ratio of grade.	Comparative view of loads by × by ratio of grade.	Ratio of engine.	Engine in tons.
level.	200	—	200	—	
18 857	95.75	2	191.5	1	8.5
37.715	61.00	3	183.	2	17.
56.572	43.625	4	174.5	3	25.5
75.436	33.2	5	166.	4	34.

The load taken for a level is 200 tons; and there is as much power required from an Engine in ascending a Plane of $18\frac{857}{1000}$ feet per mile, with a load of $95\frac{75}{100}$ t., as with the above load of 200 tons on a level. The comparison for the other lines in the table may be done in like manner, or they may be compared with each other, as each of the horizontal lines requires = power with each other, and with the top line also.

The defect in the load, as seen by the fourth column, is owing to the power expended by the Engine to support her gravity ascending the Inclined Planes.

This result in the above table differs much from Mr. Seymour's assertion that 25 feet ascent per mile only required double traction. Now we see $18\frac{857}{}$ feet requires more than double traction by once the weight of the Engine. The following table will give us a more clear view for comparison. Thus taking the same values of the foregoing table to express engine, &c.

Ascent per mile in feet.	Load in tons.	Ratio of load.	Load × by ratio of loads	Ratio of loads	Product of ratio of loads by ascent in miles per ft.
level.	200.	—	200.	—	0.00
17.38	100.	2	200.	2	8.69
28.23	75.	$\frac{200}{75}$	200.	$\frac{200}{75}$	10.586
48.35	50.	4	200.	4	12.090
98.57	25.	8	200.	8	12.315

The explanation of the former table will suit for this, as they differ but little in the progressive grades, and agree exactly in the comparative necessary powers to draw loads up those Planes.

This table shows us that $17\frac{38}{100}$ feet ascent per mile require double traction of a Locomotive Engine, compared with a level road, or in other words she cannot draw but half the load up this Plane that she will take on a level at the same velocity; and at $48\frac{35}{100}$ feet ascent per mile she can only draw $\frac{1}{4}$ of the load she will on a level road, also, at $98\frac{57}{100}$ feet ascent per mile, she can only draw $\frac{1}{8}$ of the load she will on a level road. In all the foregoing the road is understood to be straight. Now if Mr. W. L. can support Mr. Seymour in his assertion of not less than 25 ft. per mile to require double traction, I should be pleased to hear him do so. This mere outward smoothing assertion appears, by a comparison with these tables, (say the least of them) to be vague and full of discrepancy with truth.

In Mr. S.'s communication of the 23d of Jan. last, to the President of the New-York and Erie Railroad Company, he also asserts that a Railroad curving, with a radius of 700 feet, when travelled over at a velocity of 12 miles per hour, merely occasions an equal resistance with those of an Inclined Planes ascending 18 ft. per mile. Above we see that 18 ft. per mile occasions more than double traction, consequently, by his assertion, a curve of 700 ft. radius in a Railroad, when travelled over at the velocity of 12 miles per hour, occasions an additional resistance of more than an equivalent to draw this load at the same velocity on a straight level road. Certainly the inconvenience of causing double traction is considerable, but when we see it smoothed over, by the remarks that its grade only wants to be flattened 18 ft. per mile, to make it as easy as a straight level road. Let us view for a moment a Railroad in its natural way; when curves are necessary in Railroads it is most generally at the points of, rocks and round low dells and valleys, and one reason for submitting to curves is to avoid the great expense of excavation and embankment.

(To be Continued.)

KNOXVILLE CONVENTION.

The following letters and remarks, from the Savannah Georgian, will prove interesting to the friends of internal improvement.

We have also received the Report of the South Carolina Commissioners to the Convention, and shall publish it in our next

KNOXVILLE CONVENTION.—This important Convention, we learn, has adjourned—not, as some letter writers have predicted, without yielding to the claims of Georgia, but, as we are led to believe, with a full conviction, that it will be for the interest of the people of the west to have more than one outlet for their productions.

We have been favored with the following extract of a letter from one of our fellow-citizens, at present at Flat Rock, to a gentleman of this city, dated 12th inst. (Tuesday last.)

"The Convention at Knoxville adjourned *sine die* about 12 o'clock on Friday last, and two of the South Carolina delagates arrived here, (Flat Rock) last evening.—One of them informs me that the railroad is to come up the valley of the French Broad, and will pass not far from Flat Rock. The Georgia and Carolina members compromised, and the Convention unanimously agreed that a road should pass through Georgia and strike the main line at some point near, or at Knoxville, and the stockholders thereof then to be considered as the same company, and to be in all respects the same as the original stockholders. This great undertaking is to be commenced immediately. The Convention, it is said, was in some danger of breaking up without doing any thing, had it not been for the compromise with the delegates from Georgia, which appeared to satisfy all parties."

Other extracts of letters from the correspondents of the Augusta Constitutionalist of earlier date, will be found in our columns.

Since writing the above, we have been favored with the following extract of a letter received in this city, from one of the delegates from Georgia, dated,

"Clarksville, July 13th, 1836.

"The Knoxville Convention was perhaps the most respectable ever held in the Southern and Western States. Col. Williams, of Tennessee, was called to the chair, Gen. Hayne, of South Carolina, unanimously elected President, by about four hundred delegates from ten States. Pryor Lea, of Tennessee, was appointed Secretary. A select committee of forty were appointed, to which all the different subjects brought before the Convention were referred. The Georgia delegation consisted of about sixty; to the surprise of most of us, when we got to Knoxville, we found that charters for a company had been already granted by the States of Kentucky, Tennessee, North and South Carolina, limiting the road and company to those four States, Georgia being excluded. A very able and clear report of the trade and resources of Georgia, was immediately, however, prepared by a committee; Messrs. S. B. Parkman, of Savannah, R. Campbell, of Augusta, and Poe, of Macon, and read to the Convention, which, while it astonished the western members, convinced them that it was decidedly for their interest to bring Georgia into the compact; and on the motion of Mr. Wickliffe, of Kentucky, it was unanimously resolved to recommend to the several States, so to amend the charters as to permit Georgia to participate upon perfect terms of equality with the other States, and to connect a branch of the road at Knoxville. Col. Blanding, of Columbia, S. C., with others in that interest, had fixed long before the meeting of the Convention, that the main track must go through the French Broad in North Carolina, by Columbia to Charleston, and of course came prepared with a printed report of the Engineers, showing the facilities of that route; by these the estimates were, that 60 or 90, I forget which, but I believe the latter number of miles would cost an average of \$30,000, and 10 miles an average of \$40,000. By Mr. Thompson, the Georgia Engineer's report, confirmed by Col. Brisbane, the Engineer of South Carolina, it is estimated that the cost of a single track from Athens to Knoxville, 205 miles, would only average \$8,500, and that there was no single mile which would exceed \$15,000; this route is by Clarksville, through Miller's Gap in Rabun, then down the Little Tennessee, to about 12 miles below the Smoky Mountains, then across the country to Knoxville.

"This report was read before our delegation, but the Carolinians with some little aid from Georgia, succeeded in preventing its being read before the Convention; and I have some doubts whether it will ever be presented with the other documents laid before the Convention. But with such an easy passage before them, the Columbia interest could not venture to insist upon the French Broad being the best route, and therefore the only resolution offered and adopted, was that a practicable route within the chartered limits, had been found by way of the French Broad from Cincinnati to Charleston.

The above letters exhibit a flattering evidence of the favorable disposition of the delegates in Convention towards our State. We hope and trust that it will not be in vain, but that the people will, (throughout the State,) rouse up *en masse*, and return to the next legislature men who will, by their strenuous efforts to advance the prosperity of their State, show the people of other States that they are not only awake on the subject of Internal Improvement, but are unwilling to see their State out-stripped by other States in the march of that prosperity, to which an enlightened spirit on the engrossing subject (to which we have referred) can alone elevate her. Georgia must act through her legislature. Delegates must be sent to the Legislatures of Tennessee, Kentucky, Ohio, North and South Carolina, to procure amendments to the charters already granted, so that Georgia, with her imposing position—her immense resources, may be allowed to participate in a work, creditable to the enterprise of those States, who first originated it. The State too must subscribe, and not leave to individuals the completion of an enterprise, which must, more or less, pour into the lap of her citizens—the treasures of other States, by producing a commercial spirit so eminently necessary for a sound and healthful action in the people generally.—We must not be slothful at this time. If we are, we will live to reproach ourselves for our inaction, and posterity will grieve that a people lived before them who bartered their birth-right for a mess of pottage—who cast away their abiding interests for selfish or party gratification.

From the Correspondence of the Augusta Constitutionalists.

Knoxville, (Tenn.) 6th July, 1836.

Gentlemen:—Having obtained a list of the committee of 44, and believing you would like to see it, I shall forward the same with such other remarks as may occur.

Those taken from the Ohio Delegation are, Doctor Drake, E. S. Thomas, and Mr. Mansfield.

From Indiana, Melton Stopp, and Mr. Fields.

From Kentucky, Robert Wickliffe, Judge S. S. Nicholas, Daniel Buck, Richard Haws, John Kincaid, F. F. Fox, and Daniel Garrard.

From Tennessee, John Williams, Judge Emmerson, Gen. John Cocke, M. C. Rodgers, and F. B. Fogg.

From North Carolina, Gov. D. L. Swain, Dr. S. F. Hardy, Joseph M. D. Carson, J. Humphry Bissell, H. P. Willis, Samuel Chunn, E. M. Bryant, and Mr. Avery.

From Virginia, Peter C. Johnson, and Samuel C. Goodson.

From South Carolina, Abm. Blanding, Chas. Edmonston, Judge Bayles Earle, Judge O'Neal, Alex. Black, James Wardlaw, J. Barkley, and Gen. Hayne.

From Alabama, Dr. Thomas Fearne, and John D. Williams.

From Georgia, Judge A. S. Clayton, Richard W. Habersham, Wm. Dearing, H. M. McAllister, and W. W. Holt.

To-day the Convention met, and after reading the minutes of yesterday, Mr. Chapel, from Macon, presented a report on the practicability and importance of the different routes for railroads through the State of Georgia, together with the report of the Engineer of the Athens railroad to the Committee of 44.

Some one moved to add Mr. Coleman, Maysville, Kentucky, who had just arrived, to the Committee of 44 which was agreed to. Thus the committee will hereafter be called the Committee of 45. Some one attempted to add another member to this committee, from Lincoln county, North Carolina, but was not sustained.

Perhaps we shall be able to have our different reports printed for the benefit or instruction of the people of the West. Our report yesterday on the commercial advantages of our State seemed to astonish many of the people of this Convention.

The Convention adjourned to-day to meet to-morrow at 12 o'clock, by which time we hope the committee will probably be able to report at least in part.

The distribution of the surplus fund appears to have in the minds of some, removed some of the difficulties which were in the way of the construction of the contemplated Railroad. There is evidently some dispondency about the ability of subscribing for the stock. But this fund they hope to be able to have appropriated to this matter.

I have forwarded the report, &c. of the South Carolina Commissioners to the Knoxville Convention. I have heard nothing farther from the committee, therefore will close my letter.

Respectfully, yours,

A. Cunningham.

It is believed, if the road is recommended to pass through South Carolina to Columbia and Charleston, that the other States will make such amendments to their charters, as will allow Georgia to connect her road at any point on the route, with full and equal privileges. The northwest is already favorably disposed to the route through Georgia. The cost according to Mr. Thompson's estimate, would not exceed $14,000 per mile from Knoxville to Athens, Georgia, finished in the very best manner. The advantages South Carolina has, are, in having obtained the charters in which Georgia is not named, and been active in directing the preliminary movements, and offering a continuous route, and a willingness to be a large subscriber to the stock—against these, Georgia offers the best route, and greater choice of markets.

A route connecting Nashville, (from whence there is to be railroad to Louisville,) entering Georgia at Murray County, joining the Athens road, also branching to Macon and Columbus, has many friends.

The distribution of the public revenue will give a new impulse to the railrord feeling, and new routes will be proposed in every direction.

July 6—Convention met at 9 o'clock; some new delegates from Ohio made their appearance; adjourned at 11 o'clock until to-morrow at 12, when the great committee will probably report. They have been in animated debate to-day, which resulted in appointing a committee of conference, (of five) to report on the subject of charters.

Yours, &c.,

T. G. Casey.

From the Courier and Enquirer.

THE ATTICA AND BUFFALO RAILROAD.

This road will form the last western link in the chain of railroads from Albany to Buffalo, the first or eastern link of which to Utica, is in active operation. The other portions are all chartered. Attica is near the centre of the county of Genesee, 30 miles directly east of Buffalo. The whole elevation from the Tonawanda to the Buffalo summit is only 80 feet; the greatest ascent per mile is 35 feet for two miles only; the rest is from 30 feet per mile to a level. The charter is very liberal: goods and freight are to be carried at all seasons without restrictions as to canal duties. The cost will be cheap, not over from $6000 to $7000 per mile, including every thing for a single track and necessary turnouts, which with the rich country and great thoroughfare of the commerce of the west in the tract of which it lies, together with the facts that there are no charters of turnpikes to be bought out, and that most of the owners of the land residing on the route, have already given written releases to the land for the use of the road, are sure to make stock in this road a profitable investment. The following is an extract from the report of the Engineer:

On leaving the village of *Attica*, for the first two miles, which brought me to the summit, the whole rise that must be surmounted is eighty feet, passing up a small stream, or rather ravine, on almost one regular inclined plane. This may, however, be reduced by extending the plane a greater length, by cutting through near the summit so as to reduce it to a rise of about thirty-five feet to the mile, or it may be brought to a much shorter space, and surmount the rise in a shorter or longer distance as may be thought best, and yet not materially affect the expense of grading.

From the summit westerly to Alden, I find almost one perfect inclined plane, falling from twenty to thirty feet to the mile, a distance of seven to eight miles. From Alden westerly, we pass along the valley of a creek, a distance of eleven miles, with

no material obstruction, gradually descending a part of the way, while other parts of the route we run on a level to the village of Lancaster, where we have to cross a stream, which will require bridging or embanking a distance of two hundred feet. From Lancaster to Buffalo, a di tance of about ten miles, the present surface of the ground is almost sufficiently graded for laying timbers for the road, and it is nearly a level. The route, on the whole, is an advantageous one, and indeed more advantageous than can be found in most sections of this vic n ty. The whole amount of grading will not exceed from eight hundred to one thousand dollars per mile; and even one-half the distance may be graded for less than half that sum. All of which is respectfully submitted.

JAMES I. BBALDWIN, Engineer.

The Tonawanda Railroad which runs from Rochester to Attica, will be completed early in the next summer, a distance of about 41 miles, so that the whole distance from Rochester to Buffalo over these roads, will not exceed 72 miles. Should the stock of the Attica and Buffalo road be readily taken, the whole may be finished within one year from the first of September next. The books will close this afternoon, a 3 o'clock, at the Farmer's Loan & Trust Co.'s Office.

From the New-York Express.

NEW-ORLEANS—INTERNAL IMPROVEMENTS.

Having noticed the improvements in progress to meliorate the health and port of New-Orleans, and to benefit the navigation of the Mississippi, by removing the obstructions at its mouth, we shall now glance at the internal improvements in and near that city, for increasing and extending the facilities of intercommunication for trade and travel, with the remote parts of Louisiana and the adjacent States. The merchants and other citizens of New-Orleans have wisely resolved not to depend exclusively on the manifest natural advantages which that city enjoys by its position on the "father of waters," but have concentrated the late improvements in steam, in several canals and rail roads immediately or mediately leading into the city.

The Canal *Carondelet* connecting the Mississippi river with Lake Ponchatrain, by the river St. John, has been in operation since 1805. The company incorporated for that purpose has a perpetual charter with extraordinary privileges; and are now using every exertion to promote the advantages they enjoy. This unwonted energy has been caused by the competition experienced from the canal constructed in the upper part of the city, in the same direction and for similar objects, under the care of a banking company, having a capital of four million of dollars.—This canal is upwards of six miles in length, and has by its side a turnpike road covered with shells. When completed it will be 120 feet wide, and adapted for the steamboats which ply on the lakes to Moqile, and other ports in the Gulf of Mexico.

There are two other canals very near New-Orleans, on the west side of the river—the Plaquemine, which has been in operation for several years; and the Barrataria and Lafourche canal. This latter has been so far completed, as to open an inland communication between New-Orleans and the Barrataria bay; but it is designed to extend westward through the lake Verret, and the Atchafalaya and Teche rivers.—The second section of this line will be finished during the ensuing winter.—Steamboats of light draught ply on this canal.

But more attention is properly paid to railroads than to canals in that neighborhood, as the numerous water courses supercede the necessity of the former, except in the south-western parts of Louisiana, where the alluvial lands are scarcely yet formed or reclaimed from the Gulf. There are now three railroads in full operation in New-Orleans—the Pontchartrain, the Carrolton, and the Orleans.

The Pontchartrain railroad was the second completed in the Union; and is probably the best disciplined in every respect. It runs through a street in the lower part of the city—now situated in the third municipality—to Lake Pontchartrain, where a harbor is constructed, with a respectable hotel for boarders and visitors, to enjoy the lake breezes. This drive would be excellent, were it not through swamps; but these will shortly be reclaimed. Locomotives on this route run every hour during week days, and every half hour on Sundays. The company incorporated to construct this railroad, was lately conceded banking privileges, with a capital of one and a half million, in order to construct a similar road in the lower part of the city, to Lake Borgne, where a good harbor will be formed that can facilitate greatly the communication by that part of the Gulf of Mexico with New-Orleans.—The navigation of Lake Borgne, has hitherto been neglected, although the great depth of water was evidenced by the expedition of the British in 1814, when invading Louisiana; but the spirit of competition now happily excited in New-Orleans, by the struggles for the trade of various ports among the sections and classes of that city, will bring all facilities of communication into action.

The Orleans railroad is a petty one, ostensibly designed to effect an easy and expeditious route to a new country in the rearward swamps; but really designed by its projector, to improve his own land in that neighborhood. It has accomplished both. A horse car runs on it every hour, for the convenience of those travelling in that direction.

The railroad to Carrolton enters the city to Canal-street; and is nearly six miles long. The company chartered to construct it, met with considerable opposition, and acted with so much energy in conquering it, that the Legislature of the State perceived the utility of conceding them banking privileges—exacting at the same time from them the duty of continuing the railroad to Bayou Sarah.—When this shall have been completed, the railroad from the latter place to Woodville, in Miss., and thence another to Natchez; will give a continuous land route by steam from New-Orleans to Natchez. Various lateral railways will intersect the main route in this direction, through the eastern part of Louisiana; and bring a constant and early supply of produce, ect., to the market of New-Orleans.

A company (we are informed) is now organized, and will be chartered at the ensuing session of the Lousiana Legislature, to construct a railway through the lower parts of the city to the English Turn, first, and afterwards to the Balize—on the same plan, and for the like objects as the Carrolton railroad.

But the grand route, independent of the Mississippi, is the contemplated railroad to Nashville. This will be about 560 miles long. It has been surveyed throughont; and the route for several miles has been located and prepared for the grading. Owing to the opposition experienced in the Mississippi Legislature, as to the particular location of the route in that State, the energies of the company have been partially paralized; but the Mississippians being now restored to their better senses, will not again act so suicidally. The States of Tennessee, Alabama, and Louisiana, have largely subscribed to the stock of this company; and Congress has granted permission to pass through the public lands on the route.

The railroad to Nashville will have one grand entrance into New-Orleans, by Canal street, through which it will pass to the river; and will have lateral arms into the upper and lower parts of the city.—Throughout its course, lateral branches will be constructed on both sides to every principal town or city—so as to afford the necessary facilities to planters, in places where there are no roads better than bridle paths.

Were it not beside our purpose, we might notice the other railroads and canals in Louisiana; but we have designedly confined ourselves to those in and about New-Orleans. We may however, remark, that attention is simultaneously paid to the formation of companies to extend and secure the facilities of intercommunication between that city and her dependencies. A company has been chartered to establish regular lines of steamboats on Lake Pontchartrain to Mobile, touching at all the intermediate places; and a second company another line to Mobile and Pensacola. A banking company is required by its act of incorporation, to establish one such line of steamboats to Madisonville, another to Bayou Sarah, and a third to Natchitoches, on the Red river. We perceive also, by advertisements in the New-Orleans papers, that companies of merchants are now being formed to establish lines of steam-ships to Tampico, to Vera Cruz, and to Havana.

But the inhabitants of New-Orleans are singularly—we had almost written shamefully apathetic in the establishment of regular packets to distant and foreign ports. Some of the merchants of this city offered those of New-Orleans to furnish one or two regular lines between both cities, provided the merchants of the latter took a

certain share, so as to secure an interest in them; but the project was frustrated. And we learn that the New-Orleans merchants have absolutely refused to establish regular lines of packets either to Liverpool or Havre, as they prefer to depend on the transit trading ships. They will however, soon perceive the advantage if not the necessity of having regularity and punctuality in their trade, in order to secure despathc and afford certainty.

THE LATE HON. JOHN B. YATES.—We take from the Albany Argus the following extract from the will of the late Hon. John B. Yates. It is quite unnecessary to eulogise the character of a man who dispenses the fruits of a life of industry in the manner which Mr. Yates proposes in his will to do. We should think more favorably of mankind if similar instances of liberality were more frequent:—

THE WILL OF THE LATE JOHN B. YATES, ESQ.

We have been favored with an extract of this will, drawn by the testator himself, and lay it before our readers. It furnishes evidence of that enlarged and philanthropic intellect for which Mr. Yates was distinguished throughout his whole life. A large estate, between *three and four hundred thousand dollars*, over and above a very ample support for his widow, and other legacies, he has set apart for the purposes of literature and science. He has shown, in his dying moments, his regard for the morality, happiness and character of his country. Indeed, this was his 'master passion, strong in death,' and posterity will enrol his name among its noblest benefactors. During his life, he evinced the same unceasing solicitude for the general good. Aware that the perpetuity of our republican institutions could be best secured by a general diffusion of intelligence, no man was more active in the cause of education than he. The emphatic and no less interesting injunction contained in his address delivered in February last to the State Agricultural Society, exemplifies the deep interest he felt in its cause. These are his words: 'Do you wish, quietly, without injustice and without violence, to equalize property as conducive to the greater safety of the republic? and in fine do you wish to foster any hope to preserve your republic?—educate thoroughly your whole community.' At his own expense he established the Polytechny School at Chittenango, which was ably conducted, and continued in successful operation ten years.—His financial operations and unremitting exertions, in connexion with his partners, raised Union College from a state of comparative insolvency to that of opulence and distinction. We have no doubt that the legislature of this State will give every aid in its power to promote the great and benevolent objects of the testator, and thus furnish a monument more durable than marble to the memory of its truly patriotic and benevolent founder.

He conveys all his property to Mrs. Yates, his widow, Charles Yates, William K. Fuller, and George K. Fuller, *in trust;* and after providing for certain bequests, he directs as follows:

'I direct further that my said trustees apply the remainder of my property, my real and personal estate, if any there shall be, to the endowment and support of a school embracing literary instruction, combined with the pursuits of real life of every practical description. The institution to be called the *Polytechny*, upon the plan as near as may be, laid down in the memorial presented by me to the legislature of the State of New-York, and the report of a committee and draft of a law founded thereon, during the session of the year 1830. If after winding up my affairs, it shall be ascertained that there are funds sufficient left to commence and found such institution, I then wish my trustees aforesaid to petition the legislature of this State to accept this devise for the object named, to confirm its permanency by a legislative act, and make the necessary arrangement for its uniform and steady government by the appointment of a Governor or Director, who shall not be liable to removal by the fluctuations of party or the miserable *charlatanry* of political jugglers.

'If such a law to the satisfaction of my said trustees, cannot be obtained in this State, I then direct that as soon as may be, without incurring unnecessary loss, my whole estate left after the legacies and devises be disposed of, on the terms and in the manner that shall be thought most advantageous, and as it shall from time to time be disposed of or sold in such portions as may be offered at the various times, and the money received therefor, that the same be invested until the sum of one hundred thousand dollars be funded, and they are requested in that event to form such an institution in any State which a majority of them please to select, which is willing to give the proper irrevocable legal guaranty for its permanency, and appropriate not less than one thousand acres of land for the purpose. The income only of the one hundred thousand dollars to be applied in this last case to the support of the institution, and the principal to be transferred to the State, and kept by it invested for a school of this description. If afterwards, a greater residuary sum than this shall be realized, I then direct that the balance, not exceeding one hundred thousand dollars, be offered on the same terms to another State, and so on until the whole residuary estate be thus applied and absorbed in amounts not exceeding as above one hundred thousand dollars to each.

Having ascertained with certainty to my own mind, that almost all political men of all parties are more particularly anxious for personal aggrandizement than any permanent arrangements by which the general standard of popular information may be raised, and thus greater stability be given to the political institutions of our country, I am apprehensive of the same secret opposition which I have experienced and which I know exists to every project of the sort. It is therefore my wish that a printing press, and weekly paper at least, devoted to the purpose of advocating literary information among all classes of people, be established, connected with the institution, and that printing and book-binding in all its branches, form a branch of mechanical occupation of a portion of the students in the institution. It is also my will that a professorship of law be established, and that every student be made familiar with the constitution of the United States and each State in the Union, at as early an age as possible, and to be connected throughout with the moral and religious instructions of the institution. Being also firmly persuaded that the safety of society and its proper moral government cannot be sustained without a high regard for the present legal domestic relations in life, it is therefore my wish that no illegitimate child shall be admitted into the institutions whose parents shall not have legally intermarried, either before or after the birth of the child, and that such prohibition be made a fundamental law of each institution which may be established under this will. If my life shall not be spared to settle my estate myself, and ascertain its value, so as to know accurately what may be left for this purpose, and also enable me to form a more full and detailed plan for the government and management of the institutions, and the specific approriations for each object, which, from the uncertainty of the amount, I cannot now do, I leave the manner and extent of the arrangements to the sound discretion of my said trustees, in conjunction with my friends John Savage, chief justice of the State, John Van Ness Yates, of Albany, and John C. Spencer of Canandaigua, whom I solicit to aid my trustees by their counsel and advice in organizing and establishing the said institutions.'

GREAT INVENTION.—The Boston Atlas notices at some length the very important invention, by a young man named Cochran, a native of New Hampshire, of what are denominated the "Many chambered, Non-recoil," fire arms. Through the instrumentality of Mr. G. Gay of Providence, now in this place, we were some time since made acquainted with the properties of this wonderful improvement in the construction of cannon, rifles, muskets and pistols—for to all these the invention has been adapted—and should have sooner noticed the subject, but that we were waiting for an actual inspection of some specimen. This opportunity has been promised; and it is expected that one of the rifles, already sent for by Mr. Gay, will soon be ready for exhibition to those of our citizens who feel an interest in the protection of their property upon the ocean, against pirates or hostile savages

These weapons are so contrived, that by means of a metallic cylinder, or wheel, revolving on an axis immediately in the rear of the barrel, some twelve discharges may be made in rapid succession; insomuch that by a little practice, the loading and firing of the whole twelve may be performed in little more time than is now required for a single charge and discharge of a common rifle. This wheel is perforated at the periphery, with cavities or chambers, to contain the charges, of a calibre corresponding with that of the barrel; and the charges are ignited by means of percussion caps inserted in a smaller hole at right angles with the above cavity, and striking the centre of the charge. In large ordnance, the wheel or cylinder revolves vertically; but in small arms it has a horizontal motion, with the lock or igniting apparatus underneath. The wheel passes round by means of proper guides, and as fast as each charge arrives opposite the breech of the barrel, it may be exploded. As our description is derived only from verbal testimony, it may not be entirely accurate, or even inteiligible; but we are satisfied that the extraordinary effects ascribed to the invention are by no means overrated or misrepresented.

Mr. G. informs us that he has discharged several hundred shots from one of the rifles; and after the closest attention he could discern no recoil whatever. The cannon may be discharged easily, twelve times per minute—and a succession of loading and firing may be kept up for almost any length of time. The shot are also driven to a greater distance than by the common method; and a less quantity of powder is used in the process.

Respecting the inventor, who is short of 25 years of age, we have the following particulars, which we abridge from the Atlas: Having obtained a patent in this country, he proceeded to England and France, where his invention was readily patented, after a series of experiments made in presence of distinguished naval and military officers, at London and Paris. The Turkish ambassador, who witnessed the tremendous results, induced Mr. Cochran to go to Constantinople—where he was most kindly received by the Sultan, who loaded the ingenious artist with presents, after ordering a twelve pounder to be constructed on this principle, under the inspection of Mr. C. at the public laboratories, and attending in person, with his whole court, at the trial. Mr Cochran resided six months at the Turkish capital, receiving the most marked distinction from the government. He then returned to this country, and established a manufactory at Springfield in this Commonwealth, at which small arms and cannon are now being made, chiefly to order, for sportsmen, &c., or for experiment, by the ordnance officers of the U. States. A piece of brass ordnance is now in course of construction at Troy, and another at West Point, under the direction of the inventor.

Besides the facility and rapidity with which these weapons may be discharged, the rifles, &c. possess many other advantages over all others. There is nothing upon the barrel to obstruct or confuse the sight—the surface being perfectly smooth; they never miss fire, and are little liable to accident. Our whale ships generally carry a number of muskets: but we are persuaded that nothing yet contrived by human ingenuity for security against capture or plunder at sea, can in any shape compete with the implement under notice. We are therefore anxious that ship owners, and others interested at this place, may examine this new and most effectual engine of destruction, and from its peculiar principle of action, judge of its terrific powers. With these deadly instruments, and plenty of ammunition, a single man may disperse a score of pirates, and a small crew contend triumphantly against myriads of barbarians.—[Nantucket Inquirer.]

ON THE IMMERSION OF COPPER FOR BOLTS AND SHIP SHEATHING IN MURIATIC ACID, AS A TEST OF ITS DURABILITY. BY DAVID MUSHET, ESQ.

The durability of copper for bolts and ship sheathing being an object of great national importance, and as there is no better test of its resistance to waste, than immersion in muriatic acid, the following experiments, made thirteen years ago, will, it is hoped, be found not uninteresting.

Small quantities, presenting nearly equal surfaces of each of the kinds of copper described in my last communication, namely, pure shotted copper of the quality from which brass is made, and shots obtained from unrefined copper, were separately immersed in equal weights of muriatic acid. The immersion having been continued for 48 hours, the acid was poured off, and the copper washed repeatedly, and thoroughly dried. The pure copper had lost at the rate of 5½ grains in 100. But the unrefined copper, on being weighed, seemed to have gained half a grain; so that either a mistake must have been made in the weighing, or else a portion of unexpelled moisture had remained in the porous flakes of the copper.

Six ounces of unrefined copper were mixed with three times their bulk of charcoal, and exposed for six hours to a high heat of cementation much beyond what in the absence of the cementation would have sufficed to melt the copper. The flakes of copper were found surrounded by the charcoal, welded together without fusion, and soft and extremely flexible. Six ounces of the pure copper shots were treated in a similar manner, but the result was so far different that no adhesion of the masses had taken place, and the only perceptible change was a slight cracking or bursting upon the surface of the spheriods, which may be considered as a prelude to fusion. Both results were melted down with charcoal and run into iron moulds. The unrefined copper, when cold, was the strongest and softest; a bar of it, about ⅜ths of an inch thick, cut easily across with a knife, and in color and general appearance it very nearly resembled Swedish copper. Another piece was flattened out thin when cold for the purpose of immersion in the muriatic acid. The pure copper was melted in rather a higher degree of heat, and although not teemed until it had assumed a creamy surface, and the crucible had fallen to a low red temperature, it was crystalized throughout the whole fracture. The surface and the fracture of this copper were of a red color; the body weak, and tearing with facility into pieces. Fragments for immersion were cut off and flattend.

The following specimens were then placed separately in muriatic acid.

No. 1, Pure copper, cut off with a chisel,	53 grains
2, Ditto, flattened,	30 —
3, Unrefined copper, cut off with a knife,	39½ —
4, Ditto, flattened, in which stuck a minute portion of the knife,	45 —

On the morning of the third day the following remarks were made upon their respective solutions:

No. 1, Light green color, very transparent when dashed against the sides of the glass. No. 2, equally transparent, but the green was brownish and not so decidedly cupreous. After continuing the immersion for 48 hours longer, the acid was poured off and the specimens were well washed and dried.

No. 1, That weighed 53 grains, now weighed 39½ grains.
Loss 13½ grains, equal to 25.4 per cent.

No. 2. That weighen 30 grains, now weighed 11½ —
Loss 18½ grains. Equal to 61.2 per cent.

No. 3, Unrefined copper flattened, 39½ grains. now weighed, 19 grains
Loss 20½ gains. Equal to 50 per cent.

No. 4, Unrefined copper bar, 42 grains now weighed, 38½ —
Loss 3½ grains. Equal to 8.33 per cent.

It would appear from this experiment that the unrefined copper resists waste in the muriatic acid, in the same way, and to nearly the same extent, as in the cementation with lime mentioned in my last previous paper.

In corroboration of this fact, we may take the following abstract of another series of experiments, wherein the specimens were weighed three times, at intervals of 48 hours between each weighing.

Unrefined copper, 1st immersion, lost,			15 per cent.
Ditto,	2nd	ditto	$8\frac{3}{10}$ —
Ditto,	2rd	ditto	6 —
			$29\frac{3}{10}$

Pure copper, 1st immersion, lost			25.4 per cent.
Ditto,	2nd	ditto	9.7 —
Ditto.	3rd	ditto	11.1 —
			46.2

In favor of the unrefined copper principally containing tin,—16.9 per cent. Two pieces of copper, the one pure, the other unrefined, were immersed, under similar circumstances, for seven days. The unrefined copper lost 17 per cent., and the pure copper 45 per cent. To ascertain whether the greater indestructibility was owing to the tin which remained in the unrefined copper, I formed a bar of alloy as follows:

Pure copper	2880 grains
Block tin	84 —

a proportion of tin about equal to 3 per cent. A piece from this bar weighing about 183 grains was exposed for seven days in muriatic acid, at the end of which time it was found to have lost 30 grains, or $16\frac{4}{10}$ per cent. The unrefined copper, above mentioned, lost in the same time and under similar circumstances, 17 per cent., which is a striking correspondence. The same piece of tin alloy, at the end of five weeks, was found to have lost in all 76 grains, or 38½ per cent. Pure copper by the foregoing results lost in seven days immersion 46.2 and 45 per cent.

In the first instance I was inclined to attribute the indestructibility of the unrefined copper in the acid, partly to the effects of the charcoal in the cementation, seeing that the effect produced by that operation was much greater upon unrefined than upon pure copper. Whatever advantages may belong to the proper use of charcoal in the reduction and cementation of copper (and

I consider them not unimportant,) the addition of a small portion of tin will be sufficient to account for the superior resistance to waste which this alloy presents in the muriatic acid, over that of the common refined copper of this country. This incapacity to rapid oxidation which is presented by the alloy of tin with copper, suggests many useful hints to the artists and the manufacturers, of which advantage has already been taken in forming ship-sheathing and other articles.—[Lon. and Edin. Phil. Mag.]

AGRICULTURE, &c.

VALUABLE TIMBER.

About five years since, a man named Smith, purchased a number of trees of heavy Locust, in this county, for which he paid as high as seventy and eighty dollars each. The buts were squared and sent to Philadelphia, where they were used in ship building. The price apppears extraordinary; but had many of those choice trees been cut up into posts, they would have produced to their owners, nearly, if not quite as much as were paid for them by Mr. Smith. In proof of the correctness of this opinion, we give the following fact:

On the farm of Mrs. Evans, near Marietta, in this county, a yellow locust was felled last season, from which 140 posts were made, one hundred and ten of which were first rate, hewed and morticed, and sold for 50 cents each, and the remaining 30, cullings, fit for board fence, and worth 25 cents each, yielding to Mrs. Evans, *sixty-two dollars and fifty cents.*

The yellow locust is of quick growth, sprouts from the stump, and is natural to the soil of our river bottoms. A grove of this valuable timber, covering three or four acres, will keep a farm of 200 acres in fences forever: and when the trees are at maturity, say 25 years old, will produce more clear cash than 2 years produce of the whole farm.—*Lancaster Farmer.*

[It has always been a matter of surprise to us that farmers who own bottom lands, do do not cultivate the yellow locust as a crop, in 12 or 15 years they would produce several hundred dollars to the acre.]—*Ed. Farmer & Gardener.*

FLORIDA ARROW ROOT.

The day, we trust, is not far distant, when prejudices in favor of the productions of foreign countries will cease to operate to the detriment of the agriculturists and manufacturers of our own. We are sufficiently friendly to the policy and principle of free trade, to allow every man to exercise the most perfect freedom in the purchase of whatever he may require, whether the necessaries or luxuries of life, at whatever price he may think proper, yet we cannot but lament the blindness or perverseness that will lead any one to overlook an article of home manufacture supplied at comparatively a low price, for one of foreign production in no way superior and truly considered "a dear article." The arrow root, which is the growth of South Florida, may be considered one of the home productions which are sacrificed to the undue preference for those imported. Equally white, equally pure with that of Jamaica, heretofore deemed the best, and by many thought to be the most nutritous of the two, there can be no reason for its not superseding the necessity of supplying market with any of the articles from abroad.

We have no price current at hand giving the value of the imported article in first hands, but we are well assured that it cannot be imported at less than from two or three times the price of that manufactured in this vicinity, which is from 6 to 8 cts. per lb. With an increase of demand, the aid of machinery would be required, and diminution in price might be anticipated; at present a similar mode of manufacture to that followed abroad is pursued in Florida, though it is probable the Florida manufacturers possess not all the facilities of their competitors.

We are not sufficiently versed in botany to pronounce upon the similarity of the Florida root to that of Jamaica or Bermuda, but there can be no doubt of there belonging to the same family of plants. The quantity manufactured is sufficient for the present demand, and doubtless will increase, as the root is indigenious, and but two or three planters being at present engaged in the manufacture, and that too, in connection with their other agricultural pursuits.

The low price at which the Florida arrow root is sold, allows of its being applied to other purposes than those to which, from its dearness, foreign arrow root was usually restricted. For instance, it is used here almost universally, in the place of starch, and no one can visit Key West without being positively satisfied of the fitness of the substitute. It is so extremely valuable in the composition of many nicities of the table (a fact which have made known for the particular edification of our fair readers, and particularly in an imitation *Best Mang.* It is used by the planters, in some places as a bread stuff, and was so used by the aboregines, but do not ask it for so general a use as to have it superceds the use of either wheat or rye.

We shall rest satified if our notices secures for the manufactures as great a demand as the goodness of their arrow root deserves.—*Key West Enquirer.*

THE FARMER AND EARL FITZWILLIAM.

A farmer called on Earl Fitzwilliam to represent that his crop of wheat had been seriously injured in a field adjoining a certain wood, where his hounds had, during the winter, frequently met to hunt. He stated that the young wheat had been so cut up and destroyed in some parts he could not hope for any produce. "Well, my friend," said his lordship, "I am aware that we have frequently met in that field, and that we have done considerable injury, and if you can procure an estimate of the loss you have sustained, I will repay you." The farmer replied, that anticipating his lordship's consideration of kindness, he had requested a friend to assist him in estimating the damage, and they thought that, as the crop was quite destroyed, 50*l.* would not more than repay him. The Earl immediately gave him the money. As the harvest, however, approached, the wheat grew, and in those parts of the field that were most trampled, the corn was the strongest and most luxuriant. The farmer went again to his lordship, and being introduced said, "I am come, my lord, respecting the field of wheat adjoining such a wood."—His lordship instantly recollected the circumstance—"Well, my friend, did I not allow you sufficient to remunerate you for your loss?" "Yes, my lord, I have found that I have sustained no loss at all, for where the horses had most cut up the land the crop is most promising, and I have therefore brought the 50*l.* back again."—"Ah!" exclaimed the venerable Earl, "that is what I like; this is what it ought to be between man and man." He then entered into conversation with the farmer, asking him some questions about his family—how many children he had, &c. His lordship then went into another room, and returning, presented the farmer a check for 100*l.*—"Take care of this, and when your eldest son is of age, present it to him and tell him, the occasion that produced it." We know not which most to admire, the benevolence or wisdom displayed by this illustrious man; for while doing a noble act of generosity, he was handing down a lesson of integrity to another generation.—[*English paper.*]

Remarks by the Editor of the Farmer and Gardener.

The moral taught by the above simple narration of an anecdote, is worth millions to the world, if those who inhabit it would only profit by it. It demonstrates with a clearness, beauty, and force, which challenges admiration and wins respect in every quarter where integrity of the higest order is appreciated, and where benevolence springing from an unadulterated heart can find a response. How commendable the example of the young farmer! how glorious that of the venerable Earl! Such acts are, indeed, praiseworthy beyond all comparison—they are as the salts of the earth, and should teach poor grovelling humanity, even against its own consent, to pursue an upright and honorable course; for it places the *expediency* of such actions upon the all-subduing ground of interest. By an adage, as venerable as venerated. we are taught, that "honesty is the best policy"—and how happily does the present anecdote illustrate its truth, and exemplify the justness of its philosophy. "Take care of this, and when your eldest son is of age present it to him, and tell him the occasion that produced it"—said the Earl, as he handed the young farmer a check for a hundred pounds. Could advice be more appropriate? "Tell him the occasion that produced it!"—how solemn and how pleasing was the duty imposed upon the father of that son!—our life on it, his eyes glistened with the tear of gratitude and joy—gratitude to the thrice noble and generous donor, and joy that he had been made the herald of news so fulfil of the emanations of the most exalted and estimable attributes of human nature, clad in its best and holiest vestments! We would rather be able to pre

rent to our eldest boy, a hundred pound note under simil r circumstances, on his arriving at his majority, than to have it in our power on our demise to leave him thou sands unaccompanied by a deed so savory so hallowed by its purity, and so dignified by all that is lovely in the sight of God or man.

From the Maine Farmer.

CULTURE OF ROOTS—SILK, &C.

Mr. Holmes.—I will now resume the subject of root crops. Although the season is unfavorable yet my ruta baga, and particularly my potatoes look very promising. Much might be said to prove that some respectable farmers of our county, (Oxford) are beginning to awaken; and the probability is, that our State will in a short time rival the mother country in this most profitable branch of agriculture. Much has been written in regard to Silk culture, and I doubt not if these statements are correct, it must be a profitable branch of husbandry; but neverthel ss I will give it as my opinion that root husbandry will give employment to the greatest number of laborers. It has been said that one acre of land in Silk will yield, if the soil is suitable for the growth of the mulberry, three hundred dollars. I am perfectly willing that ladies and gentlemen too, should be clothed in Silk, but after home consumption is over supplied, what shall we do with the surplus? I have heretofore mentioned the subject of His Britannic Majesty's Provinces being contiguous to our State; this is indeed fortunate to both countries, for commerce is the handmaid of agriculture, and a beautiful damsel she is too, if you will permit me to write metaphorically a little. In regard to manufactures—if there are but three productive employments, this branch of industry must be of immense importance in every civilized country at least.

I will demonstrate, that if our farmers employ all their capital in cultivating silk, it must be that they pay little regard to poti tical economists. Mankind are so constituted that they must have food or perish, let them be clothed ever so well. The desires and tastes of men happily differ.—What will satisfy one man will only disgust nother.

Accordingly we find in all enlightened communities a vast variety of laborers calculated to enhance their own individual prosperity, and of course the public weal. But I will notice still further the subject of roots. It is said this branch of farming is the great boast of British Agriculture—yes, even in Ireland they are skilful in root husbandry, and in Wales for aught we know may be very skilful; indeed, in this and other branches of husbandry, experience teaches a good school, and fools will sometimes learn in no other. No man of intelligence will doubt the excellency of British agriculture, and no man of common sense, will, if he is patriotic, deny the fact, that we can catch light from our British brethren on the subject of scientific, and I will add practical husbandry. This being the case, let us notice something in regard to one Cobbett, who was, if report says true, a great cultivator of ruta baga or Swedish turnips. It is said he raised 50,000 bushels or more of this root. An inquisitive Yankee would naturally ask the question, what did he do with them? Of course stock of some kind or other must consume them: beef is very much relished in England and this country too—butter and cheese are also articles of comfort, and are convenient articles of the table. The profit loving Dutch generally manage business economically, and in a manner calculated to acquire the greatest amount of money from a given quantity of land with as little labor as possible; of course inventions, introductions of arts are beneficial to at least civilized communities. We can return a little light for light to our British brethren, let us then be thankful to that Being of beings whose providence has heretofore so signally favored our common country; let us then indeed be not only, united in the excellent cause of agriculture, but use a little energy in putting right those Southern patriots who stand in the way of the best interests of society. It is said that roots given to beef cattle do not yield quite half the profits as when given to milk cows, of course female labor will be highly necessary, not only in the management of daries, silken manufactories, &c., but various other concerns, and last not least, I think farmers' daughters should be well educated, or at least should spend a few hours every day studying or reading, which will doubtless promote the public interest. Agriculture as a science being made honorable and the young misses in their teens not wholly neglecting or despising it, we may fairly suppose. that being supported by such powerful pleaders, we may calculate on the future prospects of agriculture in our State with pleasure. Accordingly those gentlemen, manufacturers, as I shall term them, who furnish ingenious machines for farmers and those who use them either industriously or skilfully, together with logical and other literary gentlemen who directly or indirectly afford aid to that branch of industry, which I declare to be the foundation of national prosperity, and one of the surest bulwarks of liberty, are entitled to the high considerations of the public.—With regard to manure, our farmers are beginning to think a little on the subject; but alas! does enterprise sleep? are the minds of farmers clouded, or are they blind to their best interests? The Main Farmer is not a political journal indeed, but then we must conclude that agriculture is the foundation of our national glory.

A YOUNG FARMER OF RUMFORD.

From the Indiana Farmer.

Cincinnati, June 23, 1836.

IMPROVED STOCK.

I have just returned from an interesting visit to Major Clarkson's farm, where I was particularly delighted in viewing his stock, especially his improved Durham cattle. The Major has some fifty or sixty superior animals, from half to full blood. Those which are not full blood improved short horn, are generally crosses upon the Patton stock, varying, as said before, from one half, upwards. The animals I most admired was the bull Proclamation, a noble animal of pure blood, fine form, and weighing about 2000 pounds; old Hyacinth, a fine full blood cow, formerly belonging to Mr. Gerrard, deceased; and a two year old heifer, which sold at Gerrard's sale for $595. This is a very beautiful animal, and among other excellencies, has in my opinion, the most perfect hind quarter I have ever seen to a female quadruped of the cow kind.

Much as I was pleased with the view of this fine stock, I was a little disappointed on finding Major Clarkson's late purchases of stock, about twelve in number, at the sale of Mr. Powell, of Philadelphia and elsewhere, had not arrived. Among that stock is a bull of two years old, which cost $700. I suppose Major Clarkson's stock, with these additions, will be equal to any in the United States.

He will soon be able to furnish the enterprising stock growers of the west, with first rate animals, with which to commence an improvement of their stock.

I much hope the example of Ohio on this subject, will be followed and emulated by the farmers of Indiana. The country is waking up to the importance of improved breeds of stock of every kind. Farmers find but a trifle of difference, after the first outlay of procuring the better breed, between raising a horse that will command $150, and one that will sell for $30. They find it as easy to grow an ox worth $50 as $15—a calf that will sell at weaning for 50 to 100 dollars, as one that will only command two or three dollars. But I must close this epistle. I go from here to the Shaker village, where you may expect to hear from me again.

Yours &c. H.

From the New England Farmer.

FARMERS' AND GARDENERS' WORK.

On the use of lime for preserving health.—Lime is an antidote to contagon, a preservative against infection, and as a means of purifying sinks, vaults, &c., is one of the most useful substances. By making proper applications of this cheap, but powerful agent, together with a due attention to cleanliness and ventilation, the air in jails, hospitals, ships, &c., may be rendered comparatively sweet and salubrious. A quantity of lime while hot and quick scattered every day or two, into the vaults of back houses, and other repositories of offensive matter is indispensable as well to health as to cleanliness.

We should think it a very serious matter if we were forced to eat tainted provisions and drink filthy water; and yet many people appear to be very well satisfied, when, at every breath, they take a substance into their lungs, which is not only nauseous but poisonous. This inconvenience, however,

they submit to, when the remedy is cheap, and almost always to be obtained when and where the evil exists.

The walls of cellars, dairy rooms, sitting rooms, and indeed of all apartments, much occupied by human beings should be well coated with good caustic lime white wash, at least once a year. The time of its application may as well be just before the heat of summer becomes oppressive. In London, says an English writer, a society is organized for the "Cure and Prevention of Contagious Fevers, in the Metropolis," and they have appropriated a certain sum of money for purifying the tainted habitations of the poor. Their method consists simply in washing the walls of the room with hot lime which renders the rooms to which the white wash is applied, perfectly sweet and wholesome. In the villages of New England, the practice of white washing the walls of apartments is common, in cities it is not so usual. The walls of the apartments of our more opulent citizens are ussally decorated with costly paper, or something else, which answers as a receptacle for foul air, and which would be spoiled by white washing; and if they prefer finery to health, they must enjoy their own whims, and pay their own Doctors' bills.

Harvesting Rye.—The following rules for cutting and curing Rye are from an old Albany paper. They appear to us to be judicious, and may furnish hints to some young farmers.

Rye ought to be cut as soon as possible after the milk is out of the berry or kernel; then rake, bind in small sheaves and shock in the following manner; Set up four, five, or six sheaves together according to their bulk; then place on a cap sheaf.

In this position the shocks may stand till perfectly dry; then secure them in a barrack or barn, but never mow them on hay. Grain mowed on hay will receive more or less must, which is deleterious to animals of every kind.

Rye cut and secured in this manner is worth nearly double the price of that cut in the common way; the straw will make better fodder than clover, unless the clover be cut when very green, and particularly attended to in curing; the berry of rye will fill in a plump state, and the flour will afford as good bread as we can commonly obtain from wheat.

I have known number of persons who were deceived when eating rye bread from rye thus managed, and supposed the bread made of wheaten flour.

Weeds.—If you have a stock of weeds on your premises it may be worth the trouble to convert them to some useful purpose. We would not wish you in haying or harvesting to devote more time to saving weeds than may be compatible with correct economy. But it may be the case that the pig weed, the purslane, &c., of your garden will make food for store swine, and be worth your attention. Some bury weeds in trenches between rows of plants, and they make good articles in composts. In the latter case it may be well to sift a little quick lime over your heaps of weeds, and then cover them with a layer of the richest soil you can conveniently obtain to receive the fertilizing gases, given out by fermentation. A good husbandman permits as few vegetable and animal substances as possible to decay and putrify in the open air, but covers them with earth and quick lime if he has it, thus preserving his health by the same means by which he fertilizes his grounds.

From the Genesee Farmer.

BREAKING VICIOUS COWS.

BY C. P.

Mr. Tucker—I noticed an article in the 27th No. of the Genesee Farmer, describing the manner in which a "vicious cow" was reclaimed. I think such instances very rare, for I have known many men to possess vicious cows for years, who never read nor never thought of their being reclaimed; it was the same thing year after year. They thought as much before hand of the job of attending to them, as of any other work they had to do. Milking, as far as my experience has extended, is considered one of the most, if not the most, unpleasant chores there is to be performed about a family, and above all things a kicking cow is to be dreaded. She is always worse in the worst weather, and one is in danger at every milking time of loosing all the profits of his labor, unless he can content himself to go through with some operation of making her secure where she can do no injury.

I should be very much in favor of breaking vicious cows when it is practicable, but I believe the attempt is seldom successful. I think it is the best way generally to dispose of them for beef, unless a man has a very valuable one, which will well recompense the labor of keeping her. But such an animal as a vicious cow a man never ought to *raise*—there is no need of it. If one necessarily comes upon his hands already made vicious, he is not to blame. I have long thought that there was a great defect in the mode which some farmers use to break their young cows. We never should undertake to milk a heifer out in the lot, or in a corner either of the open field or of the barn-yard, where there is any chance for her to escape, and oblige us to have a *race* before we can again go on with the operation of milking. One such attempt may spoil her for a gentle cow, for she will long recollect it, and will be doubly worse to manage the next time. I have heretofore passed by farm-houses, and seen two or three great lusty fellows to work in this way, paraded around a corner of the yard, each holding some sort of a cudgel in his hand, raised over the apparently harmless young heifer, while she stands to be milked, half scared, and trembling prodigiously for fear of the expected blow.—Now this is all wrong, and entirely unnecessary. They very much mistake the nature of the creature—she is not so to be tamed. It is the regular course to make her vicious and ungovernable, and it will need but a few such operations.

I will suggest a plan which I invariably followed for four or five years with triumphant success, and when I changed my occupation, transmitted it to my successor with a special charge not to depart from it, during which time, and since which, (for I have been an eye witness of its faithful fulfillment,) I did not know, nor have not known, one single subject of its operation but what was or has been of the most harmless and peaceful disposition, so that man and boy, woman and girl, all, could perform the task of milking with equal ease and in equal security, either as it respects themselves or their pail of milk. And in such a case, every cow must not have her particular milker, whom when he is necessarily absent, or in any wise rendered incapable of performing this his ordinary labor, it requires two or three a half of an hour with clubs and stones, racing to and fro across the yard, to obtain her milk, or else she must go unmilked until her former master returns, or is sufficiently recovered to again enter upon his task. Some may have been acquainted with the plan long ago, but many to my knowledge do not now know it, or if they do, do not practice it: Drive the heifer and her calf carefully into the shed or stable, tie one end of a rope loosely around her horns, fasten the other end firmly to some post or staple, giving her a short play, and there let her stand.—Mind and not take her into any strange place, where cattle are not used to going. If she was accustomed to be led when a calf she will stand still, if not she will flounce around very briskly a short time at the length of the rope, but soon finding by experience that all is fast, she will immediately cool down. Then place before her a little mess, and commence milking while she is eating. Let there be no whip about, let there be no noise or blows, but every movement around her gentle and still.—When the oporation is completed, carefully untie her, open the door and let her out. One person is sufficient for the whole. Two is one too many, especially if she is a little wild, which however, ought never to be known among a farmer's cattle. She is now a cow, subdued and manageable,—all it requires is a few more such lessons, and I have the confidence to believe, from some experience too, that with a proper milker she will ever afterwards remain a gentle cow. She will be perfectly tame, so that you can lead her as well as a horse, and approach her in the field as well as in the yard.

There is a fault with some of our farmers in trusting the breaking of their heifers, and in fact the whole care of their cows, to boys. As a general thing they are not competent to perform the labor as it should be performed. It is often the case that they will get fretful while milking, and punish the cow most unmercifully when it is not due. The man should keep an eye to these things and see that all goes on in a proper manner. There is one universal fact occurs, and to which I presume hundreds can witness, when the management of the milk-yard is solely in the hands of boys—an immense deal of rubbish, clubs, broken rails, and strips of boards, and especially stones in abundance may be seen

scattered all over the yard, and in case one wishes to correct his cow, he finds every thing in readiness. I have before now seen loads of such rubbish collected around farm-yards, and truly it does not present a very neat looking appearance. Those farmers, therefore, who cannot well take the manage- of these affairs to themselves, if they wish to have their cows thrive, keep in good order, and gently treated, are advised to keep their yards clear of all these weapons, so as to remove even the temptation to evil. And nothing will give a stranger a better opinion of a farmer as he passes by, than to see every thing look neat and clean around his dwelling and barns. From this circumstance he will draw the inference, that it is so all over his farm, and he will always call that man a *neat* farmer.

H———e, July 16, 1836.

From the Genesee Farmer.

INFORMATION WANTED.

BY A YOUNG FARMER.

Ever since the introduction of the Saxon Merino into the country, there has existed a considerable difference of opinion among the breeders of sheep, and wool growers, as to their relative value, when compared with the Spanish Merino previously existing among us; some maintaining that they are more profitable than the Spanish, while others as strenuously contend that the advantage is on the side of the latter. The advocates of the Saxony breed insist that the superior fineness of the wool and the consequently higher price it commands, will more than compensate the deficiency in quantity of fleece, lightness of body, and tenderness in keeping, charged as faults upon them by the friends of Spanish Merino.

As wool growing is becoming an important and profitable branch of American industry, it is very desirable that the points in crotroversy between the two breeds of sheep should be early and correctly settled, that those who are entering upon the business may have certain data to go upon, and not encounter the losses usually attendant on undigested speculations. The points of difference which should be settled, and on which we as farmers require information, may be included in the following queries, viz: Does the Spanish Merino on the average clip a greater amount of wool than the Saxony; and if so how much? Does the Saxon wool on an average command a higher price than the Spanish; and if so, how much? Is the number of sheep lost—the average number we mean—greater in a year in one hundred Saxons, than in one hundred Merinos? Is the number of lambs raised from one hundred Merino ewes greater on the average than from the same number of Saxon ewes?—and if so, what is the rate of difference? Does the Spanish Merino usually weigh more than the Saxon, and for slaughtering command a greater price?—and if so, what will be the average difference between the weight and value of one hundred of each kind? In all these queries and estimates, it will of course be understood that full blooded animals of each kind are intended.

There have already been a number of excellent articles on sheep given to the public in the Farmer; but they relate principally to the best mode of treatment, diseases, &c., and do not enter fully into the points suggested above, and on which at the present time information is particularly desired. Some few writers have incidentally touched them, and to show what the opinion of some practical men has been, we give here an extract or two from some communications. Mr. Z. Barton Stout says—"In proportion to my ewes I have not succeeded in rearing an equal number of lambs for several years past, as I did before the intermingling of the Saxon sheep." "It is well known that some large flocks along the Genesee river, have, for some years past, deteriorated rapidly; and it is not unworthy of inquiry, how far the cause assigned, (the introduction of Saxon blood,) may have occasioned this deterioration." Mr. Jarvis, of Vermont, whose opinion may be relied on in this matter, he having been for a great number of years extensively engaged in sheep and wool growing, says, in an articles in Niles' Register, speaking of some pure Saxon imported sheep, "I put eight of these bucks to three hundred Merino ewes, and the progeny was more feeble than I ever witnessed from Merino bucks. I did not raise more than three lambs from five ewes, for two successive years; and in putting full blood Saxony bucks to the ewes thus crossed, I have not raised more than two lambs to five ewes. I have been still more unsuccessful in raising lambs from the full blood Saxon ewes and buck, although they have been rather better kept than my other sheep. From my full blooded Merino stock, my increase was commonly nine lambs to ten ewes, and never less than four lambs to five ewes, and my Merino bucks had always been selected for fineness and weight of fleece, and shape, from my own stock." As a reason for this difficulty of rearing, Mr. Jarvis says—"The form of the sheep will satisfy an experienced agriculturist of the true cause. They are long legged, thin quartered, flat sided, narrow boned, not sufficiently deep chested, and long necked. All domestic animals of this shape have feeble constitutions." The cause assigned by Mr. Jarvis for this constitutional defect is this: the persons employed by the elector of Saxony to make the selections from the Merino flocks in Spain, made fineness of wool the principal object, "and selected the finest wooled sheep without any reference to form of carcass or weight of fleece. In this they have succeeded, for the Saxony wool is certainly finer than the Spanish; but the latter will yield, sheep for sheep, one third more in weight of wool."

Perhaps the experience of the writer of this is too limited to justify the expression of an opinion; yet so far as it extends, it would seem to establish the principles laid down in the above extracts from Messrs. Stout and Jarvis. There can be no doubt that among the subscribers to the Farmer, there are a multitude of practical men, whose experience in sheep raising and wool growing, amply qualifies them to impart to others the information so much desired, and which would at once settle those questions which now perplex so many farmers. If such men would now and then devote an hour to the recording of facts connected with their experience in farming, and particularly to the queries mentioned above respecting sheep, and give them to the public through the medium of the Farmer, we are confident they would receive the thanks of the farming community, and from no individual would these be more sincerely rendered than by a YOUNG FARMER.

From the Genesee Farmer.

COW-YARD FROLICS.

BY J. B B.

How many lamentable as well as laughable scenes I have witnessed in the cow-yard, when good management would have produced a flowing pail of milk, quietly and peacably drawn from the cow, with ease and comfort to her, and the milker satisfied and thankful. There are different ways to do the same thing, yet but one way that is right, and that is the *best* way. For instance, you have a cow with sore or cracked teats, from which when milked the blood will ooze out between the fingers. This must necessarily be very painful to the cow; but never mind that—she must stand or take a drubbing. Heedless that a cure might be effected in a very short time, with very little trouble, the cracked teats are left to get well as they may. Now, "Old Kick" is a very high strung cow, and full of mettle, and will not stand such treatment. She kicks and runs occasionally, and occasionally gets a flogging to pay for it. However, she continues to kick, because she is hurt, when milked, until the habit of kicking becomes a kind of second nature to her, and then look out for trouble afterwards. The milker commences milking her, she chews her cud, looks good natured, and every thing appears as though it was to be done decently and in order.—But the scene soon changes, for "Old Kick," not liking some movement, introduces her hoof against the side of the pail, (if not into it,) and turns it topsy-turvey, the pail rattling and the milk flying. "Old Kick" now expects a flogging, so off she starts full sail. The provoked and angry milker pursues her with the first club or stool he can get hold of, and now for a chase. Round the yard they go at full speed, (which frequently starts the other cows, and over goes another pail of milk,) until "Old Kick" is overtaken, and then the club or stool is set in motion upon her sides, the sound of which is not unlike the sound of the thresher's flail, which makes the woods resound with its echo. "Old Kick" is now cornered up, and has to take *it*, (showing her *good will* by kicking now and then, and shaking her head,) till the milker considers her thoroughly subdued, and then commences again to milk. Ten chances to one if he has not to go through with another performance like the one just mentioned, before "Old Kick" is set at liberty until the time for another milking. Now, the right way would have prevented all this

trouble, and "Old Kick" would have remained as she used to be, not the worst of cows. The first step would have been to have cured her teats, which is very readily done by washing them with cold water, and then applying a little *linseed oil*, for a few milkings,—(an effectual cure.)

I had the misfortune to be milker of a cow, ("Old Kick" was her name,) for two or three years, which had been trained as above mentioned. She was as bad as bad could be, as split pails and sore shins would at the time have testified. She was for the first two seasons gentle and kind, and was considered a very excellent cow. She was then sold, and probably by bad management, either by having sore teats or some other cause, became, as I have stated, as bad as bad could be. The purchaser was accordingly dissatisfied with his bargain, and the seller not knowing the reason, and considering her well worth the money paid for her, gave the man his money and again took the cow. Many has been the frolic I have had with her, for hardly a night or morning passed without a chase, and nothing short of a good threshing would induce her to stand still and be milked. At length I invented a plan which ended the flogging business, and "Old Kick" was completely under my control. I made a small pen and drove her into it, having prepared a strap with a buckle at one end, and buckled it around her hind legs. I then let her manœuvre to her own satisfaction, and finding she was fast, she accordingly gave up, and I milked her without even one attempt to kick. She soon became willing for me to buckle the strap without choice of place, and I had no more trouble afterwards, otherwise than keeping a strap in readiness. I tried several times to milk her without fastening her legs, but she soon convinced me she had not forgotten her old pranks. I used the strap two years; she was then fattened and sold to the butcher, and thus ended the life of "Old Kick."

To me no part of the farmer's stock looks more grand and beautiful, as well as lucrative, than a number of sleek, handsome and stately cows, yarded for the purpose of milking. See them! How majestic they look! Their large and handsome bags, furnished with clean and nicely shaped *handles*; and then to draw an overflowing pail of the white and foaming liquid. What can be more delightful!

In my opinion, farmers in general do not make it sufficiently their interest in the selection of their stock, especially those for the dairy. In the first place, the best breed should be obtained, and then a selection should be made of such as are kind and gentle, with another very necessary appendage, viz: sizeable teats. We have a young cow at the present time, and, to speak within bounds, I should not think her teats exceeded one inch and a half in length. The other day I had occasion to milk an old ewe, which had lost her lamb, and am confident her teats were full as long, and I think for choice I had rather milk her! Now I should charge in the course of a season to milk such a cow the extra time, well as trouble and perplexity taken into consideration, full as much as the butter or cheese made from the milk would be worth. The better way I think would be, if necessary, to buy a cow furnished with better teats, (even upon credit,) and let the calf run with the former until old enough to wean, and then fit her for market.

Once more, and I conclude. As it is a very easy thing to spoil young cows, even by a few milkings at first, by bad management, due care should be taken, and the best method pursued. We have found it the most advisable in breaking heifers, to make a small yard and drive them into it, when milked, for a short time at first. If they show any disposition to be obstinate or sulky, the better way is to coax them and treat them gently; they will soon yield, and you will gain their affections, and be blessed with good and gentle cows.

J. B. B.

Ledyard, July 2, 1836.

From the Maine Farmer.

SCYTHE MAKING.

Mr. Holmes:—I have long been convinced that the Temperance reform was exerting a salutary influence on the three great interests of New-England; but never till of late have I been fully aware of the extent of the reform in the great manufacturing establishments, or the amount of good which has resulted.

During a late excursion in Massachusetts I have visited a large number of factories and workshops, and, through the politeness of the proprietors or their agents, have been informed of the principles on which they are conducted, and permitted to observe the several operations. I propose, as I may find leisure, to communicate to the public, through your highly useful paper the results of my observations.

The first factory I visited was a scythe factory; I shall therefore make the manufacture of scythes the subject of my first communication.

Most of your readers have probably used scythes stamped with the name of "*Farwell*," and have found them to deserve the very high reputation they have enjoyed for more than forty years. Mr. John Farwell, the original manufacturer of these scythes, is still living and actively engaged in the business, which he commenced so early as 1794. Prior to that time, and indeed long after, most of the scythes used in this country were imported from England and Holland. Farwell's scythes however soon entered into successful competition with the foreign article, and have continued to do so to the present time.

There are two branches of the scythe factory of Messrs. J. Farwell and Co.; the one situated in Chlemsford in the county of Middlesex, and the other in Fitchburg, in the county of Worcester. The two shops give employment eleven months in the year to about 24 men. The iron used is the best Russia Old Sable, and the steel, either Cast Steel or German Steel of the first quality. There are twelve operations in making a scythe, each of which are performed by one individual exclusively.

The first operator takes a piece of iron 5 inches long, 2½ inches, wide and half an inch thick, this is heated and drawn to the length of 15 inches, or thereabouts; it is then bent over and doubled and a bar of steel, weighing half a pound and of the same length as the doubled bar, is inserted at one side. The whole is then welded and drawn to the length required. The second operation is that of drawing the bar to a point. The third consists in plating it to the required width. The 4th in crooking the point ready for the forming or swedging machine. 5th, in turning the back and swedging the web. 6th, in turning the heel. 7th, in tempering and straightening. 9th, in grinding. 10th, in adjusting the edge and inspecting, which is usually done by the master workman. 11th, in varnishing. 12th, labelling and preparing for market. Recently these gentlemen have introduced the use of mineral coal in their forges, and one of the firm is the patentee of the "concave sett." By these two improvements combined, the expense of manufacturing the scythes is materially diminished, and the danger of separating the back from the web, in grinding, is avoided. In each of the shops there is a blowing machine, by which means of pipes, communicates with the numerous forges, and keeps up the degree of heat in all. All the machinery is driven by water power, and in both factories not less than 2500 dozen scythes are made annually.

In examining the works, I was much pleased with the neatness and order which prevailed, and with the air of cheerfulness and health which was apparent. In answer to my inquiries, on this head, the Messrs. Farwell and their partner, Mr. Simonds, informed me that they conducted their factories on the most rigid principles of temperance. They furnish no intoxicating drink to their men—they decline giving employment to any man who is known to use spirits as a drink, either habitually or occasionally. The results of this prudent arrangement is that the work is done in the best manner and in season, and there are no quarrels, nor misunderstandings. Every one knows his duty and performs it—every one understands his own rights and respects those of his employers and shop-mates.

Here, then, Mr. Editor, is another proof that intoxicating drinks are not necessary for laboring men, even when engaged in the most arduous employment, and exposed to opposite extremes of temperature. It is not, however, a solitary proof. A large proportion of the manufacturing establishments in Massachusetts are conducted on the same principle. We sometimes hear of *reaction* in the temperance reform, but I saw no reaction in Massachusetts, on the contrary the cause seemed to be everywhere gaining friends, and I doubt not that, built as it is on the truth, and connected as it is with the best interests of all classes in the community, if reasonable efforts are made by its friends, it will continue to triumph until, at no distant day, alcohol will be confined to its appropriate place—the shop of the apothecary.

A Traveller,

From the New-England Farmer.

NORTHERN EXPOSURE TO FRUITT—TARRING TREES INJURIOUS.

THOS. G. FESSENDEN, Esq.

Dear Sir—My own garden is an inclined plane, facing, as we say, to the north west, I have found from observation, during five successive years, that vegetables on land of a southerly aspect have been affected by frost, when those of the same kind in my garden were untouched. If the fact be true, I would ask what philosophical principle must be summoned to give an explanation.*

I would state a fact, showing, as I suppose, the effect of *Tar* upon fruit trees. My neighbor and I owned two adjoining orchards, the cankerworms have visited them without mercy for eight successive years—my neighbor tarred his trees in the usual way, mine were many of them large, and taking into the account the expense and trouble and chance of injury from the tar itself—I suffered the insidious invaders to range unmolested. The last season the worms were few compared with preceding years, and many trees were permitted to produce as they were wont. My neighbor's trees abreast of mine, of the same age and kind, bore but sparingly, while mine produced in great abundance—the tar must have been the cause.† This matter is, no doubt, well understood, but as it came under my own eye, I pass it to you; it may not be useful to publish.

Yours truly,
JOSEPH HARRINGTON.

* BY THE EDITOR.—The following remarks originally appeared in the Hampshire Gazette. President Dwight, in his "Travels in New-England," &c., says, the common opinion that tender plants and fruit trees ought to be placed in a warm southern exposure, to preserve them from frosts is erroneous. He adduces many facts to prove that fruit trees should be planted on north western, northern, or western declivities, where they may be exposed to the north western, northern, or western winds. A white frost being merely frozen dew, the great object should be to keep the dew from resting on the plants. This can be effectually done only by exposing them to the free access of the north western wind, the source of almost every white frost. Plants from which the dew is swept away by this wind will escape; while those which, by being sheltered from its current, retain the dew, will be destroyed. Major White, of South Hadley, had an orchard on the north western declivity of a hill, exposed to the strong winds that blow through the gap of Mount Tom and Mount Holyoke. These winds swept the dew from this orchard so effectually, that its blossoms regularly escaped the injuries of such late frosts in the spring as destroyed those of the surrounding country. The inhabitants of South Hadley styled such a frost *Major White's Harvest*, because in such years his cider commanded a very high price. A Mr. Lyman informed President Dwight that in his garden, which was exposed to the north west winds, the white frosts had never done any injury to the vegetables. See N. E. Farmer, vol. v. p. 348.

Another advantage in a northern exposure is obtained by its keeping vegetation back till late in the spring. If vegetation commences early, subsequent frosts congeal the sap in its pores, and kill the young plants by bursting or tearing its fibres: as a glass or earthen vessel is broken by water being frozen in it. See N. E. Farmer, Vol. v. p. 260.

† The following process has been recommended for defending trees against canker worms. A *strip of linen, or canvas*, is put round the body of the tree, before the females begin their ascent, and well smeared with tar, &c. The design of the strip is to prevent the tar from coming in contact with the tree, which always injures it. See New American Gardner, Art. Insects. A gentleman informs us that in Plymouth, Mass. they make use of the following mixture as a substitute for tar, in preserving fruit trees against canker worm, viz.: White varnish, soft soap and whale oil, one third of each, to be mixed and applied at the times and manner of the usual application of tar for the same purpose. The advantages of the mixture, we understand, are, that it is not so soon hardened by the weather, and of course need not be so often applied, and does not in the least injure the trees to which the application is made.

From the Cultivator, for August.

DIFFUSION OF AGRICULTURAL KNOWLEDGE.

MY DEAR SIR—I wrote you a short letter from Pennsylvania. on the subject of the sugar beet; in passing through Ohio, Kentucky, Indiana, Missouri, Illinois and Michigan, I have stated to many intelligent and wealthy individuals, the value of the sugar beet, and I am glad to inform you, that a general feeling prevails, that a new and important product is about to be introduced, which will be a source of vast benefit to our country. All that is now wanting, is information; when that is diffused, capital and enterprise are ready in abundance, to undertake the maufacture. I find that the good and enterprising every where are deeply impressed with the importance of the universal diffusion of information that will tend to improve husbandry, education and temperance. Your excellent paper, the Cultivator, is becoming a mine of wealth to farmers—could each one be induced to subscribe for it, I will venture the opinion, that he would derive advantages over the cost a hundred fold.

I have frequently forwarded a copy of our temperance papers to each post-master in the Union, with the hope of interesting them in the cause, and inducing them to act as agents. The consequence has been, they have, as a class, been among our most valuable friends, for procuring subscribers and transmitting money.

It is of such vast importance that the farmers in all parts of our country, especially in the new parts of it, should have your paper, that I wish you would forward one of your first numbers to every post-master in the United States, with a short address, calling attention to it, and soliciting each to act as agent. The low price of the Cultivator, its valuable contents, and the profits (if any,) derived from its subscribers, being entirely devoted to advance the general interests of agriculture, will commend it to universal patronage, when known and appreciated. For the expense of this distribution, you may call on me.

I am, dear sir, respectfully yours,
E. C. DELAVAN.

Chicago, June 23, 1836.

From the Cultivator, for July.

PLANTING—NO. I.

Trees give to a farm half its intrinsic value. Without trees about it, a farm house looks naked, cheerless and uncomfortable; and without trees man enjoys but a modicum of the blessings which providence has destined for his use. Trees are the farmer's resource, in most cases, for building, for fencing and for fuel. About farm buildings, they afford shelter, and are conducive alike to health and beauty. In the orchard and garden, they are sources of interest, of luxury and substantial profit. It is announced in a late Northampton paper, that Captain Hale, of that vicinity, had sold thirteen locust trees for $153, and a red oak for $30; and that a white ash, which grew in that neighborhood, when converted into plank, brought in market the round sum of $70.—Besides their intrinsic value for timber, and fruit, the judicious planting of trees, in open and exposed situations, "improves the general climate of the neighborhood, the staple of the soil, as regards the gradual accumulation of vegetable matters, affords shelter to live stock, promotes the growth of pasture and corn crops, beautifies the landscape, and thus greatly and permanently increases the value of the fee simple of the estate and adjoining lands."

"What is your age?" was the interrogatory which an eastern prince caused to be put, by one of his attendants, to a very old man, seated by the way side. "I am four years old," was the reply. "Do you intend to insult his majesty?" was the rejoinder. "No, may please your majesty—it is but four years since I began to live, as I ought, for posterity—*since I first planted a tree.*" According to this definition of living for posterity, but comparatively few of our countrymen have began yet to live; for instead of *planting*, their study and occupation have been to *destroy* trees. But every consideration of interest and comfort admonish us, to change our habits in this respect, and to provide in time for the wants of posterity. The old settled States are already experiencing a scarcity of wood, and they contain vast tracts of land, now in a great measure unproductive, which, if planted, would in a few years yield a profitable return in wood, and the great Prairie West is rapidly filling with a population which will soon exhaust its spare woods.

Planting woodland may be regarded as a new business with us, though the Massachusetts agricultural society have endeavored to encourage it by liberal premiums, and individuals, in different parts of the Union, have directed attention to it. It is related of a farmer on Long Island, that he planted a hundred locust trees on the birth of each child, and that the proceeds of the hundred trees, when the child became of age, afforded it a handsome outfit. It is a branch of rural economy which we *must* begin at some time, and the sooner we begin the better. Many districts on the old continent have become desolate, and almost uninhabitable, in consequence of the total destruction of the wood. This is the condition of many tracts in Asia, in Spain, and in the environs of its capital, and even in Russia. In speaking of the maize and vine district of that empire, lying upon the Black sea and the confines of Turkey, a late writer, said to be a Russian statesman, mentions as a great defect of this region, the almost total absence of forests: and he recommends the planting of larch and other quick growing trees in spots where the soil is suitable, and sheltered from the strong blasts which sweep the plain; to rear other plantations under shelter of the first; and the planting of trees near farm houses, and villages, round the fields, along the roads, and especially in the ravines, as means of ameliorating the climate, and increasing the productiveness of the soil.

The planting of forests and ornamental grounds, has long been practised in Europe,

particularly in Great Britain, where it is sedulously encouraged by statesmen as well as landholders. It has contributed much to beautify the country, as well as to improve the productiveness and profits of the soil. Some idea of the extent to which it is carried may be formed from the fact that in the twenty-seven years between 1802 and 1829, the Duke of Bedford alone had planted upon his estate, 1,540 acres of ground, with five millions seven hundred and thirty-five thousand trees, exclusive of 680 bushels of acorns and other seeds put in with the dibble.

The business of planting, like the culture of turnips, or any other *new* branch of rural economy, seems much more formidable and expensive in prospect, than it turns out to be in practice. It may be managed upon every farm, with but trifling expense, by the ordinary laborers. Seeds of our forest, ornamental and fruit trees, may be readily gathered at the proper seasons; and under the plain directions which we intend to give, they may be sown, and trees reared and planted and grown without difficulty.

It is not our intention, in these remarks, to say any thing of trees exclusively ornamental, or particularly belonging to the orchard or garden, except to express a hope, that at least orchards already existing may be spared from the axe, if not for the liquor they afford, or the important material of diet they furnish in the kitchen and in the dessert, or at least for the profit of the proprietor, in feeding and fattening his hogs and other farm stock. Ample and indisputable testimony has been recently afforded, that the same area of land is far more profitable, for feeding farm stock, in an apple orchard, than it can be made in growing for them grain or roots. Our present object is to make some brief suggestions on planting forest timber, particularly for the benefit of our subscribers in the Prairie West, where, if we understand the condition of the country, this ought to be one of the first subjects that should engage the attention of the settler.

From the New-England Farmer.

RAISING CHICKENS.

The following is a valuable article and relates to a branch of rural economy, which deserves more attention than it has received in this country. Further favors of a similar nature from the same hand are respectfully solicited.

Mr. Fessenden,

Sir,—In one of your late papers I saw mentioned a successful way of *raising chickens*,—I have been in the habit of raising them for some years, and if you think favorably of the mode I have adopted, you can insert it in your valuable paper.

I keep my hens warm under cover during the winter, and feed them on "Brewers' Grains" placed in an open box or tub, that they may eat when they please, occasionally giving them oats, corn, and oyster shells pounded fine, and plenty of water—by keeping them warm and well fed, they begin laying earlier in the season. I prefer spring chickens, as they lay earlier than old hens—and the old hens to set, as they make the best mothers. I take care the eggs do not get chilled with cold, and keep them in a warm place in my house. When three or four hens want to set I put from thirteen to fifteen eggs under each of them, according to size—the day of the month marked on each egg—and after the hen has set a week or ten days I examine them by holding the eggs to a crack or knot hole in a board when the sun shines through, and if I discover any rotten ones, I take them away and replace them with fresh ones marked as before mentioned. When the chickens are all hatched I put two or three of the broods to one end, in a coop with an opening against an empty barrel placed on the ridge, and with a little care, when put in the coop, the hen may be made to brood them at the further end of the barrel. In that way the chicksns that are not covered by the hen huddle together around her, and keep each other warm. The hens from which the chickens are taken I put into another coop, and in about a fortnight they will begin to lay again. The hen being confined in the coop, will leave her chickens much earlier than if left to run at large with them, and the chickens will become so accustomed to going into the barrel and huddling together, as to be quite contented to give up the hen's brooding them. After the chickens are two or three weeks old I remove them with the coops into my garden, where they feed upon insects, so as to require but little food—but do not keep them there until they are large enough to injure the garden.

I feel persuaded that in the way I have proceeded, our market could be supplied with an abundance of poultry, and I recommend it with confidence, if managed with care and attention, as profitable to those who may engage in such business.

Charlestown, July, 1836.

CLOVER LEYS.

It will undoubtedly be remembered that innumerable experiments have proved that clover leys, turned under, make an admirable dressing for a crop of wheat the next year. Clover, if we mistake not, is a biennial—that is, lasting but two years, after flowering and going to seed the second summer, the roots begin to decay, and ultimately die out and leave the soil for the Herd's grass, or other plants which may be sowed with the clover. Hence it will be well, in order to make the most of the roots as a dressing for wheat, to plough them under as early in the season after haying as can conveniently be done. By the following spring the sod has become decayed, and in a good state to promote the growth of the future crop.

From the New-England Farmer.

FARMERS' WORK.

A writer in the New-England Farmer who dated from Lynn, and used the signature "*A Farmer*," made the following remarks:

"I destroyed what few thistles I found on my farm last year by some refuse beef brine, without the trouble of cropping them down; though I think it best to crop them even under ground. Indeed the cropping or cutting down should be attended to before this time of the year, [fore part of August] if nothing more is done in order to prevent their spreading. Its downy seeds are now in this vicinity wafted about in the air by every wind—they just begin to be let loose, and will propogate far and wide. It is matter of astonishment that so little attention is paid to the subject. Farmers were informed several years ago, of the efficacy of the above method of destroying the thistle, or one quite similar in Vol. II, p 411 of the New-England Farmer, and yet they still neglect to make use of it." * * * * * *

The following is an extract from the passage alluded to: "Cut off each thistle about half an inch below the surface of the ground and then pour on it a gill of coarse salt. Fish brine may be used instead of salt, and will answer the same purpose. If in a bed of thistles a few should escape the first year the above operation should be carefully performed on them the year following. The summer season, when the thistles are in full growth is the proper time for doing the business."

A correspondent of the New-England Farmer, with the signature "*Rusticus*" Vol. VII. p. 137, ridicules the idea of destroying thistles by salt, as advised by the writer of the above article. Rusticus observes that "Philosophy as well as experience conclusively proves that mowing thistles off two or three times in a season, particularly when in blossom will effectually destroy this pest of our farms, without the application of a gill of salt. Repeated defoliation will destroy any tree or plant with which I am acquainted.—Leaves are necessary to the growth of plants, and they cannot live without them in summer. A few years ago, whole forests of sugar maple were killed by the caterpillar destroying their leaves about midsummer. The white mulberry is very tenacious of life, and yet were it entirely and repeatedly stripped of its leaves it would die. I have lost hundreds of young plum and cherry trees the last summer, by small black lice which attached and destroyed the foilage of the new budded stock. Leaves are to the vegetable what the stomach is to the animal, the organs of digestion, which converts food into nutriment, and without this nutriment the plant nor the animal cannot long subsist. The Canada thistle has diminished in West Vermont nine-tenths within my recollection. They are annually cut above the ground, and have not, I believe, been dosed with salt or pickle.

To this it was replied by our friend of Lynn, as follows: that destroying thistles by his method is not mere theory. "I have destroyed them with brine and without even cropping—nor do I believe the cropping essential. As to the expense, I should suppose a horse load of salt, which I have seen sold at the wharves for one dollar and fifty cents, being salt which had been used for salting imported hides, would be sufficient to destroy the thistles of least half an acre, and a man would perform all the labor required in three hours.

"I have seen the method of mowing them several times in a season, practised several years in succession in Ipswich, where they abound; and could perceive no other effect than a tendency to prevent tqeir spreading. As to your correspondent's philosophy of defoilation, to destroy trees and plants it may be correct as respects some species; but pray what will he charge to come and destroy

by this process an acre of my barberry bushes, blackberry vines, or of the various kinds of bushes that infest our low lands! These I have cut in the height of their vigor, without much effect, but have seen the same killed with salt without much trouble. I doubt much if the common willow would be destroyed by divesting it of its foilage at any season. If cutting a plant so tenacious of life, as the thistle will kill it, how extraordinary it must be that our tender grasses, (most of which are cut in the bloom, and often more than once in a season) are not destroyed by this means.

It is well known that some shrubs, such as the Chinese Mulberry, the Box, the Willow, &c., may be cut off, or headed down for an indefinite period without effecting their destruction. Old pastures which have been cropped for many years produce better and sweeter grasses than are obtained from land recently laid down to grass. Garden vegetables, used for salads produce more as well as better foliage for seasonable cropping. Cropping thistles in the blow, we believe, will not at once extirpate them, but it will prevent their being propagated by seed, and thus infecting a whole neighborhood.—In many cases, where the plague of thistles is limited to small locations we believe that the application of strong solutions of salt will be the cheapest as well as the most effectual mode of destroying them; but in all cases thistles should be cut in season to prevent their being propogated by seeds.

From the Cultivator, for August.

MATTERS OF INTEREST TO ALL.

We venture to lay down the following propositions as adapted to our day and country:

1. *Every business in life is mainly dependent, for its prosperity, upon the labors of agriculture.*

Agriculture is the body, while the other professions are the members; and although the body and members are mutually dependent, and reciprocally useful to each other, the body can exist without the members, much better than the members can exist without the body. The farmer can supply his necessities, and most of his reasonable wants, within the circle of his family; he can feed and clothe himself: but his wants are enlarged, and his ability to gratify them increased, in proportion to the profits of his labor. If through ignorance or sloth he produces only what is necessary for the sustenance of his household, he can buy neither of the merchant, the manufacturer or the mechanic,—nor contribute to the support of the learned professions; or, if he buys, he cannot pay. But if his produce is double what is required for the consumption of his family, the surplus half may be employed for the benefit of the other classes—in purchasing from them the comforts and elegancies of life. The other classes, on contrawise, cannot thrive, as such, without the aid of the farmer: he furnishes the raw materials for the manufacturer, he feeds the mechanic, and freights the bark of commerce; and is besides the principal customer to them all. It follows, as a corrollary, that

2. *The prosperity of a State is determined by the good or bad state of its husbandry.*

We see every where, in districts as well as in entire states, the strongest proofs of the correctness of this proposition. Contrast Dutchess, Orange and Columbia, with any three counties where agriculture is neglected, or managed in the old slovenly manner. In the first, all classes thrive and prosper, if they are industrious and prudent; because there the body is in healthful vigor. In the latter, you will find the body lethargic, diseased, and covered with putrifying sores, and the members partaking of all its infirmities. The last winter's experience, in our cities and towns, shows their extreme sensitiveness to the fluctuations in the supply of agricultural products. Some of the farmers crops were last year deficient in the accustomed yield, and the consequence was, the buyer had to pay 25 and 50 per cent above the ordinary prices for many articles of the first necessity. Had the products of the soil been double what they were, prices would have been low, and the buying classes would have subsisted cheaper and better, and the farmer would have purchased of them, in return, more liberally.

3. *The improvements and proffits of agriculture, and the consequent prosperity of a State, are in the ratio of the measure of intelligence which guides its labors.*

The head can do no more than the hands. The animal strength of the ox and the horse would effect no useful purpose, with the contrivance and direction of man. In many countries on the old continent, where the cultivator is debased by ignorance and despotism, the awkward, ill-contrived implements of the primitive ages are still in use; and in some parts of our own land, the hoe, or the rudest machine of a plough, is still substituted for the greatly improved implements of modern times, because the cultivator is ignorant and servile. There is not a manufacturing employment, nor a mechanic art, but has been greatly abridged in its manipulations, and had its fabrics improved in quality, and reduced in price, by the aid of modern science. We say *modern* science, because we consider that some branches are but beginning to develope their practical advantages to useful labor. We verily believe, that science can do more, and will do more, in the coming thirty years, to improve the condition of agriculture, than has been effected in the two last centuries. An intelligent head is deemed of more importance, and commands a higher compensation, in many of our large establishments, than half a dozen mere sinewy arms. Mind is the lever that moves the material world,—the master-spirit that civilizes man, and multiplies his comforts and enjoyments. We may acquire knowledge in our business, mechanically, but slowly. The acquisition may be accelerated and augmented, to an amazing extent, by the experience and teachings of men who have made natural and chemical science their study and employment for life. There is another consideration which renders the improvement of the mind of public benefit: ignorance begets indolence, and indolence begets vice. If we would, therefore, inculcate virtue, we must foster industry; and if we would make industry respectable and desirable, we must throw light upon its paths, and secure for it merited reward.

If we have succeeded in establishing our propositions, it results as a consequence, that the improvement of our agriculture is of the first importance to every class of our population; and that this improvement can in no way receive such efficient aid, as by instructing the youth who are hereafter to manage its concerns, as well in the science as in the practice of their business.

We have drawn the readers attention to the subject at this time, that the measures neccessary to produce the desired result may undergo a thorough and timely investigation, and that our citizens may be prepared to co-operate in such of them, as may seem best adapted to subserve the public weal, before the coming winter. The distributive share to New-York, of the surplus revenue, which congress, with great unamity and wisdom, has directed to be divided among the States, will probably amount to between two and three millions of dollars. And the question will present itself to our next legislature, and upon which they will want an expression of the public wish, to what objects, and in what manner shall these monies be applied? Shall they be expended on internal improvements, on education, and in improving our agriculture, upon either or all of them, exclusively, where their benefits cannot fail to be general, and important, and abiding,—or shall they go into the general fund, where there benefits are likely to be more partial and transitory?

As pertinent to this subject, we would ask the reader's attention to the extract in our young men's department, from "First Lessons in Political Economy," by Professor M'Vickar, of Columbia College, a little work which the man as well as boy may peruse with profit.

From the Cultivator, for August.

VIRGINIA HUSBANDRY.

Dear Sir—I enclose you five dollars, and request you to send the Cultivator from its commencement, to William Price, &c. It is pleasing to observe, that the Cultivator is so popular in this section, and I trust that it will be the means of doing much good among us. There must doubtless be much difference in the objects and the details of agriculture in the region for which the work was originally designed and ours; but the general principles of agriculture are the same every where. In this part of Virginia, we have much the advatage of you in climate, but our soil, on an average, originally thin, has been wofully abused, by the necessity which distance from market and bad avenues to it, have imposed on us, of making tobacco almost our only market crop. This weed is not a great exhauster of land, but requiring all the ma-

nure and most of the labor on a farm, that part of it occupied by other crops, which are great exhausters, must of necessity become poor. Distance from market, also, deprives us of the benefit of lime as a manure. This article generally sells at from $3 to $3,50 per tierce. There is probably no part of the United States farther removed from the facilities of procuring lime, and probably none in which lime is more needed by the soil. This defect may, possibly, at some future day, be remedied, by railroads and the improved navigation of our streams. For some time to come, however, if we improve at all, we must endeavor to do it without the aid of lime. Under past agricultural management, our lands have been constantly deteriorating, and unless the course is changed must soon arrive at that hopeful condition when they can get no worse. Under such circumstances, I see no hope for improvement, except from extra exertions to procure putrecent manures. These might be produced in greatly increased quantities, by cultivating root-crops on a greatly increased scale, and by other means of sustaining many more cattle than we generally keep; particularly by cultivating artificial grasses largely, which, while they would afford food for the stock, would protect the land from the sun and from washing, and would meliorate the soil, on the principle of convertible husbandry. That deficiency of lime which so peculiarly adapts our lands to the growth of tobacco, is accompanied by a great drawback in the culture of artificial grasses, from its excessive tendency to the spontaneous production of weeds. The most promising fields of young clover, are speedily overrun by sedge grass, stick-weed sorrel, and a thousand etceteras. We need some *half weed, half grass*, which, on poor land, could contend with such things. Perhaps yarrow might be the thing.

We generally keep no more stock than we can squeeze through the winter on the offal of the grain crops. Any accidental surplus of cattle must either be killed in autumn as grass-beef, or die towards spring to afford leather from their skins. Few think of cultivating a crop especially for cow-feed, and rare indeed is the man who makes express provision for feeding sheep. Were a few acres of our tobacco lands cultivated in roots, and the nakedness of all our idle land hidden by artificial grasses, a great change would soon be perceived in the number and quality of our cattle, and in the fertility of our soil. It is morever believed, that the increased quantity of manure resulting from such management, would operate as a poison on many of the weeds which are now such pests.

That our soils are well adapted to the culture of ruta baga, I have demonstrated, to my own satisfaction, by a successful trial, on a moderate scale, for a number of years. I intend to try it more largely this year, if the excessive wet weather will abate long enough for me to get the seed in the ground. I cultivated mangel wurtzel last year, on about the fourth of an acre, and succeeded to the astonishment of all who saw the crop. And here I should retouch the picture drawn above, of Virginia agriculture, by stating, that during the spring there was anxious inquiry for the seed of mangel wurtzel generally through the country, and that the demand could by no means be supplied. Indeed—many thanks to my friend Mr. Ruffin and yourself—there are strong symptoms of improvement in our husbandry, evinced by the greatly increased quantities of clover and other grass seed, brought from the north and sold by our merchants. Some of them, however, contain mischievous impurities, such as blue thistle, St. John's wort, ripple grass, &c. which thrive prodigiously in our soils.

My enthusiasm in the cause of agriculture, must be my apology for being tedious. My intention, when I commenced writing, was simply to mention the matter of business with which I began, and to ask a favor—it is this:—I know that an editor ought not to be expected to become the private correspondent of every obtrusive subscriber he may chance to have. But will you, in one line, recommend a person who would willingly become such? I wish to know more than I do about vetches, chicory, alsike clover, and many other matters. I received a few seed from a friend the last spring, under the name of Egyptian clover, much mixed with chicory and other things, which I never saw before. The clover put forth white blossoms soon after coming up, has, perhaps, as many blooms as leaves, and after the bloom falls, the seeds are retained in a reddish colored bur, somewhat resembling in shape the bur of the teasel. This may, possibly, be the alsike clover. It was, unfortunately, sown in very springy ground, and has been nearly drowned by wet weather. It is inclined to grow erect, and to branch but moderately, and that entirely above ground. I may wish for a friend in your region, who would be willing to answer inquiries about such matters, to attend to small agencies, in the way of transmitting small parcels of grass-seed, choice stock, &c. should I think proper to send for them. It has struck me that my professional brother, Dr. Beekman, might be the *man*. I leave this matter to you.

Allow me now, sir, in tendering to you assurances of my highest personal respect, to associate therewith my warmest wishes that the Cultivator may find its way into every house in Virginia, and thus become a strong tie between two States, in danger of being dissevered in feeling by papers of a very different description.

Your most ob't &c.

W. S. MORTON.

Near Farmville, Prince Edward Va. 30th June 81.63

A new invention for brick making has been patented by one Sawyer. The bricks are made by it from dry clay, and are said to be superior to the common kind in beauty, strength and durability. The texture is much closer than that of the common brick, so that the article absorbs less water, takes paint much better, not requiring more than one half necessary in the old way, and stands fire much longer The frost likewise does not operate on it and bricks are turned out of the new machine, at one half the expense, or less, than by any other mode now in use.—[Pennsylvania paper.]

BEECHER'S CANAL STEAMBOAT.—We witnessed last week the operation, on the Canal of a Steamboat, invented and constructed by Mr. B. D. Beecher, of New-Haven. It is propelled upon the screw augur principle. Two instruments something like screw augurs formed by winding a thick sheet of iron spirally round small shafts, are placed in the bow of the boat, both of which turned inward, and they answer the purpose of a wheel in propelling the boat. This boat was built merely for experiment, and the first of the kind ever constructed, of course very crude; notwithstanding the unfavorable circumstances under which it operated it was propelled at the rate of five or six miles an hour.—[Hampshire Gazette.]

METEOROLOGICAL RECORD.

For the month of May, 1835, kept at Avoylle Ferry, La., (Lat. 31° 10′ N., Long. 91° 59′ W.,) by P. G. VOORHIES.

MAY.

Days.	Morn.	Noon.	Night.	Wind.	Weather.	REMARKS.
1	70	74	70	calm	cloudy	heavy showers, rain all day and night
2	69	75	73	..	..	
3	76	76	74	..	..	
4	74	77	75	..	..	clear in the evening
5	72	75	80	..	clear	
6	68	73	68	W	cloudy	high wind, heavy thunder and rain at noon
7	64	74	72	calm	clear	cloudy at noon
8	66	75	74	..	..	
9	64	74	71	..	..	
10	73	72	66	..	..	
11	61	78	70	..	..	
12	60	79	74	NW	..	
13	64	82	76	calm	..	
14	63	82	74	..	..	
15	64	81	75	..	..	
16	68	86	76	SW	..	
17	70	84	74	..	..	high wind and heavy rain rain at noon from SW
18	71	78	74	..	cloudy	drizzling rain in the afternoon
19	71	76	70	..	..	rain at noon
20	69	78	68	..	..	
21	72	82	78	SE	clear	in the morning cloudy and thunder and rain at noon
22	68	80	82	calm	cloudy	heavy thunder and rain in morning, clear at noon
23	72	82	76	SW	..	heavy thunder
24	71	85	72	calm	clear	cloudy in the morning
25	73	76	68	SE	cloudy	rain all day heavy high wind at night
26	64	74	66	NW	..	thunder and drizzling rain all day
27	64	72	65	N	..	clear at noon
28	58	74	71	NW	clear	
29	63	80	76	calm	..	
30	66	86	76	..	..	
31	70	84	80	..	..	

Red River rose this month 2 feet 4½ inches—below high water mark 2 feet 2 inches.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

					lbs.	
350 tons	2½ by ⅝,	15 ft in length,	weighing		4 [illegible]/100	per ft.
280 "	2 " ½,	"	"	"	3 50/100	"
70 "	1½ " ½,	"	"	"	2½	"
80 "	1¼ " ¼,	"	"	"	1 25/100	"
90 "	1 " ¼,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON.

28–tf Philadelphia, No. 4, South Front st.

OFFICE PONTCHARTRAIN, RAILROAD CO. }
New Orleans, 19th May, 1836. }

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,

JNO. B. LEEFE, Secretary.

28—3m.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,

feb 20—ytf Superintendent, Newcastle, Del

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co., }
July 25th, 1836. }

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 30 cut stone locks, 17 dams, (varying from 5 to 20 feet in height,) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unknown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.

E H. GILL, Chief Engineer. 30—to10

TO CONTRACTORS.

Sealed proposals will be received at Jackson, until the 15th day of September next, for the grading, masonry and bridging of the 3d division (50 miles) of the Mississippi Railroad.

This road is located on a pine sandy ridge, the country is healthy, and provisions can be readily obtained at all seasons of the year.

The whole line (150 miles) will be placed under contract, as the location advances next fall; and it is believed that no institution can offer greater inducements to good Contractors than this.

F. H. PETRIE, Chief Eng.

ENGINEERS OFFICE, }
Natches, June 10, 1836. }

23—till Sep. 5.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whittemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tilitson,	St. Francisville, Lous'a.
Capt John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.

General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersunk heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames'	superior back-strap Shovels	
150	do	do	plain do
150	do	do	caststeel Shovels & Spades
150	do	do	Gold-mining Shovels
100	do	do	plated Spades
50	do	do	socket Shovels and Spades.

Together with Pick Axes, Churn Drills and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York.

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

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NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,

Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

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ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

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NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

JAMES G. KING, President.

21—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—ytf

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, AUGUST 27, 1836. [VOLUME V.—No. 34.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, AUGUST 27, 1836.

OFFICE OF THE WETUMPKA AND COOSA R. R. Co. }
WETUMPKA, ALA., 29th July, 1826. }

THE Directors of the above Company are desirous of securing the services of a competent resident Engineer, to survey and locate the route of the Wetumpka and Coosa Railroad, commencing at thts place. The route of the road will pass through a country that is considered as healthy as any in this latitude. Persons desirons of embarking in such an undertaking will please address the undersigned at this place.

W. H. HOUGHTON,
Sec. W and C. R. R. Co.

The Evening Star and Courier and Enquirer, New-York; the Commercial Herald, Philadelphia; Baltimore Gazette; National Intelligencer, Washington, Richmond Enquirer and Whig, Richmond, Va.; and Charleston Mercury, will please give the above eight weekly insertions, and send a copy containing the advertisement, together with their bills, to the undersigned. (34—5t) W. H. HOUGHTON.

NOTICE TO CONTRACTORS.

SEALED Proposals will be received by the subscriber at the office in Elizabethtown until the evening of the 10th of September next, for grading and bridging 23 miles of the Elizabethtown and Somerville Railroad—the line will be staked out ready for examination on or about the 28th inst.

Plans and specifications will be exhibited at the office 10 days previous to the day of letting. In the above work there is about 300,000 cubic yards of earth to be removed, and six bridges, from 40 to 200 feet in length—the Piers and Abutments to be built of good Ruble Masonry, and the principle part of the wooden superstructure on the Lattice plan.

JAMES MOORE, Ch. Eng. of E. and S. R. R. Co.
Elizabethtown, Aug. 17, 1836. 34

ANOTHER NEW STEAMBOAT.

The "RHODE ISLAND" has been placed on the line between Providence and this city. We received an invitation to her first trip, but were prevented by business from going—much against our will, as from the character of the other boats of the line, we had formed high expectations of her performance.

We have since understood that she gives universal satisfaction. We rejoice at every new facility given to the travelling community, and at none more than the starting of a new steamboat—one of the noblest triumphs of art.

We wish success to the Rhode Island, and every other vessel of the line.

We have received a note from a "friend and subscriber," in regard to the insertion of articles on the subject of Geology and Natural Philosophy.

It has ever been our intention, to make the Journal of general interest, and to pay particular attention to all collateral branches of science.

Owing to the press of matter of that peculiar character, that spoils by keeping, we have of late given an unusual quantity of "Railroad" matter—and several articles of interest have been delayed. Original articles on this, and all other branches of science will be thankfully received.

A situation is wanted by a man who has served as overseer on a large estate in England. He is ready at accounts, writes a good and expeditious hand, and could act as superintendant on any public or private work, where any agent to look to the employer's interests would be necessary.

Any communications for him, left at this office, will be attended to.

From the New-York Times

AVENUES.—WATER FRONTS.

Messrs. Editors—I have read with much interest your remarks on the opening the avenues in this city—also, the sensible article in your paper of the 6th, from the Johnstown Herald. This Editor truly says, "the business of the city of New-York is increasing beyond comparison in this country," and expresses his astonishment at the short sighted policy, which has prevented the opening and improving of the avenues from the compact part of the city to the north end of the Island. and then remarks, on the exertions and perseverance of a public spirited individual who has secured to our citizens, perhaps, the best McAdam road in the United States.

It is the thronged state of this road—the third avenue—and its inadequacy to accommodate even the pleasure wants of the public,—that I wish to draw your attention to—it is truly stated that we cannot take a rid[illegible] on it, except at the peril of life, so gr[illegible] the multitude who are daily tempte[illegible]e gratification of a ride on it. It is [illegible]collected that when this road was first brought forward in our common councils—its projectors and friends were denounced by the lower wards—it was called in derision "the Alderman's race course." "That it was only to accommodate a few speculators.' "There was no use for such an expenditure by the city," &c., &c. But true is the fact? Who use it the most? and for whose advantage is the opening of *all the avenues?* Certainly the citizens in general, and the lower wards in particular. The rich and middle classes enjoy their rides. The poor mechanic and laborer from the facilities of omnibusses and railroads would be able to purchase good building lots in the upper wards at very moderate prices, and remain on the island and not be subject to the in-

convenience of crossing the East and North River, to build up adjacent villages, to the injury of our city and the loss of much of their time.

We have an intelligent Board for our city councils, and I trust that the old jealousy of "up town and down town" will be done away with, and that no time will be lost to open the avenues to the fine and *deep water fronts* on the island. That the whole city and *its future prospects and population* will be considered by our city councils. The water fronts on the East and North River are nearly all occupied, and the magnificent project of Alderman Clark, claim attention. We certainly require all the water front we can make, without injury to our navigation.

Let it be considered for a moment that the Erie canal is to be enlarged to a Ship canal, so as to bring the trade of our State and the Western Lakes in barges to our wharves. Let me then ask, where can we accommodate them and the population that this *interior* trade will bring us. Without we open and McAdamize our avenues, we shall be behind the wants of the West, to accommodate their trade with water fronts —and this too without taking into view the increasing and *domestic* trade to the South, the East added to our foreign.

It is understood that there are now above 2500 boats on our canals, averaging about 30 tons each—this trade is still in its infancy. It is only ten years since we celebrated the completion of the Erie Canal, and we find that each year tha trade has increased faster than the accommodations to carry it on.—The city of New-York dates her regular and *steady increase* in population and property to the commencement of the system of internal improvement. Let me then ask, does she improve herself and her national advantages in the ratio required by her yearly increasing trade and population? I fear not. B.

REPORT OF THE SOUTH CAROLINA COMMISSIONERS TO THE KNOXVILLE CONVENTION, ON THE SUBJECT OF THE PROPOSED RAILROAD FROM CHARLESTON TO CINCINNATI AND LOUISVILLE.

The Commissioners appointed by the Legislature of South Carolina, to make an examination and survey of the country between the Ohio river and the city of Charleston, "for the purpose of ascertaining the best practicable route for a Railroad"—have the honor to submit to the Convention now assembled at Knoxville, such information as they have been able to obtain. Aware that this convention would be composed of Delegates from all those portions of country most deeply interested in the proposed road, and that it would embrace such a combination of talent, character and information, as would enable its members to exert a powerful influence over the public mind, in reference to this great work, the undersigned have not hesitated to regulate their proceedings with a view to submit the results to this assembly. The Commissioners have, accordingly, repaired to Knoxville to meet the Convention, and have also directed their several Brigades of Engineers to assemble here, for the purpose of concentrating all the information they may have procured, to be laid before you.

In giving a brief history of our proceedings, we feel that it is due to ourselves, as well as to the Engineers, who have been industriously employed in making the explorations and surveys—to state, that we have been greatly embarassed in our operations, by the shortness of the time which has been allowed us, and the extraordinary inclemency of the weather. Finding it impossible, under these circumstances, to do more than to make an examination and survey of a portion of the designated route, we did not hesitate to direct our attention exclusively to that section of country which presented the greatest difficulties—embracing the Mountain region—extending from the foot of the Blue ridge east, to the western base of the Cumberland mountain—believing that if this portion of the route should be *found to be practicable*, the country below these lines—and extending on one side to the Atlantic, and on the other to the Ohio—might be safely *assumed to be so*.

It will doubtless be recollected by the Convention, that, at a public meeting held at Cincinnati, in August last, it was proposed to connect that city with Charleston by a Railroad, and an able Report was published, showing the practicability of the scheme, and the great advantages that would result from its accomplishment. A printed copy of these proceedings having been transmitted to Charleston, the liveliest interest was excited among her citizens, who had long looked to such a connexion with the West, as an event greatly to be desired. It was peculiarly acceptable to them, that the proposition should have come from the quarter whence it now emanated, and they felt it to be their duty to respond to the appeal thus made by Ohio, in a spirit which should leave no doubt of the disposition of South Carolina, to unite most cordially with their western brethren in bringing about so desirable a result. A public meeting of the citizens of Charleston was accordingly held, and resolutions were unanimously adopted, pledging their zealous co-operation in the great work. In fulfilment of this pledge the City Council immediately appropriated $5000, out of the City Treasury, and put the same at the disposal of a committee, charged with "causing such explorations or surveys to be made, as may be deemed necessary, in order to determine the practicability, cost, and proper route of the proposed road."—This committee, acting in con unction with a similar committee appointed in Columbia, the capitol of the State—took the promptest measures to carry into effect the views of their fellow-citizens. It was accordingly determined, to apply to the Legislatures of the States through which a road from Charleston to Cincinnati must necessarily pass, for A CHARTER—and for such *appropriations* as might cover the expenses of the surveys. In the mean time, and in order to afford to the Legislatures of those States such information as might induce them to comply with these requests, a Board of Engineers was constituted—consisting of Cols. Gadsden and Brisbane and Mr. Holmes—gentlemen eminently qualified for the task—who were charged in behalf of the citizens of Charleston, with making an exploration of the several passes through the Blue ridge, and across the intermediate country to the foot of the Cumberland mountain, in Kentucky, in the general direction of the proposed road from Cincinnati to Charleston, so as to lay their report before the Legislature of South Carolina, at their annual meeting in December. Agents were also appointed to attend the Legislatures of North Carolina, Tennessee and Kentucky, to make such explanations as might be required, and, if possible, to obtain charters from each of the said States, identical, in all their provisions.

In the prosecution of the duties thus imposed upon them, Col. Gadsden and his party entered promptly and zealously upon the explorations required, and embodied in a luminous report the result of their examinations, the substance of which was communicated in due season to the Legislatures of the several States interested therein.—From this report, which will be found to contain a mass of valuable information, such extracts are hereto annexed, as bear more immediately on the questions now before the Convention. Our Agents who attended the Legislatures of North Carolina, Tennessee and Kentucky, succeeded in obtaining charters from those States; but as the charters in the two latter States, vary in several particulars from those passed by North and South Carolina, it has been deemed advisable to cause the original charter, as passed by South Carolina, to be printed, with the several amendments made thereto by the other States, so that the Convention may be able to decide whether any alterations have been made therein, or any restrictions or limitations imposed, which may render further amendments necessary.

The Legislature of South Carolina, in addition to the charter above mentioned, also passed an act to cause surveys to be made for a Railroad between Cincinnati and Charleston, appropriated $10,000 for that purpose, and appointed the undersigned Commissioners to carry the same into effect. This act contemplated the passage of similar acts by the Legislatures of North Carolina, Tennessee and Kentucky, and accordingly directed the South Carolina Commissioners to unite with those of the said States in causing the proper surveys to be made. In consequence, however, of the failure of those States to pass such acts, the undersigned have been compelled to assume the whole duty, which was intended to have been performed in conjunction with the Commissioners of the other States. If Commissioners had been appointed, and appropriations made by these States, surveys might have been commenced simultaneously in North Carolina, South Carolina, Tennessee and Kentucky, and the Convention might thus have been put in possession of an actual survey of the whole route.—Necessarily restricted in our operations, we have made, however, the utmost possible exertions to put the Convention in possession of such information as may enable them to act efficiently on this subject. On an application made to the Secretary of War, that officer was pleased to suffer Capt. W. G. Williams, of the Topographical Engineers, Lieuts. Drayton, White and Reed, of the army, and Mr. G. F. Featherstonehaugh, of the Civil Engineers, to enter into the service of the Commissioners for the purpose of making under their direction, the above mentioned surveys.—These gentlemen being organized into two Brigades, under the orders of Capt. Williams, have been engaged since the middle of April last, in surveying the passes leading from the head waters of the Broad and Saluda Rivers in South Carolina, across the Blue ridge, into the valley of the French Broad River, and from thence down that valley to a point from whence a suita-

ble route for a Railroad could be marked out, across the Cumberland Mountain into Kentucky.

The Commissioners felt themselves restrained by the shortness of the time, and the small amount of the appropriation, from extending their surveys further than to the several passes leading into the valley of the French Broad River, a restriction to which they were the more reconciled from the fact that any route to the North or South of that valley, would tresspass upon the territory of Virginia or Georgia, from neither of which States have charters been obtained. It cannot be doubted that there is no route within the limits of the existing charter, by which a Rail Road can be carried across the Blue Ridge, that must not pass along the valley of the French Broad river; and the Commissioners are under a full conviction that this valley affords, *by far, the best channel of communication*, between the Ohio River and the Atlantic Ocean. This opinion is founded upon some personal observation, extensive enquiries, and explorations and surveys of the several routes which have been suggested. Public attention having been several times called to a route extending from the Linnville Mountain in North Carolina through Virginia, across the Moccasin Gap to the Ohio, by the valley of the Licking or Big Sandy Rivers in Kentucky,—Mr. Holmes was despatched in November last by the Charleston Committee to examine that route, and from the information obtained by him, as well as from an actual survey made by Col. Long, of the United States Topographical Engineers in 1831, the Engineers unanimously pronounced that route to be inadmissable. From a careful exploration made by Capt. Williams, of the whole mountain range within the limits of South Carolina, there does not appear in the opinion of that officer to be any practicable route for a Railroad south of the Saluda Mountnin. A route, however, has been suggested, across the Rabun Gap in Georgia, which the Governor of that State has been directed by their Legislature to cause to be surveyed, and it is understood that the Engineer of the Athens Railroad Company has also been employed in examining a line from Athens across that Gap. For the reasons above mentioned, the Commissioners did not feel themselves called upon to survey any route not embraced within the lines covered by their charter, and even if not restrained by this consideration, had neither time nor means to extend their surveys beyond the limits of their own State, and a line drawn from thence across the Cumberland Mountain, by the valley of the French Broad, and looking to the connection of Cincinnati and Louisville with Charleston. In consequence, however, of the surveys directed by Georgia of the Gap, through Rabun, they deemed it advisable to obtain all the information on the subject in their power. With this view, Col. Brisbane and Richard W. Colcock, Esq. have been recently sent to make a survey of that part of Pickens' District, in South Carolina, adjoining Rabun county, in Georgia, with instructions to pass by the Rabun Gap, down the valley of the little Tennessee, to some point below the Smoky Mountains, and from thence to Knoxville, where it is expected that they will arrive in a few days.

The Report of Capt. Williams, with the surveys made by the two Brigades of Engineers under his orders, will be laid before the Convention, so soon as the same can be prepared, and will afford all the additional information on this subject, which it will be in the power of the Commissioners to afford.

It will be for the Convention to determine, on full deliberation, after all the necessary information shall have been laid before them, whether a practicable route for a Railroad has been found from the Ohio River to the Atlantic Ocean, to connect Louisville and Cincinnati with Charleston? whether such a work can be constructed at a reasonable expense? whether the advantages to arise from it will justify the efforts necessary for its execution? and, finally, what are the proper means to be adopted for combining the resources of all the Statas interested therein, in one SIMULTANEOUS AND MIGHTY EFFORT for its speedy accomplishment. In an undertaking of such vast magnitude, intended to constitute a connecting link between six or eight States, it will be utterly vain and idle to expect success, unless the great work be entered upon in a spirit CORRESPONDING WITH THE GRANDEUR OF THE ENTERPRISE.

Animated by *such a spirit*, this Convention may give an impulse to this work—certainly one of the noblest which has been projected in modern times—that may ensure its success.

The Commissioners will most cordially co-operate with the Convention in all measures, calculated to advance the great object which has brought us together, and for this purpose will be ready to afford such information as may be required of them.

ROBER Y. HAYNE, ABRAHAM BLANDING, PATRICK NOBLE, THOMAS SMITH, THOS. L. JONES, CHARLES EDMONSTON.	*Commissioners on the Louisville, Cincinnati and Charleston Railroad.*

Knoxville, 5th July, 1836.

REPORT OF COLS. GADSDEN, BRISBANE AND MR. HOLMES' EXPLORATION.

The commission with which we were unexpectedly charged but 30 days since by the citizens of Charleston, and requiring that a report be made to you at an early date during the present session of the Legislature of South Carolina, allowed, as you must readily perceive, scarcely time for an imperfect reconnoisance of the country, on the shortest line of communication between the two important points, now proposed to be connected by a Railroad. With no previously prepared data as a guide, with little more knowledge, from personal examination, than what a general geographical history of our native and contiguous Southern and Western States afforded, we can, on a requisition so sudden, and within a period so limited, only present such views, as a distant *Coup Dœil* of the country has but imperfectly impressed on our visions Placed, as it were, upon an eminence to report the objects on the horizon, we can from that elevation estimate but speculatively, those vast resources; *Agricultural Mineral*, and *Commercial* of the "land in sight," which may be developed by a Railroad from Charleston to Cincinnati; and point to those topograghical characteristics, the *Swamps*—the *Rivers*, and the *Mountains* of its various sections, which may prove valuable in directing the future examinations of those who may decide on the route, by which they can be most judiciously passed, and devise the mode, by which the obstacles they present, can with the greatest facility be surmounted. In execution of the commission assigned us, to ascertain the practicability of a route for a Rail Road from Charleston to Cincinnati, we left the former place on the morning of the 7th of November—Col. Gadsden proceeded via Aiken, Edgrville, Abbotville, and Greenville, and re-united with Mr. Holmes and Col. Brisbane on the road at the Saluda Gap; who passed on their route to that place by Columbia, Newberry, Laurens, and Greenville. In addition to our own personal observations, we collected on our way much valuable information, which was cheerfully volunteered by all classes of citizens, corroborating the fact as to the various practicable routes for roads leading in every direction from the lower to the upper districts of South Carolina. The Eastern and Western territorial divisions of the United States are divided from each other by parallel chains of Mountains, stretching from the North East to the South West—where these elevations are united into a single range; the ridges and the valleys of the rivers which flow from them in opposite directions, form slopes by which their bases are approached, and the interlocking heads of the same stream, cleave gaps or open gorges, by which their summits may be overcome. But for these breaks, and depressions in the mountain regions of the United States, affording facilities for the construction of roads; a people bound together by the strongest political ties, would be entirely estranged from each other, in all their commercial and social relations. In any projects therefore, for artificial channels of communication, by which these barriers are to be passed; the Engineer is irresistibly directed in his enquiries, to those peculiar natural conformations of a country, which afford facilities by which even the natural obstacles are overcome. For it may be assumed as a position, scarcely controvertible, that where contemplated improvements run parallel with the natural channel-ways of a country, they may be generally pronounced practicable, whilst the execution of those where the line of direction is at right angles with the ridges and streams of the country, seemingly opposing the works of nature, if not doubtful, are in their difficulties proportionably enhanced. Applying this rule to the geographical conformation of South Carolina, with her rivers and parallel ridges, running almost direct from the Alleghany to the sea, and we would unhesitatingly, without the confirmation of personal observation, or the testimony of others well acquainted with the topography of the various districts of the State, decide on the practicability of approaching on planes of easy ascent, from almost any quarter in the low country, to the eastern declivity of those Mountains. It does not therefore admit of a doubt, but that by the ridges between the Savannah and Saluda; by those between the Saluda, Reedy, and Enoree, as well as by those which divide the waters of the Tyger and Pacolet, and the Pacolet and the Broad; no serious obstacles would be encountered in the grading of a Railroad through South Carolina, to the eastern base of the Blue Ridge.

Which of these ridges or valleys however would prssent the greatest facilities for construction, and which of them under all circumstances would be deemed the route through South Carolina to be preferred, would depend upon a more minute examination of each, and a comparative estimate of the advantages of all, than we have been enabled to bestow upon them, as well as upon the *determined point*, at whih cit

may be found most judicious to scale the Blue Ridge. In the examination of the project now under consideration, it will be found that the great mountain barrier interposing obstacles to any communication between Carolinas and the West, are on the borders of those States, split or divided into four distinct or parallel chains—1st, the *Blue Ridge*, of which the Saluda in South Carolina is but a spur; leaving the main range near the sources of the Saluda river, and terminating in an easterly direction near the waters of the Broad, while the main or Blue Ridge continues its onward course in a north easterly direction through the valley of Virginia—2d, a *middle chain*, no less formidable in its altitudes, and designated at various points, as the Unika, Smoky, Iron and Bald Mountains, of which the Paint Rock is an imposing member—3d, the *Clinch* and Copper, ridges between the waters of the *Clinch* and *Powell*—and 4th, the *Cumberland* Mountain, the great reservoir of all the tributaries, which flow through Western Tennessee and Kentucky to the father of rivers. The line of the contemplated Railroad from Charleston and Cincinnati, not only crosses at right angles these Mountain ranges, but in addition, five considerable streams, with their minor ridges. The *French Broad*—the *Nolachucky*—the *Holston*—the *Clinch*—and the *Powell*. From a careful inspection of the map, therefore, this portion, or what may be designated the *middle section* of the projected railway, from *the base of the Blue Ridge* east, to the western termination of the *Cumberland* Mountain, would seem in its execution to be opposed by obstacles truly appalling, if not insurmountable. With these views, we deemed it advisable to bestow most of the limited time allowed for our examination to this section of country. Assuming, that if more than the probable difficulties on this line to be encountered, could by any possibility be surmounted, we might with the more confidence, so report on the *practicability* of the grand project, as to authorize a more minute survey of the whole ground, than it has been in our power to make of it. Under these impressions, after a general and united reconnoisance of the gaps in the Saluda Spur, the valley of Green River, and some of the depressions in the Blue Ridge, affording facilities for scaling it; we separated, and so distributed the work of exploration, as to ensure within the time limited, the most extensive examination of this middle section, within the range of our inquiries. Col. Gadsden descended the French Broad—penetrated the centre of East Tennessee, and examined the communications across the interposing ridge and rivers of that valley, to the plains of Kentucky. Col. Brisbane was left to complete the observations jointly commenced on the Blue Ridge; to examine all the gaps or depressions by which its summit from the east could be attained and the communications west descending to the French Broad. The additional object devolved on him of descending by the Broad River, and of inspecting the facilities which its valleys or ridges offered for a road from the upper to the lower districts of Carolina. Mr. Holmes' attention was directed to the examination of a possible line of communication from Morganton, in Burke county, North Carolina, by the Yellow Mountains; the water of the Tow and Watauga rivers, through Carter or Washington counties, in East Tennesse—and by Estilville, in Virginia, to the sources of the Big Sandy or Licking; the valleys of which it was supposed might afford favorable descents to Cincinnati, the point of designation on the Ohio river.

In this direction we were particularly attracted by the fact, that drawing a line from Cincinnati to Charleston, it would pass through this very section of country, as the shortest possible line of communication between those two designated extremes of the road contemplated. Another consideration recommended an examination in that quarter, that as early as the year 1831, there was a convention of citizens held at Estilville, on the subject of a road connecting the Carolinas with Kentucky by that route, and to which delegates from Charleston were invited, and were deputed. This encouraged a hope that the result of that meeting might shed much light on the geographical and topographical subjects of our inquiries; and in this we were not disappointed.

[To be Continued.]

It is not long since we introduced to our readers "Flint Soap." We now give specifications for a Soap from "*mica, steatite, or porcelain clay.*" No end to wonders in this world. By the way, would not the soap be apt to dull razors, and render it worthless as a shaving soap?

From the Repertory of Inventions.

SPECIFICATION OF THE PATENT GRANTED TO JOHN HEWITT, FOR A COMBINATION OF CERTAIN MATERIALS OR MATTERS, WHICH BEING COMBINED OR MIXED TOGETHER WILL FORM A VALUABLE SUBSTANCE OR COMPOUND WHICH MAY BE USED WITH OR AS A SUBSTITUTE FOR SOAP.

My invention consists in combining the well known substsnces called mica, steatite, porcelain earth or clay, and gard or guard with soap, in the proportions herein particularly defined.

Having thus stated generally the object of my invention, I will proceed to describe the manner of performing the same; I take from one-eighth to three-fourths by weight of mica, steatite, of porcelain clay, or of gard, ground or reduced to a fine powder, or I take from one-eighth to three-fourths of these substances combine, and mix or incorporate such one-eighth to three fourths with seven-eighths to one-fourth by weight of the ordinary soap of commerce, known by the names of mottled and yellow soap, but I prefer, and usually employ, one-half of the earthy substances and one-half of soap, which, when combined in any of these proportions, will form a compound to be applied to the ordinary purposes of soap.

When it is desired to make a finer quality of soap intended for the purposes of the toilet, I take from one-eighth to one-half by weight of mica, steatite, or porcelain earth or clay, and mix or incorporote the same with seven-eighths to one-half of the soap of commerce called curd soap, and thus produce a valuable compound, which may be perfumed as is usual in fancy soaps.

Having thus given the definite proportions which constitute my invention, I will now point out the manner pursued by me in mixing or compounding the aforesaid substances with soap. Having determined on the proportion of mica, steatite, porcelain clay or earth, or of gard, which, as aforesaid, must be within the proportions of one-eighth to three-fourths by weight of the mass intended to be produced, and this is to be the case whether these substances are combined or used separately, for it is essential that these substances should not exceed or be below the proportions by weight here given, these being essential to the best effect being obtained. The soap, whether yellow, mottled or curd, is sliced into small pieces, and mixed with the substance or substances above mentioned, and the whole mixture or compound being placed in a suitable vessel is to be melted, (sufficient water being added to facilitate the operation,) and the compound, when well stirred and sufficiently blended, is to be allowed to cool in the ordinary manner of making soap, and cut into bars, it will then be ready for sale. Or it will be evident that in place of taking the soap of commerce, the compound may be produced by adding the substances in the proportions aforesaid to the melted materials of soap previous to allowing them to cool, which would be the most advisable course for a soap maker. It will be, perhaps, desirable here to observe, that the substances hereinbefore mentionod are found plentifully in Cornwall, and that the substance named gard or guard, is that part of the sediment which first precipitates itself in washing or cleansing porcelain earth or clay for the use of the China manufacture.

Having now described the nature of my invention, and the manner of carrying the same into effect, I would observe that I am aware that the various clays and earthy substances have been before used for cleansing both separately, and in some instances combined with soap, I do not therefere claim the mixing of the aforesaid substances generally with soap, or of the application of them to the purposes of scouring or cleansing other than in the proportions before mentioned. I do therefore hereby declare that I confine my claim of invention to the mixing or compounding of mica, steatite, porcelain clay or earth, and gard, within the propottions of from one-eighth to three-fourths by weight of the bulk of the compound to be produced with the ordinary soap of commerce, as above described, and thus producing a valuable compound, applicable to the various purposes of soap. —In witness whereof, &c.

Enrolled October 18, 1834.

SPECIFICATION OF THE PATENT GRANTED TO JAMES LEMAN, FOR THE MAKING, COMPOUNDING, IMPROVING, OR ALTERING OF SOAP. SEALED JUNE 4, 1835.

The oxymuriatic gas or chlorine is sold in commerce combined with soda, with potash, and with lime, under the denominations of the cholorate or oxymuriate of soda, the chlorate or oxymuriate of potash, and the chlorate or oxymuriate of lime; the first two in a state of solution, and the last in an earthy state. Chlorine combined with these three alkaline substances has been employed in washing and bleaching but where combined with soap, as described below, advantages and considerable economy are effected in both these operations, and that combination I claim as my invention.

The following are my processes or combinations:

First. To make chlorated soap in employing the chlorate or oxymuriate of soda.—1st. Take equal quantities by measure of a solution of chlorate of soda of a specific gravity of e689, and of oil, and mix

them perfectly together.—2nd. Heat the mixture over a very gentle fire to assist its combination.—3rd. Add to the mixture, ley of caustic soda, and continue the operation in the same manner as done by soapmakers, employing successively the ley of various degrees until the saponification is complete.

If, instead of oil, it is wished to fat or other saponifiable substance, it will be necessary to melt it previously over the fire, and then the mixture with the solution of chlorate of soda, and proceed in the same manner as is above directed for oil.

Second. Chlorafed soap by the chlorate of potash. The process for the manufacture of this soap is the same as the preceding: mix equal parts by measure, of a solution of chlorate of potash of a specific gravity of 1089, and oil or fat, or a mixture of both. Heat the mixture gently, and add the quantity of ley of caustic of potash or of caustic soda necessary to render the soap perfect. In other respects proceed in the same manner as the common manufacturers do.

Third. Chlorated soap by the chlorate of lime.—To make this soap.—1st. Mix thoroughly one part by weight of chlorate lime with three parts of water, let the insoluble part subside and draw off the clear solution, which is commonly of a specific gravity of about 1072. Make a mixture of this solution with an equal quantity of oil or fat, or of a mixture of both, and stir up this mixture at intervals during three days, so that the combination of the chlorate of lime with the oil or fat may be complete.—3rd. Add ley of caustic soda at different degrees of strength as is done by manufacturers to make common soap.

Nota.—If fat or grease is employed it will be necessary to mix it with the chlorated solution in a heated state. In other respects the process is the same as before described.

The chlorated solution may be employed weaker, thar is to say, if a specific gravity of 1033 or more. After having made the mixture with the oil, it will be necessary to stir it well and let it settle for twenty-four hours, draw on the water, then repeat this operation until the oil is saturated with chlorine to the degree desired. As to the quantity of water retained by the mixture it will bo separated from it during the process of saponification, and will remain mixed with the water of the ley employed.

These kinds of soaps may be made by mixing the ingredients cold, and letting them remain for at least twenty-four hours, stirring them often. The ley must be employed at 1360, in the proportion of one-third of the quantity of oil used. Apply a gentle heat (a water or steam bath is preferable on account of the color, until the saponification is complete.

If common soap is melted in a solution of chlorate of soda upon a moderate fire, this soap will become chlorated but it never will be so well combined as that of which the manufacture is above described.

A solution of chlorate of lime may also be added to the common soap dissolved by this means a chlorated soap will be obtained.

If it is wished not to employ the chlorate of soda of potash or of lime for the manufacture of soap, they may be replaced by water saturated with chlorine; or it is still better to saturate the oil or grease by means of a current of chlorine applied directly to it without the intervention of any alkali.

I claim also to form a chlorated soap through the medium of a combination of a combination of chlorine with all other alkaline subetances. In witness whereof, &c.

Enrolled December 4, 1835.

From the Journal of the American Institute.

INFORMATION TO PERSONS HAVING BUSINESS TO TRANSACT AT THE PATENT OFFICE.

All former acts are repealed by the act passed 4th July, 1836.

"Patents are granted for any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement on any art, machine, manufacture or composition of matter, not known or used by others before his or their discovery or invention thereof, and not at the time of his application for a patent in public use, or on sale with his or their consent or allowance, as the inventor or discoverer."

The term for which a patent is granted is fourteen years; but may, under certain circumstances, be renewed for seven years, as hereinafter mentioned.

Patents are granted to citizens of the United States, to aliens who shall have been resident in the United States one year next preceding, and shall have made oath of their intention to become citizens thereof, and also to foreigners who are inventors or discoverers.

A patent may be taken out by the inventor in a foreign country without affecting his right to a patent here, if the patent is not delayed in this country longer than six months from the time of taking it out abroad; and any publicity in consequence of such foreign patent does not affect his right to a patent in the United States. A patent is not granted upon introduction of a new invention from a foreign country, unless the person who introduced it be the inventor or discoverer. If an alien neglects to put and continue on sale the invention in the United States, to the public, on reasonable terms, for eighteen months, the patentee loses all benefit of the patent.

Joint inventors are entitled to a joint patent, but neither can claim one separately.

An inventor cannot assign his right before a patent is obtained, so as to enable the assignee to take out a patent in his own name.

The assignment of a patent may be the whole or undivided part, "by any instrument in writing." All assignments, and also the grant or conveyance, of the use of the patent in any town, county, or State, or limited district, must be recorded in the patent office within three months from the date of the same; for which record the grantee or assignee must pay three dollars to the patent office.

All applications pending on the 4th July, 1836, (the time of passing the said act,) on which the duty of thirty dollars has been paid, will be considered as presented under the new act, and will not require a new petition. In all other cases the papers will be returned for correction with this circular explanatory.

"In case of the decease of an inventor, before he has obtained a patent for his invention, the right of applying for, and obtaining, such patent, shall devolve on the administrator or executor of such person, in trust for the heirs at law of the deceased, if he shall have died intestate; but if otherwise, then in trust for his devisees, in as full and ample manner, and under the same conditions, limititations, and restrictions as the same was held, or might have been claimed or enjoyed, by such person in his or her lifetime; and when application for a patent shall be made by such legal representatives, the oath or affirmation shall be so varied as to be applicable to them."

The patent office will be open for examination during office hours, and applicants can personally, or by attorney, satisfy themselves, on inspection of models and specifications, of the expediency of filing an application for a patent.

All fees received are paid into the treasury, and constitute a fund to defray the expenses of the office: hence the law has required the payment of the patent fee before the application is considered; two thirds of which fee is refunded on withdrawing the petition.

It has bitherto been the practice for inventors to send a description of their inventions to the office, and inquire whether there is any thing like it, and whether a patent can be had. As the law does not provide for the examination of descriptions of new inventions, except upon application for a patent, no notice can be taken of such inquiries.

On the application for a Patent.

No application will be considered until the fee for the patent is paid.

The application for a patent must be made by petition to the *commissioner of patents*, signifying a desire of obtaining an exclusive property in the invention or discovery, and praying that a patent may be granted therefor, as in the form annexed hereto, *which petition should be signed by the inventor.*

Description of Specification.

"Before any inventor shall receive a patent for any such new invention or discovery, he shall deliver a written description of his invention or discovery, and of the manner and process of making, constructing, using, and compounding the same, in such full, clear, and exact terms, avoiding unnecessary prolixity, as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of any machine, he shall fully explain the principle, and the several modes in which he has contemplated the applica-

tion of that principle, or character by which it may be distinguished from other inventions; and shall particularly specify and point out the part, improvement, or combination, which he claims as his own invention or discovery."

It is recommended in all cases where the machine or improvement is complicated, to frame the specification with reference to the drawings.

A *defective description* or specification may be amended any time before issuing the patent.

For a new Improvement.

"Whenever the original patentee shall be desirous of adding the description and specification of any new improvement of the original invention or discovery, which shall have been invented or discovered by him subsequent to the date of his patent, he may, like proceedings being had in all respects as in the case of original applications, and on the payment of fifteen dollars, as herein after mentioned, have the same annexed to the orignal description and specification; and the commissioner shall certify, on the margin of such annexed description and specification, the time of its being annexed and recorded; and the same shall thereafter have the same effect in law, to all intents and purposes, as though it had been embraced in the original description and specification."

"Every inventor, before he can receive a patent, must make oath or affirmation, that he does verily believe that he is the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement, for which he solicits a patent, and that he does not know or believe that the same was ever before known or used, and also of what country he is a citizen." (See form annexed.)

If the applicant be an alien, and have resided one year in the United States preceding the application, and have given legal notice of his intention to become a citizen of the United States, he must make oath to these facts before he can claim a patent, for the same sum paid by a citizen.

Of Drawings, and specimens of Ingredients.

The law requires, that "the applicant for a patent shall accompany his application with drawing or drawings, and written references, when the nature of the case admits of drawings." These drawings should be according to the rules of perspective, and neatly executed; and such parts as cannot be shown in perspective, must, if important, be represented in section or detail. When the specifications refer to the drawings, duplicates of them are required, as one must accompany the patent when issued, as explanatory of it, and one must be kept on file in the office.

The drawings must be signed by the patentee, and attested by two witnesses: many drawings have been transmitted without any name or references.

Drawings are necessary, even though a model be sent.

Of Models.

The law requires that the inventor shall deliver a model of his invention or improvement when the same admits of a model. The model should be neatly made, and as small as a distinct representation of the machine or improvement, and its intended properties, will admit; and the name of the inventor should be printed *upon* or *affixed* to it, in a *durable* manner. Many models have been forwarded without a name, and therefore lost or mislaid.

Models must be forwarded at the expense of the applicant.

When the invention is of a "a composition of matter," the law requires that the application be accompanied with specimens of the ingredients. and of the composition of matter, sufficient in quantity for the purpose of experiment.

Proceedings on applications for Patents, and on appeals from the deceision of the Commissioner.

"That on the filing of any such application, description, and specification, and the payment of the duty hereinafter provided, the commissioner shall make, or cause to be made, an examination of the alleged new invention or discovery; and if, on any such examination, it shall not appear to the commissioner that the same had been invented or discovered by any other person in this country, prior to the alleged invention or discovery thereof by the applicant, or that it had been patented or described in any printed publication in this or any foreign country, or had been in public use or on sale, with the applicant's consent or allowance, prior to the application, if the commissioner shall deem it to be sufficiently useful and important, it shall be his duty to issue a patent therefor. But whenever, on such examination, it shall appear to the commissioner that the applicant was not the original and first inventor or discoverer thereof, or that any part of that which is claimed as new had before been invented or discovered, or patented, or described in any printed publication, in this or any foreign country, as aforesaid or that the description is defective and insufficient, he shall notify the applicant thereof, giving him briefly such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification, to embrace only that part of the invention or discovery which is new. In every snch case, if the applicant shall elect to withdraw his application, relinquishing his claim to the model, he shall be entitled to receive back twenty dollars, part of the duty required by this act, on filing a notice in writing of such election in the patent office, a copy of which, certified by the commissioner, shall be a sufficient warrant to the treasurer for paying back to the said applicant the said sum of twenty dollars.—But if the applicant, in such case, shall persist in his claim for a patent, with or without any alteration of his specification, he shall be required to make oath or affirmation anew, and in manner as aforesaid; and if the specification and claim shall not have been so modified as, in the opinion of of the commissioner, shall entitle the applicant to a patent, he may, on appeal, and upon request in writing, have the decision of a board of examiners, to be composed of three disinterested persons, who shall be appointed for that purpose by the Secretary of State, one of whom, at least, to be selected, if practicable and convenient, for his knowledge and skill in the particular art, manufacture, or branch of science to which the alleged invention appertains, who shall be under oath or affirmation for the faithful and impartial performance of the duty imposed upon them by said appointment. Said board shall be furnished with a certificate, in writing, of the opinion and decision of the commissioner, stating the particular gronnds of his objeetion, and the part or parts of the invention which he considers is not entitled to be patented. And the said board shall give reasonable notice to the applicant, as well as to the commissioner, of the time and place of their meeting, that they may have an opportunity of furnishing them with such facts and evidence as they may deem necessary to a just decision; and it shall be the duty of the commissioner to furnish to the board of examiners such information as he may possess relative to the matter under their consideration. And on an examination and consideration of the matter by such board, it shall be in their power, or of a majority of them, to reverse the decision of the commissioner, either in whole or in part; and their opinion being certified to the commissioner, he shall be governed thereby in the further proceedings to be had on such application: *Provided however*, That before a board shall be instituted in any such case the applieant shall pay to the credit of the treasurer, as provided in ninth section of this act, the sum of twenty-five dollars; and each of said persons so appointed, shall be entitled to receive for his services, in each case, a sum not exceeding ten dollars, to be determined and paid by the commissioner, out of any money in his hands, which shall be in full compensation to the persons who may be so appointed, for their examination and certificate as aforesaid."

Re issue to correct a defective description.

When the applicant wishes to cancel his old patent, for a mistake or inadvertence, he should state the reasons in his application, and expressly surrender the old patent, which must be transmitted to the patent office before a new patent will be issued.—Section thirteen enacts: "That whenever any patent which has heretofore been granted, or which shall hereafter be granted, shall be inoperative or invalid, by reason of a defective or insufficient description or specification, or by reason of the patentee claiming in his specification, as his own invention, more than he had or shall have a right to claim as new, if the error has, or shall have arisen by inadvertancy, or accident, or mistake, and without any fraudulent or deceptive intention, it shall be lawful for the commissioner, upon the surrender to him of such patent, and the payment of the further duty of fifteen dollars, to cause a new patent to be issued to the said inventor, for the same invention, for the residue of the period then unexpired for which the

original patent was granted, in accordance with the patentee's corrected description and specification."

And in case of his death, or any assignment by him made of the original patent, a similar right shall vest in his executors, administrators, or assignees, and the patent, so reissued, together with the corrected description and specification, shall have the same effect and operation in law, on the trial of all actions hereafter commenced for causes subsequently accruing, as though the same had been originally filed in such corrected form before the issuing out of the original patent.

Interfering applicatians.

" Whenever an application shall be made for a patent, which, in the opinion of the commissioner, would interfere with any other patent for which an application may be pending, or with any unexpired patent which shall have been granted, it shall be the duty of the commissioner to give notice to such applicants, or patentees, as the case may be; and if either shall be dissatisfied with the decision of the commissioner on the question of priority of right or invention, on a hearing thereof, he may appeal from such decision, on the like terms and conditions as are provided in the case of applications for inventions not new; and the like proceedings shall be had to determine which, or whether either of the applications is entitled to receive a patent, as prayed for."

Caveats.

The law enacts, "that any citizen of the United States, or alien, who shall have been resident in the United States one year next preceding, and shall have made oath of his inention to become a citizen thereof, who shall have invented any new art, machine, or improvement thereof, and shall desire further time to mature the same, may, on paying to the credit of the treasury, in manner as provided in the ninth section of this act, the sum of twenty dollars, file in the patent office a caveat setting forth the design and purpose thereof, and its principal and distinguishing characteristics, and praying protection of his right, till he shall have matured his invention: which sum of twenty dollars, in case the person filing such caveat shall afterwards take out a patent for the invention therein mentioned, shall be considered a part of the sum here in required for the same. And such caveat shall be filed in the confidential archives of the office, and preserved in secrecy. And if application shall be made by any other person, within one year from the time of filing such caveat, for a patent of any invention with which it may in any respect interfere, it shall be the duty of the commissioner to deposite the description, specifications, drawings, and model, in the confidential archives of the office, and to give notice, by mail, to the person filing the caveat, of such application, who shall, within three months after receiving the notice, if he would avail himself of the benefit of his caveat, file his description, specifications, drawings, and model; and if, in the opinion of the commissioner, the specifications of claim interfere with each other, like proceedings may be had in all respects as are in this act provided in the case of interfering applications: provided, however, that no opinion or decision of any board of examiners, under the provisions of this act, shall preclude any person interested in favor of or against the validity of any patent which has been, or may hereafter be granted, from the right to contest the same in any judicial court, in any action in which its validity may come in question."

Extension of the patent beyond the fourteen years.

Section eightenn enacts: " That whenever any patentee of an invention or discovery shall desire an extension of his patent beyond the term of its limitation, he may make application therefor, in writing, to the commissioner of the patent office, setting forth the grounds thereof; and the commissioner shall, on the applicant's paying the sum of forty dollars to the credit of the treasury, as in the case of an original application for a patent, cause to be published, in one or more of the principal newspapers in the city of Washington, and in such other paper or papers as he may deem proper, published in the section of country most interested, adversely, to the extension of the patent, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted. And the Secretary of State, the commissioner of the patent office, and the solicitor of the treasury, shall constitute a board to hear and decide upon the evidence produced before them, both for and against the extension, and shall sit for that purpose at the time and place designated in the published notice thereof. The patentee shall furnish to said board a statement, in writing, under oath, of the ascertained value of the invention, and of his receipts and expenditures, sufficiently in detail to exhibit a true and faithful account of loss and profit, in any manner accruing to him from and by reason of said invention. And if, upon hearing of the matter, it shall appear to the full and entire satisfaction of said board, having due regard to the public interest therein, that it is just and proper that the term of the patent should be extended, by reason of the patentee, without neglect or fault on his part, having failed to obtain, from the use and sale of his invention, a reasonable remuneration for the time, ingenuity and expense bestowed upon the same, and the introduction thereof into use, it shall be the duty of the commissioner to renew and extend the patent, by making a certificate thereon of such extension, for the term of seven years, from and after the expiration of the first term; which certificate, with a certifinate of said board of their judgment and opinion as aforesaid, shall be entered on record in the patent office; and thereupon the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years; and the benefit of such renewal shall extend to assignees and grantees of the right to use the thing patented, to the extent of their respective interest therein: *Provided, however,* That no extension of a patent shall be granted after the term for which it was originally issued."

Fees payable at the Patent Office.

All fees must be paid in advance: the amount is fixed by law, except in the case of drawings, the expense of which will be communicated on application for the same.

Every applicant must pay into the treasury of the United States, or into the patent office, or into any of the deposite banks, to the credit of the treasurer, on presenting his petition, as follows:

If a citizen of the United States	$30 00
If a foreigner, who has resided in the United States one year next preceding the application for a patent, and shall have made oath of his intention to become a citizen	30 90
If a subject of the King of Great Britain	500 00
All other foreigners	300 00
On entering a caveat	20 00
On entering an application for the decision of arbitrators, after notice from the commissioner that the patent is not new, or interferes with a pending application or caveat	25 00
On extending a patent beyond the fourteen years	40 00
For recording each assignment or transfer of patent	3 00
For adding to a patent the specification of a subsequent improvement	15 00
On surrender of old patent, and new issue for mistake or inadvertence of patentee	15 00
For copies of patents, or any other paper on file, for each 100 words	10
For copies of drawings, a reasonable sum in proportion to the time occupied in making the same	

N. B. The patent office does not make original drawings to accompany applications for patents, and gives only copies of the same after the patent is completed.—Draughtsmen in the city of Washington are always ready to make drawings, at the expense of the patentees.

Communications to and from the patent office are free of postage.

All fees, if sent to the commissioner of patents, should be transmitted in gold or silver coin, when they amount to less than five dollars, as bank notes under that sum will not be received.

It is recommended to make a deposite in a deposite bank, for the fee for the patent, and remit the certificate. Where this cannot be done without much inconvenience, gold may be remitted by mail, free of postage; and this is preferred to the bills of the deposite banks, which, however, will not be refused.

In case of deposites, made in the deposite banks, a duplicate receipt should be taken, stating by whom the payment is made, and for what object. The particular patent should be referred to, to enable the applicant to recover back the twenty dollars in case of withdrawal of the petition.

On recovering back Money paid for Patents not taken out.

When a patentee relinquishes or abandons the application for a patent, he must petition the commissioner of patents, stating the abandonment or withdrawal of his petition, in which case twenty dollars will be repaid.

In case of withdrawing petition, the model deposited is by law retained.

Further remedy in Equity for Patentees.

In case of intefering applications with other pending applications or unexpired patents or caveats, a hearing is had before the commissioner of patents prior to the appeal to a board of arbitrators. In other cases the decision of the commissioner on the novelty and utility of the invention is made without a hearing, and from which an appeal may be taken to a court of arbitrators.

When the decision of the board of arbitrators shall be unsatisfactory to a party interested, a bill of equity can be filed in the United States courts, whose decision will be imperative.

On filing the Specification and Drawings as a Caveat.

"Whenever the applicant shall request it, the patent shall take date from the time of filing the specification and drawings, not however exceeding six months prior to the actual issuing of the patent; and, on like request, and the payment of the duty herein required, by any applicant, his specification and drawing shall be filed in the secret archieves of the office until he shall furnish the model, and the patent be issued, not exceeding the term of one year, the applicant being entitled to notice of interfering applications."

A full description of the invention is required to enable the commissioner of patents to judge of interferences.

All applications will be examined, and patents issued, in the order of time in which the proper documents are completed.

Exhibitions of Model and Manufactures.

Unpatented models, specimens of compostions, and of fabrics, and other manufactures or works of art, will be received and arranged in the national repository of the patent office as soon as the new buiding is finished.

Personal attendance of the applicant at the patent office, to obtain a patent, is unnecessary. The business can be done by correspondence (free of postage) or by power of attorney.

Oaths.

Any magistrate authorised to administer oaths is qualified to certify under this act.

Form of Petition.

To the Commissioner of Patents:

The petition of Sebastian Cabot, of Cabotsville, in the county of Hampden, and State of Massachusetts,

Respectfully represents:

That your petitioner has invented a new [and improved mode of preventing steam boilers from bursting,] which he verily believes has not been known or used prior to the invention thereof by your petitioner. He therefore prays that letters patent of the United States may be granted to him therefor, vesting in him and his legal representatives the exclusive right to the same, upon the terms and conditions expressed in the act of Congress in that case made and provided; he having paid thirty dollars into the treasury, and complied with the other provisions of the said act.

SEBASTIAN CABOT.

Form of Specification.

To all whom it may concern:

Be it known, that I, Sebastian Cabot, of Cabotsville, in the county of Hampden, and state of Massachusetts, have invented a new and improved mode of preventing steam boilers from bursting, and I do hereby declare that the following is a full and exact description:

The nature of my invention consists in providing the upper part of a steam boiler with an aperture, in addition to the safety valve, to be closed up with a plug or disk of alloy, which will fuse at any given degree of heat, to be governed by the proportions forming the alloy, and permit the steam to escape, should the safety valve fail to perform its functions.

To enable others skilled in the art to make and use my invention, I will proceed to describe its constrution and operation: I construct my steam boiler in any of the known forms, and apply thereto gauge cocks, a safety valve, and the other appendages of such boilers; but in order to obviate the danger arising from the adhesion of the safety valve, and from other causes, I make a second opening in the top of the boiler, similar to that made for the safety valve, and in this opening I insert a plug or disk of fusible alloy, securing it in its place by a metal ring and screws, or otherwise. This fusible metal I, in general, compose of a mixture of lead, tin, and bismuth, in such proportions as will insure its melting at a given temperature, which must be that to which it is intended to limit the steam, and will, of course, vary with the pressure the boiler is intended to sustain. I surround the opening containing the fusible alloy, by a tube intended to conduct off any steam which may be discharged therefrom. When the temperature of the steam in such a boiler rises to its assigned limit, the fusible alloy will melt, and allow the steam to escape freely, thereby securing it from all danger of explosion.

What I claim as my invention, and desire to secure by letters patent, is the application to the steam boilers, of a fusible alloy which will melt at a given temperature, and allow the steam to escape, as herein described; using for that purpose any metallic compound which will produce the intended effect.

Witnesses: SEBASTIAN CABOT.
JOHN DOE.
RICHARD ROE.

If the thing desired to be patented be an original machine, the title, in that part of the petition and specification between brackets, should be altered thus: [have invented a new and useful machine, &c.] and if an improvement only, thus: [have invented a new and useful improvement on a, or on the, machine, &c.]

Form of Oath.

County of Hampden, State of Massachusetts, ss.

On this day of 183 , before the subscriber, a justice of the peace in and for the said county, personally appeared the within named Sebastian Cabot, and made solemn oath (or affirmation) that he verily believes himself to be the original and first inventor of the mode herein described, of preventing steam boilers from bursting, and that he does not know or believe that the same was ever before known or used; and that he is a citizen of the United States:

Signed, A. B., Justice of the Peace.

If the following questions can be answered affirmatively before transmitting the papers, few applications will be returned for correction of emissions:

1. Is the fee transmitted?
2. Is the petition signed, and directed to the commissioner of patents?
3. Is the specification signed, and witnessed by two witnesses?
4. Are the drawings signed, and witnessed by two witnesses?
5. Do the drawings contain references? and if the specificatio refers to them, are duplicates sent?
6. Has the inventor made oath to his being a citizen, and that his invention is new, &c.
7. Does the specification contain a specific claim?
8. If an alien and resident, is this affirmed or sworn to?
9. Has the model been sent, and how?
10. Is the name of the inventor durably affixed to the same?
11. In case of reissue, is the old patent surrendered?
12. Has the oath of invention been renewed, before applying for a board of arbitrators?
13. Have the fees unler $5 been remitted in coin?

All communicatious should be addressed to the commissioner of patents.

HENRY L. ELLSWORTH,
Commissioner of Patents.

A new invention for brick making has been patented by one Sawyer. The bricks are made by it from dry clay, and are said to be superior to the common kind in beauty, strength and durability. The texture is much closer than thut of the common brick, so that the article absorbs less water, takes paint much better, not requiring more than one half necessary in the old way, and stands fire much longer. The frost likewise does not operate on it, and bricks are turned out of the new machine, at one half the expense, or less, than by any other mode now in use.—[Pennsylvania paper.]

AGRICULTURE, &c.

From the Genesee Farmer.

THE DAIRY—ITS PROFITS.

BY W. G.

The first object of a farmer in cultivating the soil is profit; and next to this is the desire of securing the first with as little expenditure of labor and means as is possible. To do this the quality of the soil, its condition, and the size of the farm, must be taken into consideration. Its very situation will in a great measure determine the first; its condition will of course be depending on the judicious or injudicious treatment it has received and as to number of acres, it is evident that without a certain quantity of them, some kinds of farming, such as grain raising, or wool growing, cannot be profitably undertaken. Perhaps there is no one branch of farming that can be so readily adopted to all farms great or small, as the dairy; and while it is clear to raise grain extensively a large farm must be required, and much labor and money expended, a medium farm, one of eighty or a hundred acres will be found best calculated for the dairy, as the hiring of assistants can usually be dispensed with in such cases. For a man with but forty acres to attempt the raising of grain for sale, and at the same time keep the necessary horses and cows and sheep required to cultivate the farm, and supply the family, would be an unprofitable undertaking; but on such a farm a dairy may be kept that will be a source of great profit, when compared with the capital invested.

To make this matter clear, it may be best to make a few estimates, in all cases getting as near well established results as possible, and where any thing must be left to conjecture, always being careful to err on the safe side of the calculation. A farmer wishes to commence a dairy with ten *good* cows, not herd book stock, but good native animals. The price of cows for several years past in the spring of the year has varied from 18 to 22 dollars—we will call it 20—thus making the cost of his cows 200 dollars. For pasturing cows it is generally estimated that two acres to each one will be required; and it may be so as pastures are generally laid down, but where the turf is clean and close and the soil in good heart, we are confident something less will be sufficient to give them every advantage. The interest on the twenty acres required, for six months, the time the dairy will be in operation, at 30 dollars per acre, will be 21 dollars. The interest on the money invested in cows, will be 7 dollars. A dairy maid, if one is required, for 6 months, at a dollar per week, twenty-six dollars. The expense will stand thus:

10 cows, at $20 each,	$200 00
Interest on do. 6 months,	7 00
Interest on 2 acres to each cow,	21 00
Dairy maid 6 months,	26 00
Total expense,	$254 80

If a dairy is a cheese dairy, much will be depending as to the receipts, on the qualities of the milk produced, and the skill shown in making. The quantity of cheese produced, varies much in different dairies, and in estimating profits a medium rate must be selected. Mr. Brown, of Otsego county, made from thirteen cows 4700 lbs of cheese, or 361 lbs. to each cow. Mr. E. Perkins, of Trenton, Oneida county, from 78 cows, made 32,000 lbs. or 410 lbs. to each cow; and in the same communication he states, that the dairies in that cheese making region vary from 200 to 500 lbs. of cheese to a cow. Some experience in the dairy business, and an acquaintance with a dairy district, leads us to suppose that 350 lbs. to each cow would not be an extravagant estimate. The average price of good cheese when sufficiently ripe for sale, for several years past, has not been less than 8 cents per lb., and many dairies find their sales have averaged 9 or $9,50 per cwt. Making our estimate at 8 cents per lb., the receipts of a dairy of ten cows would stand as follows:

3500 lbs. cheese, 8 cts. per lb.	$280 00
100 lbs. butter, 15 cts. per lb.	15 00
Whey for swine, $2 per cow,	20 00
	$315 00

Making the receipts from each cow for six months $31,50—or if we deduct the butter as being most of it necessary in the dairy room, it will leave the sum of 30 dollars per cow. In some of the best dairy districts of New-England, it has been common to dispose of the cows to drovers after the dairy season has closed, but little feeding being generally required to make them good beef. Cows are not as high in the fall as in the spring, by about 20 per cent., and if our farmer determines to sell his cows in preference to keeping them over the winter, they will bring him about 160 dollars.—This sum must be added to the receipt of the year, making a total of 475 dollars.—The whole will then stand thus:

Receipts,	$475 00
Expenses,	254 00
	$221 00

Giving to the farmer a clear profit of eleven dollars upon each of the twenty acres used for the dairy. It must be remarked, however, that to produce this result, the cows must be in good heart and tolerable order on the first of May, and have good feed for the summer. Cows that "shirked" through the winter, and pasture on daisies, johnswort, and thistles, through the summer, will not reach the above mark, and the owners may think themselves fortunate if the "summing up" should not show a balance the other way.

If the dairy is to be devoted to making butter, there will be but little difference in the result; though if conducted under favorable circumstances, we think making butter rather more profitable than cheese.—Many persons, however, connected with the dairy, think otherwise, and the odds at any rate cannot be very great. To make butter through the summer, the dairy must be so situated and constructed, that a uniform proper temperature may be maintained, as it is well known if the temperature is too low, the cream will be so long in rising as to become bitter; and if too high, as is usually the case in the summer, the milk sours before the cream has time to separate, by which much of the cream is lost, and the butter rendered of an inferior quality.—In making butter, more is depending on the quality and richness of the milk, than in making cheese, as some cows from the same quantity of milk will give double the amount of cream that others will; and hence the selection of animals must be made with reference to this very point.—This fact accounts for the discrepancy shown in the quantity of butter produced in different dairies, and the varying estimates consequently made of the butter each cow will produce in a season. There are some cows that will make a pound of butter a day for seven or eight months, with good keeping, and there are others, that if they give half a pound a day may be considered as doing well.

The breed of cows has a great influence in determing the quantity or quality of the milk. The Earl of Chesterfield a short time since instituted a series of experiments on some favorite cows of different breeds, the result of which was as follows: "In the height of the season the

	Qts. milk.	Oz. butter.
Holderness gave per day,	29	38½
Long Horn,	19	25
Alderney,	19	25
Devonshire,	17	28
Ayrshire,	20	34"

That there are few, if any cows, of our native breeds that will approach this quantity of milk or butter, most must be willing to admit; indeed, an able writer on cattle in the Farmer, thinks that few dairies, or cows, in this country will average more than from 160 to 170 pounds a year. From some experiments we have made, and the reports of some few ordinary dairies for butter, we are disposed to dissent from this writer, and believe that with ordinary care in the selection of cows and the management of the dairy, 200 lbs. may easily be reached. Mr. Curtis, of Marblehead, from common cows and ordinary pasture, for three years, made butter as follows:

1828—8 cows,	1272 lbs. butter.
1829—7 "	1175 "
1830—6 "	1090 "

Which last is at the rate of 181 pounds to a cow, and that under unfavorable circumstances to make the most of the milk. We know of cows that produce a pound a day for at least three months in the hight of the season, and that without extra care or feed; still, a native cow, to do this, must be good. For three years past, butter, taking the whole season, will average 15 cts. per lb., and calling the amount produced from a cow 200 lbs., the balance would stand thus:

Butter from 10 cows, 2,000 lbs.	$300 00
Skimmed milk $3 per cow,	30 00
	$330 00

Making a difference of fifteen dollars in favor of butter over cheese making. Where the milk is churned new from the cows, the quantity of butter will of course be greater, but we have never made it in that way, and have no authentic information by which the difference, and of course the profits, can be correctly estimated.

Various estimates have been made of the expense of getting in a crop of wheat or corn; but where wheat is put in after a summer fallow, as is usually the case, the expense of the ploughings, harrowings, seed, interest, and wear of implements and the land, cannot be estimated at less than ten dollars per acre. Admitting the average crop of wheat to be twenty bushels per acre, which must, taking the whole, be considered liberal, and a profit of ten dollars per acre, wheat at one dollar per bushel, which may be considered the average price, will be the result. It would be easy to make a list of the items of expense and profit but there can be no necessity for it here, as every wheat grower can make the estimate for himself, if he needs to be convinced that the above estimate is not far from the truth. If the crop to be compared is one of corn, estimates made with great care by Judge Buel, Clark, and others, show that in ordinary cases the expense of a crop, including labor, seed, use of land, &c., is at least fifteen dollars per acre. The profits

of a corn crop are more variable in our latitude than most others, sometimes running very high, and at others being literally nothing; and we believe that if the average estimate of profit on an acre of corn is put the same as wheat, it is as high as the experience of the farming community will justify.

If the above calculations are correct—and if they are not we should be happy to have the errors pointed out, by any one practically acquainted with the subject—then the difference in profit per acre between the dairyman and the wheat grower, is not so much in favor of the latter as has been generally supposed. It may however be said, that the practice of disposing of the cows by the dairyman after the season is closed, would in the end be suicidal to the business if generally adopted, and hence as a general rule the cows must be kept over the winter, making it necessary to deduct from the profits the expense of keeping through the winter. This may be admitted, and the result would then be as follows:—A cow will eat a ton and a half of hay in the winter, which at the average price of eight dollars a ton, would be twelve dollars for keeping; rather exceeding, if there is any difference, the neat profit on each cow the first season. It must be remembered, however, that if the produce of a good cow will pay for herself and her winter's keeping the first season, then the dairyman enters the field on the second year with an unencumbered capital; the cows are paid for, and the entire amount of their produce, with the trifling deductions above stated, are to be counted as profit. Let our dairy counties look at this matter carefully—it is well worth their attention. W. G.

MASSACHUSETTS HORTICULTURAL SOCIETY.

Saturday, July 30, 1836.

Proceedings of the Massachusetts Horticultural Society at a meeting held at the Hall of the Institution on Saturday, July 30, 1836.

The following Report was made by the President of the Society.

I have the pleasure to lay before the Society two communications from M. Emilien de Wael. This gentleman it will be recollected was the bearer of letters to the Society from Doct Van Mons and M. A. Poiteau, accompanying a donation of books, received a short time since. Mr. de Wael is an amateur cultivator and the Secretary of the Horticultural Society of Antwerp; he is now on a tour of the United States for scientific purposes, connected with Entomology and the examination of the marine plants of our country, and I have to congratulate the Society on the addition to its list of corresponding members of the name of an individual who is not only highly qualified, but who is entirely disposed to subserve its purposes at Antwerp, located as he is, in a country to which Horticulture, so far as *promology* is concerned, is indebted for more numerous and valuable acquisitions, than to any other

Mr. de Wael's remarks on the results of various experiments made in Belgium to protect the Mores Multicaulis from the effects of cold must be interesting to those who are endeavoring to protect that plant from the severity of our own winters; it is desirable to know what is now considered the best method of cultivating it in other countries; for it is by a careful collation of facts, connected with its culture abroad in aid of the actual experiments making here, that we may hope shortly to overcome every obstacle to the extensive cultivation of that invaluable plant.

Respectfully submitted by

ELIJAH VOSE,

President of the Mass. Hor. Society.

Boston, July 25, 1836.

Since I have been in this country I have heard of several complaints, chiefly from the Hartford Mulberry tree planters, of the difficulty experienced the last two years in making the *Morus Multicaulis* stand your winters well.

This kind of mulberry is easily acclimated if a proper mode of culture be adopted in the places where it is planted.

In Belgium, the winters, notwithstanding they are not so severe as yours, often give us great trouble, and the influence of the cold was repeatedly experienced on these Mulberries, which were often killed down to the roots.

The late *J. Le Candele* of Humbeck, near Brussells, suggested the idea of having different modes of experiment adopted in distant places. And the one which proved most efficient, was to cut down yearly, the Morus Multicaulis, in the same manner as is done with willows in a *Salictum*, that is to say, at a few inches above the soil, and to cover the remaining trunk with dead leaves; in three or four years, the roots being stout enough, they did not require any more covering. From the buds preserved on the plants, fine and hardy shoots came forth, giving larger and more lively leaves to feed the silk worms upon.

It has been since stated to me in a letter from Batavia, (Island of Java,) that this mode of culture is much in use near Manilla and in parts of China, not on account of the cold, but in order to keep the Morus in a shrubby state, which affords greater facility for gathering the leaves in the season when desired. There the mulberry seems to be planted in fields as Indian corn is here,—in the fall of the year the plants are deprived of their branches, the number of which is continually increasing, and growing in one season from five to eight—which growth is fully equalled by our own. I would advise a similar experiment in this State; it might, perhaps, answer well.

Most respectfully, your ob't. servant,

EMILIEN DE WAEL.

Hon. ELIJAH VOSE,

President Mass. Hort. Society.

From the Genesee Farmer.

THE HORSE HOE.

The indifference manifested by many of our farmers as to the tools they work with, is most surprising. If they are good, or of the improved kind, they seem to consider it a lucky chance; if they are bad, or old fashioned, they jog on with them, only hitching on more team, and putting to it more strength. Nobody presumes to dispute the merits, or dispense with the services of the cast iron ploughs, now-a-days; yet we well remember they were looked upon with suspicion, and worked their way into use slowly. Improved implements in almost every branch of agricultural industry have followed the plough, although perhaps they have not in every instance received or deserved such complete success. There is one however which we have been surprised to find in so few hands, as from the experience of years we consider it deserving a place on every farm. This implement is the Cultivator, or Horse Hoe. Experience has shown that the troublesome process of hililng most plants may with advantage be dispensed with, especially such as corn and potatoes, and that all the benefits derived from hoeing by hand, on clean ground, may be fully realized in the use of the cultivator, and with an expense of time and labor inconsiderable. Where it is necessary to use the hoe at all after the cultivator, it is only in cutting out such few weeds as that could not reach without injury to the plants cultivated, or when desired, in placing small quantities of fresh earth around the growing crop. For stirring up the ground, rendering it loose and accessible to the influences of air and dews, and destroying weeds, the cultivator is unrivalled. In corn planted on lays, or turf turned over and rolled close, it may be used when the plough would disturb the turf, and do nearly as much hurt as good. The cultivator is a cheap implement, not liable to fail when well made, and if housed when not in use, as all tools should be, is very durable. Let those farmers who like a good thing, try the cultivator. G.

From Hovey's Gardener's Magazine, for August.

REVIEW.

THE GARDENER'S MAGAZINE AND REGISTER OF RURAL AND DOMESTIC IMPROVEMENT. CONDUCTED BY J. C. LOUDON, F. L. S., H. S., &C. IN MONTHLY 8VO NUMBERS; 1S. 6D. EACH. NO. LXXIV, FOR MAY.

This number is full of valuable information, from which we shall make large extracts. It contains twelve excellent original communications, from various scientific and practical men.

Art. 1.—"Gardening Notices suggested by a tour in France, in August and September, 1835." By T. Rivers, Jr., the well-know nurseryman at Sawbridgeworth, at which place is one of the finest collections of roses in England. The article is full of interest, being amusingly as well as instructively written. The following extracts include the most useful parts of the paper:

"*Forcing the Rose.*—At Lisle, in one of the numerous small nursery gardens, I was interested with what might be called a most eligible mode of forcing the rose. In this instance a small span-roofed house was used. A border on each side of the central path was planted with roses budded on dog-rose stems of different heights; the shortest stems being put next the path, so as to make their heads form a sloping bank. The surface of these borders was covered with manure, to keep them in a constantly moist state. The common smoke flues were used for heating this house; and the owner informed me that, by beginning to

force in December, roses were gathered from it plentifully for the market in March and April.

"After the crop of flowers was gathered, the lights were taken off in May, and the plants exposed till the period for forcing again arrived. This method appeared so simple and economical, that I took a memorandum merely for the purpose of suggesting it to your readers; and, for growing moss and other roses for boquets near London, it might, I think, with some little modification, be carried extensively and profitably into practice. In this way, also, with but very little trouble, a rose garden in full bloom and luxuriance might be created as early as the end of February; and, by selecting some of the ever-blooming varieties, continued nearly through the whole year. And what a delightful sheltered promenade might thus be formed by those who, regardless of expense, would build an elegant span-roofed house, with movable lights, so as to form an agreeable resort, not only in early spring, but also at the end of summer and autumn! for in September and October, and even in November, the Noisette, China and perpetual roses, regardless of having been forced, would bloom again as luxuriantly as ever."

The following is given as the "Mode of Cultivating Pear Trees in Pots, where the object is economy of space."

"A Frenchman's town garden is often a model of economy of space. You will find a choice collection of roses, budded on short stems; a collection of valuable rhododendrons, azaleas, and camellias, in pots; and, perhaps, thirty or forty varieties of pears, all growing in so small a space, that an English gardener, can scarcely believe what he sees. In the garden of M. Smedt, a distinguished amateur at Lisle, the pear trees were literally pyramids of fruit. The summer foreright shoots were tied in so as not to shade the pears, and the following winter they were removed. I suspect, also, that the roots of the trees were annually shortened, to reduce the luxuriant growth which pear trees are so liable to; but this I could not ascertain. The soil was a loose black sand, and the trees models of productiveness. Many of their stems, being too weak to support the weight of fruit, were tied to green painted stakes. Much of this extraordinary fruitfulness in such confined limits was owing, no doubt, to a more genial climate than we have here; as the summers and autumns are warmer, and the wood is always well ripened: but many of the best Flemish pears might be grown in our town gardens with quite as much economy of space as in France, if any regard were paid to culture. This culture is simply to keep them from growing too fast, by confining or reducing their roots; blossom buds will then be formed in abundance. It seems almost impossible to kill a pear tree: for though I have opened a circular trench round a pear tree, and cut off every root to within fifteen inches from the stem, yet it has not suffered, but, the following season, has been covered with blossom. In some of our rich London gardens, cutting the roots annually would have little or no effect; but I think that, if pots were manufactured expressly for the purpose, of large dimensions, we will say two feet deep, and one and a half foot in diameter, and plunged to the rim, not deeper, a collection of the new Flemish pears might be grown in any small garden. I mention, particularly, that the rim of the pot ought to be above ground, on account of the lateral roots, which would otherwise make their way over it, and give the luxuriance which it is so necessary to check in order to get fine fruit. To keep the trees under control in this respect seems to be the grand object of pear tree culture; and I feel assured that this may be attained by growing the trees in pots, by keeping the surface well supplied with manure, and, in summer, by watering with liquid manure. I hope ere long to see as many amateurs of pears as there now are of dahlias and roses; and, in all the principal nurseries, specimen plants of every variety in cultivation, growing and bearing abundantly in plunged pots. One precaution must be strictly urged.—Every gardener is aware of the tendency of the pear tree to make what is called a taproot. This the plants in pots will most assuredly do, if not checked, through the hole in the bottom. I therefore recommend that, in November or December annually, a trench be dug by the side of the pot, which must then be turned on one side, and every vestige of a root which may appear through the hole cut off with a spade. In the course of a few years a bunch of fibrous roots will be formed, that will require no other trouble than being annually disturbed; that is, the pot turned completely on one side, to prevent their giving too much luxuriance to the tree, by spreading into large feeders."

At Versailles are numerous small nurserymen, who principally grow plants for the flower-markets of Paris. Grapes are ripe there in the open border by Sept. 6. Magnol*ia* tripetala was ripening seeds at the same date. Hundreds of yellow China roses, budded on short stems, were covered with flowers. What a splendid sight! The principal plants grown are Kalm*ia* latifolia, and glauca, azaleas, rhododendrons, &c.; but it is stated they are not sold so cheap as in England.

In the *Jardin des Plantes*, at Paris, Maclur*a* aurentiaca was bearing fruit. The original plant of Æ'sculus rubicunda, raised there by Michaux, in 1812, is now a fine specimen. Two new iron palm-houses were [1835] being erected, which, it is supposed, will surpass any thing of the kind ever yet built; they are the boast of the Parisians. Iron curtains are attached to most of the green-houses in France, to protect them from hailstorms, which are very prevalent on the continent, as will be seen in another page of the present number.

The following remarks allude to the purple laburnum, of which much has been said in England, and much imposition, we believe, carried on in the sale of the plants.

"The purple laburnum, of which so much has been said lately, was growing here in great perfection. It came accidentally from seed among some common laburnums, in 1828, in the nursery of M. Adam, whence its name of *Cy*'tisus Adam*ii* in some catalogues. A fine plant was shown me by M. Camuset, which appeared to be half *C*ytisus purpureus, and the remainder purple laburnum. On examination, the curious fact was ascertained, that the purple laburnum, which is evidently a hybrid between *C*. purpureus and *C*. Laburnum, had partially returned to the habits of one of its parents, the *C*. purpureus. This is surely a most unusual occurrence. Here was no trickery of grafting practised; for I saw nearly a similar fect produced, in Jan. of the present year (1836), on a tree which I had sent to the Hon. C. Herbert of Ickleton, Cambridgeshire, in 1834, which presented preciselythe same appearance. At the extreme end of one of its shoots there came forth a branch of the pure *Cy*'tisus purpureus, with its small leaves and peculiar habit, appearing as if budded on the purple laburnum. Have you in your long experience, ever seen any fact approaching to this, viz. of a tree returning from hybridisation to the state of one of its parents?"

Among the French gardeners, the practice is adopted of surface manuring the soil, and, more particularly, roses: the importance of this system may be seen from the following observations:—

"During this last dry summer, when they constantly required water, without this, the surface of the ground would have been regularly baked and impervious; with it, the water poured down did not rapidly evaporate, but carried to the fibres a constant supply of nutriment from the manure. What an excellent hint does this give to planters on poor, stoney, sandy, or chalky districts in this country! On such soils all the manure should be put on the surface, and left for the worms and the rain to force it in. In the private garden attached to the Luxembourg Palace, and open to the members of the French Chambers only, are some of the finest rose trees in the world, apparently of great age (I regret not ascertaining this more correctly) and in vigorous health. Many of the stems of the standard roses in this garden are as thick as a stout man's leg. They are not budded on tall stems, their average height being, perhaps, from four to five feet; and they support themselves without stakes. Though so old and so large, they have regular annual culture, their heads being pruned every season, and the surface of the ground constantly manured. In this we have yet much to learn from our neighbors. With us the general mode is to plant a tree, and leave its after-growth to chance. Of course I now allude to amateurs and those gentlemen who amuse themselves by being their own gardeners; and, perhaps, this hint may induce them to give all their trees and shrubs some little annual notice."

We have frequently heard it stated, by many of our amateur gardeners, that tree roses are of very short duration in our climate; that from some causes they suddenly died off before the cultivator was even aware they were in an unhealthy state. These causes have been by some attributed to the effect of climate—by others to their cultivation—and by many to improper

stocks, on which they are budded. We have not had sufficient experience to allow us to offer any information on the subject; but so far as we have grown the tree roses, we have found them to flourish equally well with the dwarfs. The severity of last winter, which, as almost every one knows, was unprecedented for its duration, as well as for its intensity of cold, left unharmed some dozen or more of tree roses, among which were two or three hybrids that were fully exposed to the weather. The ends of the shoots were killed more or less, as were also the dwarf ones, but they grew as well and flowered as freely as ever we have seen them. We are rather inclined to the opinion of the author of this paper, that it is more from neglect than from any effect of climate or soil. It is too often the case that after a plant is set out, whether it be a fruit tree, a vine, or a shrub, nothing more is thought of it, unless it be the thought of wonder and astonishment that it should not flourish and bloom as well as those under the care of the experienced cultivator. It is impossible to expect plants to grow of themselves; they need care and attention, and, unless they have it, they must not be expected to repay the cultivator by either brilliant blossoms or vigorous growth. We do not hesitate to say, that tree roses will live to as great an age and blossom as finely in our climate, as those mentioned in the above extract.

Numerous beds of seedling China roses (Rosa indica), and the tea-scented China roses (R. indica odorata), were in full luxuriance of bloom on Sept. 10th, which was attributed to the superiority of the climate. Those little petty jealousies which are too common among our gardeners, it will be observed, by the following extract, tend to have no good effect upon the advancement of hor iculture or floriculture:—

"Some most superb varieties were among them; but M. Hardy is rather chary of his roses, and does not like them to be distributed hastily, patronising the old fashioned idea of possessing what his neighbors have not. It is amusing to find very prevalent here the little jealousies and envyings that at one time were so common among our florists. If a rose that has been raised from seed by M. Hardy is praised in the presence of another celebrated amateur near Paris, it is always responded to with "Bah!" and a shrug of contempt. Reverse this, by praising the amateur's rose to another, and you will find the same effect produced. It is therefore most prudent, if you wish to remain in the sunshine of favor, to limit all your admiration to the roses present, forgetting that there are any other roses or rose amateurs in the world.

"Among the seedling roses in this garden were some most curious hybrids, between Rosa or Lowe*a berberi*folia and other roses: they had not yet bloomed, but r[illegible] looked very interesting, owing to their peculiar habit. A custom in France among rose-growers gives rise to many (to us) very uninteresting names. An amateur who raises roses from seed is regularly beseiged by his lady friends to name one after them. He therefore keeps a book in which applications are duly registered, and this is only deviated from, under very peculiar circumstances; hence we have Madame Desprez, Madame Hardy, &c. I often think some of the fair applicants have not been in high favor when I find very bad roses honored with their names, which are soon consigned to oblivion. On the contrary, if you find a cultivator names one after his wife, it is generally a very fine flower, as is the case with those above mentioned. I think this is generally a very safe criterion for judging of the goodness of the flower, merely by the name; for, if the unfortunate grower has a termagant wife, I am quite sure (from the active part French women take in business) that she would not allow her name to be attached to a bad rose; and if an affectionate partner, his feelings will prompt him to honor her name with a fine flower."

The Paris Nurseries.—The nursery business in Paris seems to be at a low ebb; the writer states that there is not a respectable one in the vicinity. That of Cels is much reduced. Noisette has retired. Fion's nursery is in good taste, but very small. It is said that new and rare plants are not patronized, and only flowers and flowering plants for the market are worth cultivating. This depression of the nursery business the writer attributes partly to the ollowing cause:—

"Another cause for the slovenly and bad state of the French nurseries is, that the instant, by plodding, the proprietor accumulates eight or ten thousand francs, he considers himself a man of fortune; and, instead of investing it in improvements in business, as we do, he lives on the interest, and feels proud in being called a gentleman; for, however respectable we think a man in large business, the French do not; but consider an idle man of thirty pounds per annum as much his superior.. I have found this from experience; as an amateur, you may command any thing: but if you avow yourself *un commercant*, ten to one, but the tone is changed. When an Englishman is told the amount of property that some of these "men of fortune" possess, it is impossible to repress a smile at the extraordinary smallness of the sum which contents them; but then *soupe aux choux* (cabbage soup without meat) five days out of seven is cheap living, and coffee is also cheap; and these are all a Frenchman cares about *at home*; though, if you take him to a restaurateur's, and *treat* him with a good dinner, it is amazing how he will enjoy the good things of this life."

This is a true trait in the French character.

"*Commercial Rose Nurseries in Paris.*—Nothing can be more insignificant, both as to size and stock, than the nurseries of the commercial rose-growers near Paris; they seldom exceed one acre, and more frequently contain but half that quantity of ground; in which standard roses of all heights, and dwarfs of all sorts, are grown in the same rows; presenting, to a stranger, an inextricable mass of confusion. It would be difficult to execute an order for a general good collection from any one of these nurseries; but they are so numerous, that twenty may be visited, for twenty sorts of roses, with but little difficulty. I had concluded that M. Laffay, and one or two others, whom I knew to have been in our English nurseries, would have adopted, in some degree, our orderly arrangement; but they had not in the least deviated from the custom of their neighbors; and M. Laffay's little garden, of half or three quarters of an acre, was as full of roses and confusion as any that I saw."

With the Cemetery of Pere la Chaise the author was not very well pleased; too many evergreens are planted about the graves, forming a dreary and gloomy mass. The cypress and weeping willow, the two most appropriate trees for planting in such situations, are rarely seen. The same may be said of the Cemetery at Mount Auburn; we have been surprised to see so few cypresses and weeping willows planted, while masses of arbor vitæ and balsam firs are scattered in profusion around many of the graves. We hope the proprietors of lots will give some attention to this, and plant more flowers and fewer trees, and those appropriate to the scene.

From the higher parts of Pere la Chaise the view of Paris is said to be most beautiful. The following remarks in regard to this place we commend to the attention of every person interested in the cemetery of our vicinity; they are applicable in every instance:—

"How much it is to be regretted that a finish is not given to this interesting place by removing and thinning the overgrown and crowded trees, and planting others more appropriate; filling up the hollow paths, and giving some of them a fresh direction! In short, it ought to be under the management of a committee of taste, rather than left to individual caprice."

How delightful and pleasing a view of the city and environs of Boston might be opened, by cutting away some of the trees and brushwood which surround the highest part of Mount Auburn, and from where nothing can now be seen but the blue sky above. In the foreground might be traced the gentle curvings of Charles River, beyond and to the left of which, Cambridge, with its colleges and retired residences, and, farther still, the distant city. On one side would be seen the rich scenery of the highly cultivated and fertile village of Watertown, with its noble sheet of water, and, on another, the adjacent towns of Brighton and Newton, with their quiet villas and picturesque landscape. Indeed, we know of no spot where the surrounding country could be viewed with more advantage—no place where the many strangers who resort there during the summer season could gather a more favorable opinion of the varied scenery and highly cultivated character of the vicinity than on this spot. We have long hoped that this rare opportunity would not have escaped the observation of the proprietors of this interesting place—and we look anxiously forward to see it carried into effect.

The second article is by our well known and practical agriculturist, Judge Buel, "on the Excretory functions of Plants."

The third article is a continuation of designs for laying out suburban gardens, with wood-cuts.

Art. 4. contains some account of the "Indigenous and Exotic Trees of Switzerland."

The total number of ligneous species of trees in Switzerland is two hundred and eighteen, of which fifty five rarely exceed the height of two feet; one hundred and one are shrubs, varying from two to ten feet; twenty-four are shrubs and low trees, not exceeding twenty-five feet in height, and thirty-eight are trees which surpass twenty-five feet. The best vineyards of Switzerland, as to quality, are those of Valais and Tessin. Those of the Canton de Vaud furnish a fine wine, and bear enormous crops, in consequence of the manure which is lavished upon the lands.

Articles 5 and 6 are not of much interest to our readers.

The seventh details a method of grafting rhododendrons, particularly that magnificent species the alta-clerense. We give the writer's own words:—

"Having been successful in propagating *Rhododendron alta-clerense* in a way that I have not before seen practised, I make it known to you, hoping that my doing so may induce others to practice it; and trusting it may be the means of making this scarce species of this beautiful genus of plants more abundant. Calling at Chatsworth last spring, I observed that they had a fine plant of it beautifully in bloom; and I begged the favor of Mr. Paxton to allow me to take a small sprig, which he kindly permitted me to do. I then inserted the end of the sprig into a potato, and brought it home with me a distanne of eight or nine miles. Happening to have a small plant of *Rhododendron ponticum* in a pot, I cut it down to about five inches above the pot, and grafted it in the whip manner with the small sprig thus procured, letting the end still remain inserted in the potato. I then clayed it, and put it under a hand-glass in a cool vinery, where it united to the stock, and is now a healthy plant, standing out under a south wall."

Articles 8, 9 and 10 are valuable, but we have room only for one or two extracts from the 8th, upon the preparation of grape borders to graperies or green-houses, and the pruning of the vines. The author of this paper (entitled an Essay upon the Cultivation of the Vine under Glass,) gained the first prize at the St. Andrews Horticultural meeting in September, 1835.

"I now come to the preparation of the border. The situation, if not naturally dry, must, of course, be rendered so by draining. The best bottom, in my opinion, is one formed of large flat stones, got from the top of a lime rock, which is of a nature that would assist the growth of the vines when they reached it. The border ought not to be deeper than from two to three feet; as, if it is more, the roots of the vines will get away from the action of the summer weather, and the good of the manure that may be put on the surface. Instead of having the border almost composed of a stiff clay, as is often the case, I would have it formed of decomposed turf and good black earth, with a sufficient quantity of decomposed cow-dung, vegetable mould, and cold [slaked] lime, well mixed by frequently turning it. and which should be allowed to lie for two years if convenient.—Having the border filled in and subsided, I would plant the vines in rather a poor soil, as the roots will run farther in such soil, the first year, than in a strong rich soil. I would have good strong plants planted close to the wall on the outside, and introduced through holes made in the building, from four to six inches in diameter, projecting upwards towards the insid , and proceeding from a few inches above the surface of the border on the outside.

"I would not plant more than one plant for every two sashes in the house, as the less the r ots are interwoven with one another the better; and there is no difficulty in filling any house in this way. I would train up only two shoots the first year, keeping the sashes of the house on all the first season, until the leaves have fallen off; at which time I would cut down both shoots to three buds. The second season I would put on the sashes the first of March, giving pleuty of air through the day, and shutting up at night. It will be observed that I have allowed three buds to remain on each shoot of last year's growth, which I would train up to their full length. There should be a little fire put on this seoson, about the latter end of August, at night, or when the nights turn cold; and this fire should be continued until every leaf falls off. The third season I would allow the shoot in the middle of the sash to remain, nearly to the top of the house, cutting down the other two to two buds, or eyes, which will produce two shoots on each side of the fruiting one, and which are to be trained up to their full length.—The house may be shut up about the 1st March, and the fire lighted about the middle of that month, the heat being raised gradually to 75°, at which it may be kept until the fruit is ripe; when it should be allowed to fall off by degrees, but not entirely discontinued until the whole of the leaves have fallen off.

"I now come to the winter pruning for the fourth season. It will be observed, that I had one fruiting shoot and four young shoots for every sash last year: the old one I would allow to remain, with spurs of three buds, and one of the young shoots on each side of it, nearly to the top of the house, the other two I cut down to two buds, which will produce two young shoots on each side of the three fruiting ones, to be trained up to their full length. If the vines have been all along treated as above, they will now be very strong, and will be able to stand forcing nearly a month earlier, if required; and, also, more heat than when they were younger: indeed, I consider that vines, after they have attained to the age of standing forcing, should have much more heat than is commonly given to them.

"I will now describe my method of winter pruning for the fifth year, which will show how I would continne it. It will be observed that I had three fruiting shoots, and four young ones, for every sash last year; the spurred one I cut away altogether, and spur the two which had only fruited one year, with two of the young shoots, which will leave two for outting down, to produce four young shoots again. Now it will be seen that I have always two spurred shoots, and two young shoots fruiting, and two to cut down; which is not only a regular method of pruning, but one which will keep the vines in a far more growing state, than the common methods of having so much old wood upon them. It will be seen by this regular method of winter pruning, that the summer pruning can be done in much less time, which is also an advantage, by my method of performing; which is, to pinch off all the laterals which may appear below the fruit, and one bud above it; continuing to pinch off all above the next bud, as the plants grow, for the whole season. With regard to the number of branches which I would allow to grow on each fruiting spur, it should be all that set well, as the vines will be able to bring to maturity almost all the fruit they show, if treated in the manner I have endeavored to describe."

Article 11 is a plan for growing Potatoes and Dahlias on the same ground and in the same season. We believe this system is pursued by some of the florists in Philadelphia; at least, we have been so informed. We have no doubt it will answer well; and to some persons who wish to combine the useful and ornamental, and who have but a limited piece of ground, it may prove an excellent mode.

"In the autumn, when the leaves have nearly all fallen from the trees and shrubs, and the seeding weeds are near coming to seed, I fork over all the spare ground where crops have been growing, which leaves it in a neat state euring the winter. In February I plant my potatoes (the early Shaws,) which I generally put into the ground whole; but, if the potato is large, I divide it by drawing the knife through the middle of the cluster of eyes at the end of the potato. I begin planting the large beds, having the first row a convenient distance from the edge; after setting down the line, I dig a trench without treading upon the spade, and, as I come back, clean-out the trench to about four inches deep. I put in the sets, then remove the line three feet or three feet and a half, and dig another trench in the same manner, having a wooden rake by me to pull in the earth over the sets, and rake the ground even as the work of planting goes on. I next remove the line two feet, and dig another trench, which leaves but sufficient space for the moulding up of the potatoes. I next remove the line three or three and a half feet, and so on. As soon as the potatoes are grown a sufficient height to be seen, I fork the ground one fork wide on each side of the row, by thrusting in the fork and pressing it down, so as to raise the earth, and thus leave it, not to throw it out. When the plants are sufficiently high, I mould them up, observing to mould them highest on the wide side, so as to to give the stalks an inclination to fall between the narrow rows, where they are to

be kept, so that one side of each row may have the full benefit of light and air.—About the middle of May, I put on between the wide rows a slight coat of dung, and dig it in close to the moulding of popotatoes. By this plan the potatoes do not get at the dung, until they they are in a fit state to bear it without injuring their flavor. I plant the dahlias five feet asunder between the wide sows of potatoes, placing a stake about two feet high to each plant, for the purpose of supporting it, and marking the place where a taller stake is afterwards to be placed. In July and August the potatoes are taken up, and the ground cleared. If the weather should be dry, and the dahlias likely to require water, I then make basins round the plants before levelling the soil. Since I have adopted this plan, I have had a more abundant crop of potatoes, and of better flavor; and, instead of the ground appearing as if lying waste after they are gathered, I have something to look at. As my garden rises on each side from the centre walk, I can assure you the dahlias, when the colors are well mixed, make a very pretty appearance."

From the Farmers' Register.

ON THE CULTURE OF WHEAT.

By Th. J. Randolph.

READ BEFORE THE AGRICULTURAL SOCIETY OF ALBEMARLE, AND ORDERED TO BE PUBLISHED IN THE FARMERS' REGISTER.

In obedience to a resolution of this Society, appointing essayists at their October meeting, in 1835, I have the honor to submit the following communication upon the culture of wheat.

Although deep culture is important, if not indispensable with all plants, to permit their roots to penetrate the soil freely in search of food and moisture, and to allow the water in heavy rains to subside without abrading and gulleying undulating lands, or drowning those that are level, it may be doubted whether it be proper to effect this by frequent ploughing, and intermixing too perfectly the surface with the inferior soil or clay. Nature, in all her operations, manures on the surface, and forms there the soil which is best adapted to thegrowth of vegetation; and if this is inverted by the plough, she reinstates it in its original position as soon as the land is permitted to remain undisturbed a sufficient length of time, by a process more rapid in warm weather, and on rich soil, where there is much vegetable matter; and slower where the land is less fertile, and the weather colder. This is strikingly exemplified by a fact well known to most farmers, viz: that when good land (particularly clover land) with a distinctly marked surface of dark soil is fallowed for wheat, sown with the harrow upon one ploughing, and permitted to lie a year or two in clover, after the crop of wheat, the dark soil is found again formed upon the surface, occupying the position in which the clay was left by the previous ploughing and the clay, that which was occupied by the inverted soil: a change of clay into soil, and soil into clay. A question naturally arises, what good results from forcing the land to this double process? I should think, none. Economy of labor, however, requires this to be done, as an expeditious mode of disposing of the vegetable matter, by burying it with the plough; but with one ploughing, the necessity ceases for that crop.

I have said that this process was more rapid on rich soils where there was much vegetable matter, and in warm weather, than on poorer soils and in cold weather. I suppose it accomplished by the gases evolved in the decomposition of the vegetable matter turned under by the plough. If the weather is warm, and the vegetation green, succulent and abundant, the decomposition is rapid, and the quantity of gas disengaged is great. Of these, the carbonic is deemed the great stimulant of vegetable life; and being heavier than atmospheric air, but lighter than the soil, it rises to the surface, insinuating itself into the interstices of the clay brought up by the plough, saturates it, and accomplishes the first process of its conversion into soil. Hence, the cause of a well known fact, that fallows made in June, July, and early in August, become many shades darker on the surface, although exposed to the schorching rays of a summer's sun, and prior to a renewed growth of vegetation upon them. Whilst it less frequently occurs on those made in September, and on those in October rarely, until the next year, vegetation being drier, less succulent, the days shorter, the nights longer and cooler, and every circumstance less favorable to a rapid decomposition in these months. A similar process has taken place on the corn land after the cultivation of the corn has ceased, and before seed time. The fertile appearance of these lands at that time is familiar to every one.[a]—This recently formed and forming soil, my experience has convinced me, is the proper surface for wheat. A second ploughing, or fallow intermixes it with the inferior soil, and the use of the large plough on corn land produces the same effect. I formerly believed two ploughings necessary as a perfect preparation for a wheat crop. When pressed for time, I used heavy harrows as a substitute for a second ploughing, often where there was a strong growth of summer grass: such portions have always produced more grain though perhaps less straw, than that which had been twice ploughed. I once fallowed twenty or thirty acres of land in February, ploughed it with a two horse plough whenever the grass and weeds grew in the summer—it was ploughed, in all, five times before seeding on the first of October, and although it suffered from no disaster, it produced a wretched crop for the year and the land. I have occasionally coultered and harrowed small pieces of land, and prepared them without turning the surface with the plough; and have, uniformly, found the straw brighter, and the wheat more in perfection, than on the adjacent land which had been ploughed, and the surface inverted, although both were very fine. In 1822, on four plantations then under my direction, the corn crop being very forward, about half of it was removed in September, and the land ploughed with three-horse ploughs. The preparation appeared to be perfect, the earth light and thoroughly pulverized, and the grass entirely rotted: the land was harrowed and then sown, and the seed harrowed in. In the mean time, the grass had continued to grow on the portions of the field not ploughed. When the seeding of the first was completed, the rest was sown among a heavy crop of grass, with scoops, merely scarifying the surface, for nothing more could be done: the whole process was tedious and unpromising, yet the perefect preparation by which the soil had been inverted by the large plough, produced a much inferior crop to the other: the result was the same at each plantation. In putting in wheat on corn land with small ploughs, I have often laid them aside for the large plough on account of the heavy coats of grass on rich spots, old tobacco lots, &c. resuming the small plough again on passing them. The product and appearance of those spots of better land thus prepared were always inferior to that of inferior land ploughed with the small plough. I could add many instances of a similar kind with similar results.

From my observations and experience, I deduce the following conclusion:

1. That to insure the best crop, lands, should be fallowed early, viz: before the middle of August.

2. That the surface acted upon by this process of a re-formation of soil, is the proper one into which the grain should be put.

3. That a second ploughing with a large plough in fallows, and its use in preparing corn land for wheat, is disadvantageous.—Nature, in both instances, has prepared a better surface than can be prepared by art.

4. That the mixing the newly formed soil, fully saturated with carbonic gas, with the inferior soil, prevents as quick and vigorous growth of wheat, and as early and as perfect maturity.

If the fallows have been ploughed early, and a crop of summer grass has grown upon them, they may be stirred with the small plough or coulter, if hard, or harrowed, if mellow, so as to pulverize and smooth the surface, without regarding the grass and the wheat sown among it. The first frost kills the grass, and it acts as beneficial covering to the wheat.[b] When the fallows are prepared, and the corn crop sufficiently forward to take off in September, the corn land may be ploughed with the small plough, and harrowed ready for seeding, and thus enable the farmer to put all his teams to the harrow, and sow a large crop in a few days. Selecting his own time for seeding, he may hope to expect the dangers of early and late fly, and do much to insure a fair crop from his land. In anticipation of this, it is desirable to plant a corn which will mature itself somewhat earlier than the kinds now cultivated. We have a corn in this neighborhood well adapted to this purpose, which yields well. If the corn is too late to commence removing in time to prepare your land in September, the balks can be broken before the corn is taken off. You will then, upon removing the corn in the latter end of the month, have only to plough the list and harrow the land, to be ready for seeding. If a proper seed bed is prepared, one harrowing is sufficient to cover the grain.[c] In the October of 1833, I had sown in this manner 300 acres in four days and a half, employing eight harrows with two horses each, and two with a yoke of oxen each; in all, ten harrows. The teams were never hurried until the last day for a few hours, when there was an appearance of rain. The same hands and teams were closely employed the next four days in putting in forty acres of rough corn land. This present month (October, 1835,) six days have been taken to put in three hundred and forty acres of land, eighty of which were rough with stone and stumps. The team employed the same.

When tobacco is cultivated as a mixed crop, the early corn ought to be planted.—It does not attain such size of stalk, and can be removed with less labor, severing it at the ground, and stacking it on the field

without pulling the fooder or cutting the tops. Enough hay should be made to serve the farm, and the time given to tobacco and other operations which is usually spent unprofitably about the fodder. I am satisfied that corn is less injured to be cut up, with the fodder and top on, than to take them off and leave it standing in the field. In the first place it cures; in the latter, it withers. I have heard a judicious farmer estimate, as fair work, 200 lbs. per day, the average of hands employed in gathering and securing fodder; of hay, 1000 lbs. The use of the revolving horse-rake on smooth land would much increase the latter average. I am aware, that in recommending the stacking of corn on the field, I am running counter to the opinions of some of our best farmers. I would not recommend it where the corn could be housed; but when it cannot be done, from attention to the tobacco crop, lateness of ripening, or deficiency of labor, I deem it better to lose the ground covered by stalks, than the greater loss from late seeding. The injury of running your teams and carts over the fields in dry weather after the wheat is sown and up, in removing the corn, I estimate very lightly.

NOTE [a]. That this process must be effected by the action of the gases, is proven from the uniform fertility of grave yards.—Here the bodies do not come in contact with the surface. It must be by the generated gas forcing its way through the fresh dry earth. Would a culture of several feet make poor land rich? I think not. Manures never sink. Upon light, sandy soils, with too small a portion of clay to imbibe and retain the gases, they penetrate easily, and escape rapidly; such require frequent applications of manure, but in smaller quantities—it acts promptly, but evaporates with the culture of a crop. Stiff clays, deficient in aperient particles, are not sufficiently permeable to the gas; the particles become compacted together by rains so as to expel it before it can be sufficiently imbibed.—They close so completely over the manures as to exclude the air, and arrest their decomposition. Upon such soils, manure ploughed under may be found, two or three years after, retaining its original appearance, but its fertilizing principle gone; for such, straw, half rotted manures that act as a temporary aperient, are best. Sand, or some substitute for it, is necessary for its mechanical effects as an aperient to every good soil. Its excess makes a quick soil soon exhausted; its deficiency, a stiff, slow soil. In addition, there are, no doubt, chemical combinations in all soils, rendering some capable of fertility, others not.—The sterility of any soil may be temporarily overcome by the application of animal or vegetable manures. But, *quære:* Will not an originally poor soil, if made ever so rich by manures, left to itself without cultivation, lapse into its original sterility? and will not one, originally fertile, when exhausted, become rich if left undisturbed long enough?

[b]. Blue grass fallows will probably require a second ploughing to destroy it.—The first ploughing on this grass should always be made before the grass seeds, as the plants are easily destroyed if disturbed about the time of their seeding. If fallowing is postponed until July or August, the crop becomes very precarious. It will most frequently happen, that after much time and labor has been spent, it will be injured or destroyed by the turf. If such lands cannot be ploughed in May, or early in June, this grass may be destroyed, or crippled, by hard grazing from spring until June or July—it being a grass without aftermath, or ground leaf, each spire is a seed-bearing spire, and the grazing necessarily confined to these. and if it is not permitted to seed, it perishes. It is a grass never found upon commons, or on road sides, where it is perpetually grazed. It will probably be found, that grasses bear grazing in proportion to the quantity of ground leaf they put forth.

[c]. Some persons object to the harrow, as not covering the grain deep enough. If a grain of wheat is buried over 2 or 3 inches deep, it forms a joint near the surface from whence (if the plant is sown early, and the fall growth vigorous) it puts forth roots, and the spire and roots below that joint perish that fall, and the plant thrives by these surface roots.

Anderson recommends that Cows be milked three times a day in summer when full fed. If a Cow is not milked dry each time, the quantity diminishes; and if milked dry, the best milk is obtained. The first cream which rises is the best.

LARGE RHUBARB STALK.—A stalk of Rhubarb measuring thirteen feet six inches, may be seen at this office—from the House of Industry.—[New-England Farmer.]

The following article, from the New-York Express, may be of service to some of our readers. Every one who visits New-York should understand, and be governed by it, when using a Hack.

HACKNEY COACHMEN.

The difficulties constantly increasing between the Hackney coachmen of this city and our citizens, as well as strangers, together with their numerous and enormous impositions, make it our duty to let the public see what they ought to be paid. The coachmen forget that in the end they lose money by these impositions, for the dearer the fare is, the less the demand will be for coaches, and the greater the liability to imposition, the less inclined people will be to put themselves in a condition to be imposed upon. The fares now demanded are higher than in any city in England, where evry thing is so dear, and far higher than in any city upon the continent: but the fares fixed by law, we copy below, as taken from the Corporation laws, and we advise our readers to cut out and lay by the article for the purpose of using it when occasion demands.

Five dollars are often demanded for taking strangers from one hotel to another, when the hotels are full, but the privilege of keeping the carriage *all day*, and of going to and returning from Kingsbridge, costs but five dollars. Passengers, under the Corporation laws, can go to Harlem and return, with the privilege of remaining three hours, for five dollars.

The price to 86th street, for one passenger, remaining one hour, and returning is two dollars, and for every additional passenger fifty cents.

The price for one passenger to 61st street, and remaining three quarters of an hour and returning, $1 50; every additional passenger, 37½ cents.

To Fortieth street, remaining half an hour and returning, $1; every additional passenger 25 cents.

To the new Alms house and returning, 75 cents, and for every additional passenger and returning, 37½ cents.

To conveying a passenger any distance exceeding a mile, and within two miles, 50 cents; and for every additional passenger, 25 cents.

To conveying a passenger any distance not exceeding one mile, 25 cents; and for every additional passenger, 25 cents.

The Hackney coach for the hour with one or more passenge.s, with the privilege of going from place to place and of stopping,—costs for the first hour $1, for the second hour 75 cents, and for every succeeding hour 50 cents.

The Hackney coachman has no legal right to demand or to receive any pay for the conveyance of a passenger, unless the number of the carriage and the rates of fare are fixed upon the carriage.

There is a penalty of $10 for asking a larger price than the law entitles the coachman to. A penalty of $10 is also inflicted upon the driver of a coach, when on any of the public stands, or whilst waiting for employment, when tendered his fare, if he refuses to carry any person or persons to any place or places on the island of New-York.

Every driver or owner of a Hackney coach or carriage, is under a legal obligation to carry upon his coach with his passenger one trunk, or other article used for travelling, without compensation therefor, and for every article more than one, he is entitled to 6 cents, for one mile, and if more, to 12½ cents.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams; Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

JAMES G. KING, President.
21—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tilson,	St. Francisville, Lons'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersunk heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

RAILWAY IRON, LOCOMOTIVES, &

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	$2\frac{1}{2}$	by	$\frac{5}{8}$,	15 ft in length,	weighing	$4\frac{68}{100}$	per ft.
280 "	2	"	$\frac{5}{8}$,	"	"	$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$	"	$\frac{3}{8}$,	"	"	$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$	"	$\frac{1}{4}$,	"	"	$1\frac{25}{100}$	"
90 "	1	"	$\frac{1}{4}$,	"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{4}$, $2\frac{1}{2}$ 3, $3\frac{1}{4}$, $3\frac{1}{2}$, and $3\frac{1}{2}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON.
23-tf Philadelphia, No. 4, South Front st.

OFFICE PONTCHARTRAIN, RAILROAD CO.
New Orleans, 19th May, 1836.

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,
JNO. B. LEEFE, Secretary.

28—3m.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co.,
July 25th, 1836.

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cut stone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawus River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unknown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.
E. H. GILL, Chief Engineer. 30—to10

TO CONTRACTORS.

Sealed proposals will be received at Jackson, until the 15th day of September next, for the graduation, masonry and bridging of the 3d division (50 miles) of the Mississippi Railroad.

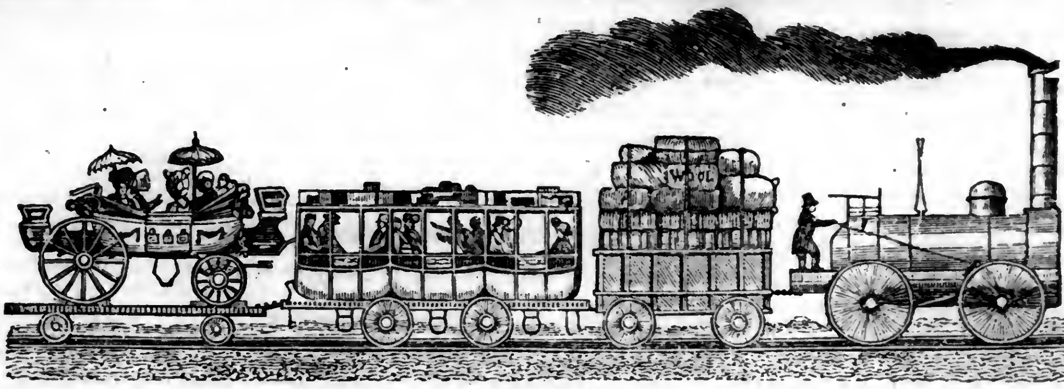
This road is located on a pine sandy ridge, the country is healthy, and provisions can be readily obtained at all seasons of the year.

The whole line (150 miles) will be placed under contract, as the location advances next fall; and it is believed that no institution can offer greater inducements to good Contractors than this.

F. H. PETRIE, Chief Eng.

ENGINEERS OFFICE,
Natches, June 10, 1836.

28—till Sep. 5.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, { EDITORS AND PRORIETORS.] SATURDAY, SEPTEMBER 3, 1836. [VOLUME V.—No. 35.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, SEPTEMBER 3, 1836.

MINERAL WEALTH OF OUR COUNTRY.

Every day brings to light some new fossil treasure. We have seen some beautiful specimens of the Rossie lead found in St. Lawrence Co. This bed of ore has already been traced to a great distance from the spot where it was first met, and we have understood that it re-appears on the other side of the St. Lawrence, where copper is also found combined with small quantities of gold.

Two fine iron ore deposites have recently been discovered. The one is the "Winslow deposite," Sus. Co., N. J., being about thirty miles from this city. This one is very easy of reduction, while the yield is very considerable.

The other is at Troy, Vermont, owned by the Boston and Troy Iron Company. This ore yields about eighty per cent of superior iron.

Those who are curious can see specimens of these ores at our office—where we are always happy to receive specimens. We conceive the Iron of our country to be worth more than gold to us. All hail to the *Iron Age.*

STEAMBOAT NOVELTY.

When some time since we saw several articles going the rounds in the papers, denying the claim of Dr. Nott to the successful introduction of Anthracite coal as fuel in our large steamboats, we passed them without notice, not choosing to detail the improvements of Dr. Nott for the benefit of every scribbler who might feel inclined to criticise.

A more serious charge has been circulated, not indeed in print as we know, but at and about the landings on the river, and wherever else such gossip might prove entertaining to its authors and injurious to the Steamboat. We have heard of worthy citizens who were induced to believe that a trip in the Novelty was at the peril of their lives!

For the benefit of those unacquainted with the boat or her machinery, we must unhesitatingly state, that in our opinion, and we judge from observation—that the construction of the machinery of the Novelty is such, that any accident from the rupture of a boiler is altogether avoided—such rupture not being at all likely to take place, and if it does, it can not do the slightest harm to any one, as they are *tubular.*

Boilers of a construction somewhat resembling these, have burst in situations (on board) where care was not taken, (we believe in Mr. Hancock's steam carriage for common roads) and the engineer himself was not aware of the peril!! The steam and water escaped through a small opening, (no large one can be made) and extinguished the fire—giving by the stoppage of the machine, the first indication of the accident.

On this very account we should prefer this construction as being the safest, even in careless hands, much more do we prefer it when applied in so beautiful a boat and conducted by such experienced and able men.

We may here remark that the prevalence of the report, coming under our notice, we deemed it proper to give our opinion on this subject, formed upon frequent examinations of the boilers and machinery, or rather to state the truth—as we shall always be ready to do, without invitation from any one, the writer of this article never having seen Dr. Nott, except in his good works.

The best mode however, of becoming satisfied of the safety and comfort of the improvements of Dr. Nott, as applied to useful purposes in the Novelty, is to go one or two trips to Albany on board of her.

For the American Railroad Journal.

A PLAN WHEREBY A WOODEN RAILWAY SHALL BE RENDERED AS INDESTRUCTIBLE AS THE BEST IRON RAILROAD.

This plan consists in having the excavations and embankments, made sufficiently wide to admit a side ditch, or ditches, and *extra* embankments raised upon the outer edges of the road to an elevation of 15 or 18 inches above the plane of the roadway.—These *extra* embankments should be made about one foot wide on the top, with slopes of one and a half of base to one of perpendicular rise.

The *side ditch* or *ditches* with the *extra embankments*, and the *upper surface of the*

roadway should be constructed with water tight materials, and the ditch or ditches made with the sufficient cross section to admit a quantity of water to feed the required distance. The cross section of the ditches will be greater upon the level parts of the road than on the descending planes, and greater at the end where the water is introduced, and decreasing toward the final discharge or waste of the water.

The *feeders* should be admitted at convenient distances, the less the distance from one feeder to another, the less will be required for the dimensions of the ditches. *Waste weirs* should be built at proper points, so as to discharge all surplus water, and the feeding gates should be regulated to give a certain quantity of water and no more, as near as the circumstances will admit.

After the wooden sleepers and rails are laid, with the iron plate put on, and the road completed for use, the water should be introduced and maintained to an elevation that will completely cover the rails, leaving the track about one inch under water.—This will be a sufficient depth, and need not be exceeded for the purposes here required to accomplish.

It is well known that wood *immersed completely under water* is thereby prevented from decay, hence a wooden railroad in the situation here described would last as long as the best constructed iron road.

The difference in cost of course would be different, as the circumstance and character of the ground would change, but I have no doubt but the average cost of railroad, upon this plan, would be $5000 per mile less than the double track iron road.

There is hardly any situation where rail roads of any extent are made, but streams of water sufficient for the purposes required can easily be obtained. In the *winter season* the water should be drawn off or reduced at least two inches below the top of the rail. There is but little tendency to decomposition during the frosty weather, hence but little objection can be urged against this measure.

The slight obstruction the water would be to the rapid progress of the engine and cars would be nearly balanced by having a constant clean and uniform surface for the wheels to run upon, the friction would be more equal, consequently the moving power could be better regulated.

A thin light wooden box should be made to enclose the wheels from near their bearing surface over the top, in order to prevent the centrifugal force of the wheels in motion from throwing the water over the bodies of the engine cars, &c.

Many advantages might be enumerated in favor of this plan of making railroads. One is the uniformity which would be given to the temperature of iron plate, thereby correcting in a manner one of the great evils, the contraction and expansion of the iron plate. I believe, also, where a road should be made in this manner, and well settled there would not be half the liability to derangement. It is the alternate wetting and drying causing the contraction and expansion of materials, which eventually disorganizes the road.

REPORT OF THE SOUTH CAROLINA COMMISSIONERS TO THE KNOXVILLE CONVENTION, ON THE SUBJECT OF THE PROPOSED RAILROAD FROM CHARLESTON TO CINCINNATI AND LOUISVILLE.

(Continued.)

COL. GADSDEN'S REPORT.

From any of the gaps or depressions, by which an ascent from the east can be had to the summit of the Blue ridge, a descent *west* from some of the tributaries of the French Broad, may be obtained to the valley of the river, and along the banks of that stream, for the whole distance of about 140 miles to Knoxville, a plane approximating to great uniformity, and on inclinations varying from 20 to 30 feet to the mile, (all within the advantageous power of Locomotives,) may with great facility be graded. The river, forcing its way, as it does, through an extremely mountainous and rocky region, is often turned from its course, but I do not think that any of its curved deviations from a straight line form less arcs of circles than those on which Locomotives may move with safety and advantage—should, however, the instruments expose defects in this instance, which the eye has not been able to detect, the additional expense, only, of bridges on a river, crossed with great facility, will be necessary at all these points where curvatures adapted to the action of an Engine, cannot be obtained. My personal inspection of the valley of the French Broad extended but 95 miles to the mouth of the Nolachucky, at which point I crossed, and left that river, with a view of ascertaining from examination, the shortest practicable route for a road to the Cumberland Gap. This gorge in that mountain necessarily attracted my attention, as most frequented in all communications with Kentucky, and as one represented as being most depressed, and presenting the least difficulty in the passage over it. Descending the French Broad by the Warm Springs, the most direct route to the Cumberland Gap, would be from that point via Warrensburg, Cheek's ✕ Roads, Bean's Station and Tazewell, in East Tennessee, a distance of 78 miles—on this line, however, the Paint Rock and the Paint Mountain, more formidable in its ascents and descents, than the Blue ridge itself, have to be surmounted; and the Clinch ridge, at Bean's Station, rising on a slope of ¼ of a mile, 800 feet from the east, and descending by successive slopes of 3 miles from the same elevation, to the valley of Indian Creek on the west. From thence a succession of hills and ridges by the town of Tazewell are encountered to the very foot of the Cumberland Gap, the approach to which by this route, is more formidable than the passage over that mountain itself, viz: Walden's ridge of 150 feet elevation at its lowest depression—hills on both sides the Powell River, the one of 250 and the other of 400 feet elevation, and the poor valley ridge of 150 feet in height. The obstacles in this direction, are so imposing, that if it was the only route by which a Railroad could be passed to the west, they would at once put a veto on the accomplishment of the great work now projected. By descending, however, the French Broad to the mouth of the Nolachucky, and by crossing the valley of East Tennessee, from that point to the Cumberland Gap, a pass is offered by which not only the Paint and Clinch Mountains may be turned, but by which most of the minor ridges, which, oppose additional objects on the more direct route by Bean's Station, may be avoided. On any road from South Carolina to the Ohio, in addition to the great mountain barriers, which interpose, it is necessary to cross the valley of East Tennessee, and thus encounter all the difficulties which usually present themselves to the construction of works, which pass at right angles to the water courses and their ridges. In this case, however, the valley is narrow, not exceeding 65 miles, and the spaces between the three rivers passed, the Holston, the Clinch, and the Powell, are so narrowed as to reduce considerably the slopes of the dividing ridges, and afford facilities by their innumerable tributaries, which necessarily interlock on these common fountains of their springs, by which these elevations may, with comparative ease, be ascended and descended. With these views of possible obstacles to be encountered, I gave to this portion a more careful examination than it was in my power to bestow on other parts of the extended route, which from the general conformation of the country, could not present other than the ordinary obstacles to the execution of the road contemplated. That these supposed difficulties may be the better estimated, I have deemed it advisable to give in detail a description of this part of a route across the valley of East Tennessee examined by me; not as recommending it as the *one* to be selected, but as *one* which being found *practicable*, it may encourage the belief, that on a more careful examination of the whole country, some *others* presenting probably fewer obstacles, and more strongly recommended by their direction may be found.—Indeed from the limited time allowed, my observations could only extend to the ascertaining of the general fact, *of the practicability of a Railroad through its middle section* from Charleston to the Ohio, and not as to the *route*, which under the due estimation of comparative advantages (should *many* be found) it would be the most judicious to adopt. The result of my observations are not without their value in strengthening a confidence *in the practicability of the project*, and under opposing difficulties far less than was generally estimated.

Cumberland Gap is, at the point examined, exceedingly depressed the whole distance across from the Eastern to the Western base, being but one mile and three quarters, rising on the Eastern face, in the distance of 1000 yards, 300 feet—and descending from that elevation west, in the space of 2000 yards. The highest point on both planes presents two singular peaks, with a descent of from 30 to 40 feet between them; both of which may with great facility be levelled, filling up the hollows between, and forming a space or bench on the top of the Gap in the mountain, for the location of a stationary engine, which may be made to operate on both planes. The slopes of the Cumberland mountain are so favorable as you approach this Gap, that I have little doubt that a judicious graduation of both inclined planes could be effected, so as to reduce their lengths to 8 or 900 yards each, and their perpendicular

lift from 250 to 270 feet. The cleft in the mountain is, however, so disposed at this point as to afford great facility for the construction of a Tunnel through its base, reducing the distance through from $\frac{3}{8}$ to $\frac{3}{4}$ of a mile. The character of the rock of which this portion of the Cumberland seems to be composed, being an indurated ferruginous sand stone, and very difficult to blast, would be the principal obstacle to the work. Such, however, is the very great objection to inclined planes requiring a stationary power to pass them; not only as to their first cost, which is very considerable, but to the continued annual expense, necessary to preserve them, and render them available for transportation and passage cars, that they are ultimately cheaply avoided, by the substition of a Tunnel, the first cost of which is well calculated to alarm those who, in a comparative estimate alone of the cost of Tunnels and inclined planes, overlook the continued drafts on the profits of a road to sustain the annual expenses on the latter, in the lost time in the interruption to transportation, and in the wear and tear of machinery, expense of Engineers, &c. Whatever may be the seemingly opposing obstacles to the construction of a road in the above description, they are comparatively much dimished by the fact that it embraces the whole mountainous section of the railway projected from the Carolinas to the Ohio, and that on a route of nearly 700 miles, with the exception of the passage of the Blue ridge, the great obstructions to be encountered are limited to the short distance of about 20 miles, or to the broken region between the Clinch and Cumberland mountains. This examination, therefore, in confirming the fact of the practicability of a Railroad, over seemingly the ruggedest portion of the whole route designated, will go far to strengthen the opinion that on a more minute examination of the country, the obstacles here encountered may be diminished, if not entirely avoided, and a communication between the two sections of country to be connected be obtained on a line, if not the most *direct*, offering at least the *greatest facilities* of construction, and the most extended benefits contemplated, from the Railroad which has been projected;—from representations from various sources, there are 4 or 5 other depressions in the Cumberland mountains, W. of the Gap examined by me, all of which afford such facilities for crossing, as to recommend an examination of them, in the surveys now about to be undertaken in connexion with the project for a road to Cincinnati, Baptist Gap, Deep Creek Gap, a Gap near Jacksborough, and the Emory Gap. Deep Creek Gap is a brake, as represented to me, made by that Creek, and which cleaves the mountain to its very base. Its location is very favorable, being on a direct line from Knoxville to Lexington in Kentucky, and as a tributary to the Cumberland, must afford, no doubt, on its banks or by its ridge, a slope, on which a plane may be graded from the mountain to that river. Its position is further recommended, as so demonstrating on or pointing to a route towards Nashville, as to enable the Cincinnati and Charleston company to embrace hereafter, by the valley or the ridges of the Cumberland river, that important point in West Tennessee, among the branch roads contemplated in the charter. On this route from the Blue ridge to the Cumberland mountain, there is no want of materials of the most durable character, or for labor to prepare and fabricate them for use. Indeed, few countries, if any, afford within the same limits the facilities which East Tennessee offers for works of improvement. All the elements of construction in the cheapness of labor, materials, and subsistence may be numbered among her resources to as great, if not greater extent, than are to be found in any other section of the United States.—The valleys as well as the hills are shadowed with a growth of pine, cedar, chesnut, black oak, black locust, mulberry and cotton wood; sand and blue limestone, and granite abound every where, and the bowels of the mountains are more than surcharged with iron.

Labor and the means of subsistence are beyond comparison exceedingly low. Effective hands may be obtained from 8 to 10 dollars per month, 4 or 5 horse teams with a driver at \$2 a day, ox team at half that amount. Corn from $18\frac{3}{4}$ to 30 cts. per bushel. Oats from 18 to 20 cents. Flour from 4 to 5 dollars per barrel. Salt at the works $37\frac{1}{2}$ cts. per bushel. Pork from 2 50 to \$4 per hundred, and beef from 2 to 3 cents per pound. Estimating all these advantages, cheapness of labor, materials and subsistence, in connection with the certainty of so commanding them, as to occasion no interruption to operations, which may be commenced in the grading and construction of a Railroad, and I feel confident in the expression of the opinion, that even this most rugged and mountainous portion of the contemplated road route from Charleston to Cincinnati may be accomplished at a cost per mile not exceeding what may be found necessary in the low countries of the Carolinas. Of the route through Kentucky, I cannot report from personal observation; the information however derived from intelligent travellers, from those who have been annually engaged in driving stock, &c., from Kentucky to the different markets in the Carolinas, and from various other sources, all confirm the opinion formed that the difficulties to be encountered in the grading of a railway to the Ohio, will not be insurmountable. The principal obstacles in the direct road from the Cumberland Gap to Paris, are to be encountered in crossing the high and precipitous banks of Cumberland and Kentucky rivers; and in passing the elevations of the Log mountain, near the former stream; and of the Big Hill in the vicinity of Richmond. The Log mountain, however, it is said, may be avoided by passing down the valley of Yellow Creek, which heads near the Cumberland Gap, to the Cumberland river, of which it is a tributary, and the Big Hill may be shunned by Mount Vernon and the Crab Orchard on the direct road to Lexington. A route which will not materially increase the route to Cincinnati, and which is recommended by considerations intimately connected with the most enlarged objects in view from the Railroad communication now under consideration. Lexington is not only among the oldest and most opulent cities of Kentucky, but is situated in the centre of one of the most populous and richest districts of that State.

The pride of Kentucky, the seat of science and of the arts, the point on which hitherto most of the road communications through the different sections of the State centre and the point from whence they diverge, a connection with Lexington at once opens the avenue of intercommunication with the various other parts of the country of which it is essentially the Capitol. Already is a railway under construction from Lexington via Frankfort to Louisville; and being but 18 miles distant from Paris, that Gap has alone to be filled up, to complete the connection with Cincinnati by the route now under consideration between those two points. A communication of the Charleston and Cincinnati Railroad with Lexington ensures therefore a communication, by railways, not only between Charleston and Cincinnati, but between Charleston and Louisville, a city in its commercial importance not inferior to Cincinnati; occupying in its position below the falls of the Ohio and in its relation to Kentucky, what Cincinnati above these obstructions does to the great State of Ohio. By a communication, however, with the Ohio River, both above and below its falls, other more extensive benefits will result from the improvements now under consideration both in Illinois and Indiana, by securing to the Charleston, Louisville and Cincinnati Railroad much of the trade of those two wealthy States, and of even Missouri, via a connection with Louisville, which would be lost—was the termination of that great project to be alone at Cincinnati.

COL. BRISBANE'S REPORT.

That in prosecuting a more minute examination of the Saluda Mountain and Blue ridge than that which had been made jointly with Col. Gadsden and Mr. Holmes, he obtained the following results: That the Saluda Mountain could be ascended from the east by no less than four Gaps or depressions on its summits, viz: Gap Creek, the westermost depression, and which has been formed by a Creek of the same name, discharging into the Saluda; Hodges' Gap, from a quarter to a half of a mile to the eastward of the former; Old Saluda Gap, which leaves the State Road at Pointsett's Spring; and the Gap at the State Road. That from a survey made by Col. Hodges, who kindly tendered his personal services on this occasion, it appears that the Gap which is known by his name, and sometimes by that of Hightower's, rises from its eastern base, in the short distance of a mile and a quarter, 924 feet; that the descent from thence to Bearing's Mills, on Green River, is 356 feet in about three miles and a quarter, and the ascent from that point, to Green's, on the Blue ridge, at the foot of the Butt Mountain, in distance of 4 miles, is 80 feet. That from a survey made by the same gentleman, the Old Saluda Gap, rises in a distance of half a mile from Pointsett's Spring, on the Saluda Road, east 332 feet; that the descent from thence to Bearing's Mills, on Green River, in a distance of 2 miles is 209 feet, and the ascent from thence to Green's 4 miles, is 80 feet. From a comparison, therefore, of these surveys, Old Gap must be depressed below Hodges' 147 feet, and the difference between 209 and 356 feet; while its descent to the eastern base of the Mountain, on the Saluda Road, is by no means as abrupt. The Saluda Road Gap is estimated from observation as equal in elevation to Hodges', while the Gap Creek Gap is evidently more depressed by 80 or 100 feet than even Old Gap; and the inclination of its slope to the low country east, is more gradual, its plane being from 7 to 8 miles in a perpendicular elevation of from 8 to 900 feet. On the Blue ridge the depressions which offer facilities for surmounting that elevation were at Green's, near the foot of the Butt Mountain, descending on a plane of from 4 to 500 feet to Green River, the descent by which to the level country was not ascertained; Mills

Gap, Reedy Patch Gap, and the Hickory Nutt Gap. From an examination of these gorges in the Blue ridge, I report, the Reedy Patch Creek as the preferable pass of the Blueridge. At this point, that chain of Mountains is singularly depressed for a distance of about 9 miles: making the distinct spur of the Sugar Loaf, the White Oak and the Look Out Mountains, and suffering a depression in their stead, from the Butt Mountain south, to the Bear Wallow north, in which it is occasionally found to be not more than six or eight feet above the flat land of French Broad. The Reedy Patch Creek leaves the Blue ridge near the northern extremity of the depression alluded to, and makes its way to the waters of the Broad River, about 4 miles above the point at which that river leaves the mountains, and with the exception of two or three distinct falls of from 20 to 30 feet each, offer fair mountain sides for grading. The rock, too, in its neighborhood, with a quantity of the finest timber, promise every facility for the best construction. I would notice the possibility here of substituting water power for stationary engines; as by reference to the accompanying maps obtained from Judge Foreman, agent for the proprietors of an extensive tract of high land in this district, it will be found that several of the streams of the French Broad and Broad River rise so high in the detached cliffs of the Sugar Loaf and Look Out mountains, as to offer eservoirs even for the use of planes ascending to the very summit of the Blue ridge. Reservations of these streams have been already made with this view, and by the enterprising individual above referred to, adding that the course of the stream is direct from the summit to its junction with the Broad River. Throughout the whole distance, should the road even pass the Tyger and Enoree at their mouth, with the exception of the ascent of the Blue ridge, which may require stationary engines, I know of no necessity of going beyond the grade of 35, or 40 feet in the mile, and this only in the immediate vicinity of the larger streams. I examined all the other passes in the Blue ridge, but giving, as I did, the decided preference to the Reedy Patch Creek, I bestowed on that most of my attention.

MR. HOLMES' REPORT.

From the Paint Rock on the French Broad River, where Col. Gadsden and Mr. Holmes separated, Mr. Holmes pursued the course to Estilville, in Virginia, passing up the valley of Paint Creek, and by the Turnpike, across the lofty summit of Paint Mountain, thence down the valley of the Nolachucky, across that stream to Greenville, in Tennessee, and thence by the most direct route, and the valley of Horse Creek to Kingsport, (the Boat Yard,) on the North side of the South fork of the Holston, one mile above its confluence with the North fork. Estilville is known as the place where a convention of citizens from Kentucky, Virginia, Tennessee, North Carolina and South Carolina, was held in 1831, for the purpose of establishing a Turnpike road from the navigable waters of the Big Sandy River in Kentucky, to the end of the Linnville Mountain, in North Carolina. This being the most direct route for connecting the Eastern part of Kentucky and Tennessee, and the Western part of Virginia and North Carolina with the Atlantic, a line on the map direct from Charleston to Cincinnati, will pass at or near Estilville, in the general direction of this route, many intelligent citizens of the several interested States became well informed of the true character of the country, and a survey was made by Col. Long, of the United States Topographical Engineers, under the orders of the Government. The report which, to the Estilville Convention, has been kindly furnished, and is herewith presented.—Availing himself of the information readily furnished from these sources, confirmed from personal observation in part, as far as the limit of time would permit, Mr. Holmes presents the following views of this route: From Portsmouth, on the Ohio river, to the foot of the Cumberland Mountains near Sounding Gap, is regarded by Col. Long as an ascending plane 100 miles long, presenting an irregular broken surface, intersected by rivers and streams flowing from hills and knobs varying in elevation from 100 or 200 feet, near the river, to 800 feet near the foot of the mountains, and presenting obstacles to the construction even of a turnpike road, deemed quite as numerous and as difficult as those presented by the Alleghany Mountains. In this direction are encountered the obstacles presented by the Big Sandy, the Licking and Kentucky Rivers, with their various tributaries. In general characteristics these streams resemble each other. The valley of the Big Sandy and its principal fork, vary in width ¾ of a mile to 3 or 400 yards, subjected to annual freshets, varying in places from 50 to 60 feet, above extreme low water, and walled in by high precipitous banks, deeply indented with ravines and water courses, thus presenting innumerable obstacles to the construction of a Turnpike road, the only practicable route for which, must be sought at a distance from the water courses, and can then only be obtained by inclined planes of great elevation, varying from 2 to 5°, or from 184.2 to 460.5 feet per mile.—From the foot of Cumberland Mountain to the summit of Sounding Gap, which is decidedly the best Gap in this direction, is an elevation of 600 feet to be surmounted only by steep mountain slopes of great angle, in one place at least 5°. The Water Gaps, formed by the head waters of the Russel and Pound forks of Sandy River, lying 15 or 20 miles northeast of Sounding Gap, are deemed impracticable from their rugged, steep and winding character. The rest of the route will be best appreciated by a knowledge of the general character of the country. The Alleghany Mountains are here divided into 3 general ranges. The North comprehending the Cumberland, Powell's and Guest's Mountains, with their numerous spurs. The middle, comprehending Clinch Mountain and several ridges, such as Copper, Moccasin, Chesnut, Baffal's, are situated between the principal branches of the Tennessee, and the Southern range comprehending the Blue ridge or main Alleghany, dividing the Atlantic from western waters. The Iron Mountains, of which the Yellow Unaka, Green, Roan, Stone, Buffalo, are constituent parts or spurs, is a distinct ridge. The Black, Linnville, Grand Father Table, and most of the other noted mountains are only spurs of the Blue ridge. The South Mountain, separated from by an extensive tract of rolling country, is of moderate height. The subordinate spurs or ridges connected with these mountains lie in all directions. The elevation of these mountains and ridges above the principal stream in their immediate vicinity, may be estimated at 600 to 3000 feet, and at 1600 to 4000 feet above tide water. The natural passes of these mountains have no general coincidence with a straight line, joining the assumed extreme points. The most favorable are Sounding Gap, in the Cumberland Mountains, already spoken of. Big Moccasin Gap, in the Clinch Mountains, at which the passage is almost a dead level, quite as low as the Water Table of the vicinity. The Blue ridge is regarded as presenting on this route, the greatest difficulty. Three passes were examined by Col. Long, McKinney's Gap, Turkey Cove Gap, and Birch Creek Gap. The last impracticableat an inclination less than 5° and for a half a m le 6° or 552.6 feet per mile. Buck Head Gap is 2000 above Catawba River. Turkey Cove Gap is 1800 feet, and Mc'Kinney's Gap 1600 feet above the Water Table, on the north side their heights are estimated at 800 feet for Buck Creek Gap, 300 feet for Turkey Cove Gap, and 130 for McKinney's Gap. Other mountain ranges and spurs in this route present numerous obstacles in the way of a road. No one acquainted with these obstacles can conceive a more difficult route, and all the testimony, as well as the opinions we have from those best informed concur in so regarding it. The most intelligent citizens of Virginia, Tennessee and North Carolina with whom Mr. Holmes conversed, expressed a decided preference for a route by the French Broad River, to a more direct one across these several ranges of mountains. Without therefore, pursuing the entire route, but judging from the evidence before him, as well as his own observations in part, Mr. Holmes has no doubt that a reconnoisance of the country, and the future surveys of it, should be directed to the waters of the Tennessee below this line.

SUMMARY.

From these reports, we have come to the decision, that the route for a Railroad via Burke County, North Carolina, the Yellow Mountain, and Estilville in Virginia, to the Big Sandy or Licking Rivers in Kentucky, is *inadmissable.*

It is greatly to be doubted if the Topography of the world affords so singular and so striking a feature as does the valley and River of the French Broad. Drawing its waters from a thousand tributaries from the topmost elevations of the Blue ridge, and intent on its purpose of conveying them to the valleys below, it forces its way through *hills, cliffs* and *mountains*, which otherwise would be inaccess.ble, and so equalises and graduates the elevations overcome in the distance traversed, as to present a *plane;* the inclination of which is not to be detected by the bye. But for the rapidity of the current by his side, and the noise of the falls and rapids which continually remind him of his descent, the traveller along the banks of this stream would truly imagine himself in a level valley, embosomed in mountains and overshadowed by cliffs, notwithstanding he is moving on an inclined plane falling at the rate of 30 feet to the mile, and overcoming in the distance of 100 miles an altitude of neaaly 3000 feet. At the mouth of the Nolachucky River, he first meets *hills* which oppose his progress, while he has been descending without interruption the slope of the Alleghany, and winding his unobstructed way amid the appalling elevations of the Paint Rock, and the cloud concealing summits of the Smoking mountains. This route, by the French Broad, is furthermore recommended by the fact, that it penetrates the very centre of East Tennessee, making the wealth of that interior, and hitherto inaccessible country, tributary to the stream of commerce, which the Charleston, Louisville, and Cincinnati Railroad is destined to pour on the planes of the Atlantic. Whatever may have been the impression hitherto as to the character

and condition of East Tennessee, there is, within that seemingly limited district of country, embosomed between the Alleghany and Cumberland Mountains, more concealed sources of wealth, *agricultural, mineral* and *manufacturing*, than is to be found within a similar extent in any other portion of the United States. With a climate mild and salubrious, equally exempt from the rigors of a northern, as it is from the enervating severity of a southern latitude; with a population healthful and industrious and economical, without any of those restraints which poverty and disease in other regions often inflict on its increase, with soils yielding and productive in all those nutritive grains which contribute to the comfortable subsistence of man, with mountains carpeted with the most luxuriant natural pastures; overshadowed with forests of durable timber, and their bowels rich with coal and the substantial metals; with rivers, if uninterrupted in their navigation, affording water power at every mile, capable of propelling any machinery, with their tributaries gushing from the purest crystal fountain, it is their hitherto inaccessibility which has kept those vast *resources* in a still *slumbering state*. But once cut the barriers which separate this country from the other more prosperous, but not more favored regions of the Globe. But once open a *highway*, such as is now contemplated by the Charleston, Louisville and Cincinnati Railroad, across these elevations which separate that Mountain District from all participation in the different markets in the world, and such an animation would be given to the industry of the people, and such a developement to its resources as to place it in a position competing with, if not rivalling all other countries. Under such a state of things, the day would not be far distant, when the Lowells and Pawtuckets, the Manchesters and the Birminghams, would find their most favored locations at the cascades of the French Broad, or near the rapids of the Holston, the Clinch, and the Nolachucky. The resources of the intermediate districts of Kentucky, over which the Charleston, Louisville and Cincinnati Railroad must pass to its destination, should not be undervalued in an estimate of the benefits and profits of that great work. Passing, as the line of communication will, over the Coal and Iron districts of the Cumberland Mountains, and crossing the no inconsiderable Rivers of the Cumberland and Kentucky, at navigable points, and from whence easy connections may be had with the Salt works on their tributaries; the *Mineral, Agricultural* and *Manufacturing* wealth of these regions, whether for neighborhood distribution, or in the commercial exchanges with the other States, within the links of this Railroad connection, will form no small item in the transportation on this great highway to the West.

All of which is respectfully submitted.

JAMES GADSDEN,
A. H. BRISBANE,
JAMES G. HOLMES.

To Gen'l. R. Y. HAYNE,
Chairman Committee, &c., &c.

A MAGNIFICENT EDIFICE.—There are 3000 workmen at St. Petersburgh, engaged upon the new cathedral of St. Isaac. The outside of the cupola is to have 24 columns of granite; the portica is 100 feet in length, and supported by 41 columns, with bronze capitals and vases.

From the Georgia Messenger.

KNOXVILLE CONVENTION.

The following proceedings of the Railroad Convention, we copy from the Knoxville Register, which comprises all the acts and doings of that body of general interest.

The representation in that Convention, we venture to affirm, comprised a greater assemblage of talented men than has ever met in the United States for any similar object, and we feel assured will be marked as a new era in the wealth and greatness of the Southern and Western States.

The number of delegates from each State, were as follows:

Ohio,	5	South Carolina,	82
Indiana,	4	Georgia,	55
Kentucky,	60	Alabama,	9
Virginia,	10	Tennessee,	125
North Carolina,	30		

On motion of Mr. Wickliffe,

Robert Y. Hayne was unanimously chosen President, and being conducted to the chair he addressed the Convention.

Pryor Lea was appointed Secretary.

Mr. Blanding presented to the Convention a report, signed by Robert Y. Hayne, Abraham Blanding, Patric Noble, Thomas Smith, Thomas L. Jones, and Charles Edmonston, South Carolina Commissioners on the "Louisville, Cincinnati and Charleston Railroad," which was read.

Ordered, That the Committee consist of thirty-nine delegates, to be appointed by the President. This Committee afterwards increased to 45.

On motion of Mr. Swain,

Resolved, That the same Committee be instructed to enquire and report to the Convention whether a practicable route for said road has been found, and the probable cost thereof, and that so much of the report of the Commissioners as relates to these subjects, be also referred to them.

Resolved, That the same committee be further instructed to enquire and report to the Convention on the advantages to arise from the construction of the said road, and especially the extent and value of the commercial intercourse it would establish among the States interested therein, and that so much of the report as relates to that subject be also referred to them.

On motion of Mr. Wickliffe,

Resolved, That the same Committee be further instructed to enquire and report, upon the measures necessary to be adopted to insure the construction of the proposed road, at the earliest possible period, should the same be found to be practicable at a reasonable cost, and that so much of the report as relates to this subject be also referred to said Committee.

TUESDAY, JULY 5.

Mr. Blanding presented the charters of the Louisville, Cincinnati, and Charleston Railroad Company, which charters were referred to the committee.

Mr. Drake presented a report of Jacob Pearson on the subject of the Hiwasse Railroad, and moved its reference, together with the charter for that road, to the committee—and it was ordered accordingly.

Mr. Alston presented a report from the commissioners appointed at Monticello, South Carolina, concerning the Broad River route: which report was referred to the committee.

On motion of Mr. Beaty,

Resolved, That the committee to whom were referred the present charters for the Railroad, be and they are hereby instructed to inquire into the expediency and propriety of amending the said charters so as to make a branch from the main stem of said road at, or near Knoxville, to run thence the most direct and practicable route to Louisville, Kentucky, provided Cumberland Gap is made a point in said road. And further, that said committee enquire into the expediency of getting competent engineers to examine and report upon said route, to the next session of the Kentucky Legislature, embracing in their report, the advantages that would result to the stockholders, and the community at large, as well as to the agricultural, commercial, and manufacturing interests in the region of country through which the branch would run.

Mr. Starke presented a report from the committee appointed at Winnsborough, on the trade, &c., of Fairfield District, South Carolina; which report was referred to the committee.

Mr. Thomas presented a report of the manufactures and commerce of Cincinnati; which was referred to the committee.

On motion of Mr. Field,

Resolved, That the committee be instructed to enquire into the expediency of connecting the Louisville Branch of the Charleston and Cincinnati Railroad with the Ohio and Indianapolis Railroad, and that the charter of said company, be referred to their consideration.

Mr. Coffey presented a report from the exploring party of the McMinn county delegation, on the route indicated by the charter of the Hiwasse Railroad; which report was referred to the committee.

Mr. Parkman, on behalf of the Georgia delegation, presented a report on the commercial advantages presented by Georgia to the west, in connection with a contemplated Railroad communication; which report was referred to the committee.

On motion of Mr. Sharp,

Resolved, That the committee take into consideration the expediency of procuring a reconnoisance of the route through Cumberland and Moccasin Gaps in Virginia, and of an application to the Legislature of that State, for a charter for a road through her territory; and report their opinion thereupon to the Convention.

WEDNESDAY, JULY 6.

Mr. Chappell, on behalf of the Georgia delegation, submitted a report; which was referred to the committee.

On motion of Mr. Cocke,

Resolved, That the committee consider and report on the expediency of giving some expression of opinion on the part of this Convention, as to the obligation on the part of the Direction of the proposed company, of having all the routes examined within the limits of the charter, before the line of Railroad shall be laid down.

Mr. Fox, in behalf of the delegates from Pulaski county, Kentucky, presented their

report which was referred to the committee. The President submitted a report of the Brigade of Engineers; which report was referred to the committee.

Mr. Blair, in behalf of the delegation from Washington, Sullivan, Carter, and Johnston counties, Tennessee, presented a statistical report on those counties; which report was referred to the committee.

On motion of Mr. Kane,

Resolved, That the committee be requested to enquire into the expediency of the examination of the route from Moccasin Gap the head waters of Sandy.

On motion of Mr. Clayton, of Ga.,

Resolved, That a committee be appointed to select for publication, from the various documents presented to the Convention, such papers as they may think necessary and proper, showing the advantages of the several routes proposed to connect the southern and western States by a *system of Railroads*.

And ordered that the committee consist of one member from every State.

The Convention adjourned until to-morrow, meridian.

THURSDAY, JULY 7.

Mr. Dunkin, in behalf of the delegation from South Carolina, presented a report on the advantages of that State in connection with the contemplated Railroad; which report was read, and referred to the committee.

On motion of Mr. Cocke,

Resolved, That the Engineers, who have been engaged in making the surveys and reports, be invited to seats within the bar of the house.

The President, according to a resolution of yesterday, announced the following committee on the subject of printing: Mr. Clayton of Ga, Mr. Williams of Tennessee, Mr. Blanding of South Carolina, Mr. Swain of North Carolina, Mr. Nicholas of Kentucky, Mr. Drake of Ohio, Mr. Field of Indiana, Mr. Johnston of Virginia, and Mr. Fearne of Alabama.

On motion of Mr. Bradley, on behalf of the Tennessee delegation, the following document was laid on the table.

Resolved, By the Tennessee delegation, That they will individually surrender their preferences for any particular route for the Louisville, Cincinnati, and Charleston Railroad, and will cordially co-operate with others in carrying the charter into operation on such route as may be designated by the Engineers under the authority of the company, when formed.

Mr. Churchwell, on behalf of the Tennessee delegation, presented a statistical report of East Tennessee; which report was referred to the committee.

Mr. Wickliffe, from the committee, presented the following preamble and resolutions.

THE REPORT OF THE COMMITTEE OF FORTY-FIVE.

The committee to whom was referred the report of the South Carolina Commissioners, and the four resolutions directing them to consider the charters, and to enquire and report on the practicability, probable cost, and commercial and other advantages of the proposed Louisville, Cincinnati, and Charleston Railroad, and the measures necessary to be adopted in relation thereto, have had these important subjects under consideration, and find that charters have been passed by the Legislatures of South Carolina, North Carolina, Tennessee, and Kentucky, for the purpose of extending a Railroad from Louisville and Cincinnati, to Charleston, through the States above mentioned. Having examined the provisions of these charters, the committee are of opinion that they should be accepted.

1. Resolved, That in the opinion of this Convention, the charters of the Louisville, Cincinnati, and Charleston Railroad should be accepted; and should alterations or amendments hereafter be found necessary, that application be made therefor to the Legislatures of the States granting the same; and this Convention hereby urges upon the said States the expediency of granting such application, should the same be made, and can entertain no doubt of the disposition, which will be felt by the Legislatures of said States, to comply with all reasonable requests, which may be made by the company, when the same shall be formed.

2. Resolved, That it is important for Georgia, and Alabama, and Virginia to unite with the Louisville, Cincinnati, and Charleston Railroad Company by branches connecting with the main trunk of the road, at points convenient for said connection in Tennessee, on terms of mutual reciprocity and perfect equality, as to the rate, accommodation and despatch in the transportation of freight and passengers.

And thereupon Mr. Blanding from the same committee, in continuation of their report, and particularly in relation to the second resolution, submitted the following resolution, accompanied by a report.

3. Resolved, That in the opinion of this Convention a practicable route for a Railroad has been found, for connecting the city of Charleston with the cities of Louisville, Cincinnati, and Maysville, and that the same may be constructed at a reasonable cost, and entirely within the means of the several States interested therein.

And thereupon Mr. Drake, from the same committee, in continuation of their report, and particularly in relation to the 3rd resolution, submitted the following, accompanied by a report.

4. Resolved, That in the opinion of this Convention, the amount of transportation and travelling on said road, will increase for an indefinite period of time, and that it will, from the completion of the road, be such as to render its estimated cost a profitable investment.

And thereupon the President from the same committee, in conclusion of their report, and particularly in relation to the fourth resolution. submitted the following resolutions, accompanied by a report.

5. Resolved, That viewing the proposed road, as one of vast importance to *the people* of the Southern and Western States, we hold them bound by every consideration of interest and duty to come forward to its support, by subscribing freely for stock, when the books shall be opened in October next; nor can we entertain a doubt, that should the road be completed at an early day by the vigorous and united efforts of the people and the States interested therein, that it will amply remunerate them for the capital invested.

6. Resolved, That we consider the Louisville, Cincinnati, and Charleston Railroad, as a work eminently entitled to the patronage and support of *the States* through which it will pass, or which may be interested therin; and as, from the national character, great cost, and magnitude of the work, it could hardly be expected that it should be carried through by private enterprise alone, we would respectfully, and do hereby most earnestly appeal to the *said States* for liberal appropriations towards carrying on the great work, which when completed, will be an enduring monument of their wisdom and patriotism.

7. Resolved, That we consider the fund which will be placed at the disposal of said States, by the division among them of the surplus revenue of the Union, as *peculiarly applicable* to this great work, which passing through several States will open a channel to the most extensive social and commercial intercourse between the Western States bordering upon the Ohio and the great Lakes, and the States on the South Atlantic and the Gulf of Mexico; thereby strengthening the bonds of our Union, and promoting the prosperity and happiness of a large and most interesting portion of our common country.

8. Resolved, That this Convention does, therefore, earnestly appeal to said States, to appropriate and set apart the said fund, or so much thereof as may be necessary for that purpose, and to cause the same to be faithfully applied to the execution of the proposed road. It is presumed that the States of Tennessee, Kentucky, Ohio, North Carolina and South Carolina, cannot receive under the distribution bill, the first year, much less than nine millions of dollars, a sum nearly sufficient to make the road; and should Georgia, Alabama, Virginia, and Indiana, become interested in it, by lateral roads, the whole amount acquired could be raised by the appropriation of the surplus of only a single year, we call upon these States, therefore, for the promotion of their own best interests, and for the sake of their posterity, not to suffer the work to fall.

9. Resolved, That, in publishing these resolutions and the proceedings of this Convention, the same be accompanied by an address, to be prepared and published in the name and behalf of this assembly, embodying and enforcing these views, and urging in the strongest manner, upon the States and the people, the duty of carrying the great work into effect.

And thereupon the entire report of the committee of forty-five was unanimously concurred with and adopted.

On motion of Mr. Drake,

Resolved, That the President be requested to prepare the address to accompany the proceedings of the Convention.

On motion of Mr. Jenkins,

Resolved, That in the opinion of this convention, a Railroad communication with the Louisville, Cincinnati, and Charleston Railroad, and the State of Georgia, and thence extending into the State of Alabama, would alike contribute to the prosperity of the States in the south, and also, those on the Ohio river, and that such efforts and Legislative provision, (provided further legislation should be found necessary) should be made as might effect upon terms of fair and just reciprocity, such connection.

On motion of Mr. John Speed Smith, the following resolution was laid on the table.

Resolved, That, as the contemplated Railroad, connecting the Ohio and the Southern Atlantic, will furnish the surest and speediest transmissions of the mail, and the most certain and expeditious means for transporting men, provisions and munitions in a period of war, it is the settled opinion of this Convention, that the government of the United States should become a large stockholder in said road.

Mr. Blanding, from the committee of forty-five, made a report, accompanied by the following resolution:

Resolved, That all communications to this Convention, pointing out the peculiar advantages of any route of Railroad between the points to be connected within the chartered limits of the company, be delivered by the Secretary of this Convention to the board of directors of the company, as soon as it shall be organized.

And thereupon said resolution was adopted.

On motion of Mr. Drake,

Resolved, That, to defray the expenses of this Convention, every member pay over to the Secretary two dollars.

The Convention adjourned until to-morrow morning, 8 o'clock.

Friday, July 8, 1836.

Mr. Wickliffe submitted the following preamble and resolutions:

Whereas it has been resolved by this Convention, that it is important that a branch of the Louisville, Cincinnati, and Charleston Railroad should be extended, from some point in Tennessee, into the State of Georgia, upon reciprocal terms with those enjoyed by the States of Kentucky, Tennessee, North Carolina and South Carolina; and whereas an opportunity should be afforded to the State of Georgia and its citizens. to become participants in the construction and benefits of said road—

1. Resolved therefore, That applications should be made to the legislatures of the States of Kentucky, Tennessee, North Carolina, South Carolina and Georgia, for an amendment of the charters granted, so as to admit the State of Georgia and its citizens to become participants in the construction and benefits of said road, upon terms of perfect equality with those to be enjoyed by the States of Kentucky, Tennessee, North Carolina, and South Carolina, and their respective citizens—and that a further amendment should be provided, giving to the state of Georgia in the general direction of the company, three directors residents of that State, and a local board, as are provided for in the existing charters for the States of Kentucky, Tennessee, North Carolina, and South Carolina.

2. Resolved further, That a further amendment should be made in the existing charters of said company, providing that the branch of the road to be extended into Georgia shall commence at Knoxville, or at the nearest point thereto, if the road of the said company shall not strike Knoxville, to be constructed thence to such point in the State of Georgia as said State may elect; and, for that purpose, that the capital of said company be increased.

3. Resolved further, That the charters of the company ought to be so amended as to authorise and require the board of general direction, whenever it shall be the unanimous vote of the directors of a State to that effect, to apply the amount subscribed by a State and its citizens, in the first place to the construction of such portion of said road and its branches as shall run within the limits of said State.

4. Resolved further, That the company should not be compelled to construct the said branch from the main trunk, or road, until the State of Georgia and others shall have subscribed for that object, and paid over, as required, to the company, the amount required for the construction of the said branch, agreeably to the provisions of the charters.

On motion of Mr. Drake,

Resolved, As the opinion of this Convention, that in reference to the particular interests of the Company, and the accommodation of all the States lying between Florida and the Lakes, it is desirable, that the States, granting the charter, should so modify it, if necessary, as to allow the company to connect the northern extremeties of the road now designated or hereafter created, with the public works, and those of incorporated companies, of Indiana and Ohio, so as to secure an uninterrupted transit of goods and passengers from the Northern to the Southern frontier of the United States; and, that a similar policy should prevail on each side of said road, and in the South—*Provided*, That said continuation of the road should not be so constructed as to violate the Constitution of Kentucky and the Compact with Virginia.

On motion of Mr. J. D. Williams,

Resolved, That this Convention are of opinion that a connection of the Wetumpka and Railroad with the Louisville, Cincinnati and Charleston Railroad, will be important to South Alabama, as it would connect the Mobile Bay with the West and the North.

On motion of Mr. Clayton,

Resolved, That the committee on Printing be discharged from the duties assigned them; and, that the President, Mr. J. Williams, Mr. Blanding, Mr. Wickliffe, and Mr. Drake, be a committee to carry into effect the resolution heretofore adopted on the subject of printing.

And Resolved further, That said committee publish the document presented by Mr. Parkman, on the commercial and agricultural statistics of Georgia; and also the document presented by Mr. Chappell' exhibiting reports of the Georgia Engineers and others, as to the practicability of approaching Georgia with the Railroad by two passes; and, also, Col. Brisbane's report in relation to passing the Rabun Gap; and, also, Mr. Colcock's report—*Provided*, similar documents should be published.

On motion of Mr. King,

Resolved, That the Secretary transmit copies of the proceedings of this Convention to the Governors of the several States here represented; and the residue equally to the members of this Convention for general information.

On motion of Mr. Wickliffe,

Resolved unanimously, That the thanks of this Convention are hereby tendered to the South Commissioners on the Louisville, Cincinnati, and Charleston Railroad, and to the Engineers acting under their direction, for the ability, industry and zeal, with which they have discharged the duties assigned them.

On motion of Mr.

Resolved unanimously, That the thanks of this Convention are hereby tendered to the several societies that have opened their buildings for the accommodation of the Convention.

On motion of Mr. Breck,

Resolved unanimously, That the grateful acknowledgments of this Convention are due and hereby tendered to the citizens of Knoxville, for the facilities afforded the Convention in its deliberations, and for the distinguished politeness and hospitality extended to its members.

On motion of Mr. Swain,

Resolved unanimously, That the thanks of this Convention are due, and are hereby tendered to the Honorable Robert Y. Hayne, for the dignity, ability and impartiality with which he has presided over the deliberations of this body.

And thereupon the President addressed the Convention.

On motion of Mr. Earle,

Resolved unanimously, That the thanks of the Convention be tendered to Pryor Lea, for the assiduity and ability with which he has discharged the duties of Secretary to the Convention.

The Convention then adjourned *sine die* —being concluded with an address to the Throne of Grace by the Rev. Isaac Anderson, D. D.

Robert Y. Hayne, President.

Pryor Lea, Secretary.

EDITORIAL REMARKS FROM THE KNOXVILLE REGISTER.

Believing that we could not furnish our readers with a more acceptable treat, we have spread before them the entire journal of the proceedings of our late Convention. This body adjourned on Friday last. Its proceedings throughout were marked with perfect order and regularity. Adopting as the rules for its government, those of the United States Senate, and having for its presiding officer, one who has been a distinguished member of that body, our late Convention could not be otherwise than a dignified and decorous assemblage. To facilitate its transactions, most of the business was referred to a committee of thirty-nine, subsequently increased to forty-five,

composed of delegates from the nine States represented in the Convention. To the assiduity, liberality, and talent of this committee, and to the enlarged and comprehensive views of the whole Convention, may we ascribe the great and important results which were produced with so much dispatch, and in such harmony of feeling. One common sentiment seemed to pervade the Convention, that the great work *must go on*, and that no sectional or local feeling should be suffered for a moment to arrest its progress. That three hundred and eighty-one delegates, representing nine States in the Union, and the diversified interests from the Lakes to the South Atlantic, should assemble without bringing with them different opinions and conflicting views, was hardly to be expected; but the minor considerations were all lost sight of, when placed in contravention of the great and paramount objects of the convention. Delegates from every quarter appeared willing to surrender every local and limited interest rather than hazard the progress of the great work. A distinguished delegate from North Carolina manfested but the general spirit of the Convention in surrendering a matter of local interest that the whole body might have "a long pull, a strong pull, and a pull altogether." This spirit of liberality extended through the various resolutions and addresses of delegates. Many interesting speeches were delivered in debating the several questions brought up for discussion. These, with a single exception, were concise, pertinent, comprehensive and sometimes eloquent. On Thursday afternoon the delegates with strangers and citizens to the number of about five hundred, partook of a sumptuous and elegant Barbacue, furnished by our citizens, in a grove near the old Methodist Church. We have never witnessed a festive entertainment, either small or great accompanied with so little disorder and confusion. After rising from the table Gen. Hayne was called on from every quarter of the company for a sentiment—he rose and in his usual animated and eloquent manner, addressed his attentive auditory for a few minutes upon the great objects of their assemblage, portrayed in glowing colors the advantages, both commercial, political and social, which were certain to result from a completion of the great work which they had then assembled to commence. He concluded his address by offering the following sentiment, and sat down amidst a universal and repeated acclamation of applause.

The proposed Union between the South and the West.—The banns have been published, and we are here to witness the ceremony—"if any man can show cause why these two shall not be united together let him now speak, or forever after hold his peace."

Doctor Drake was then called on and addressed the company by giving a lucid and comprehensive view of the consequences resulting from the completion of the contemplated work. He concluded by offering a sentiment, which we were too distant too hear, and of which we have not been able to procure a copy, but which received the universal applause of the company. Upon the call of the company some other addressed were delivered by other gentlemen of the Convention, but being compelled to absent ourselves, we could not hear them, and are, of course, incompetent to speak of their merits or the manner in which they were received.

In conclusion, we have reason to congratulate ourselves and the citizens of our whole country, that an impulse has been given by this Convention, to the prosecution of the great work, which no difficulties can resist. This great work will go on. The best talents and respectability of nine Sovereign States, stand pledged to carry it through. A body of men unequalled in talents, respectability and numbers, by any heretofore assembled in the United States, have pledged their co-operation in carrying forward this magnificent improvement, and it must succeed. We shall from time to time present our readers with the reports adopted by the Convention which are now publishing in pamphlet form.

From the Wayne County Gazette.

SODUS BAY SHIP CANAL.

The Books of subscription for the Stock of this Canal, were opened at Geneva on the sixth inst., and the whole stock, amounting to *eight hundred thousand dollars*, was subscribed on that day. The stock of this Company has gone into such hands, we learn, as to leave the construction of this canal *beyond a doubt*; and the promptness with which capitalists have stepped forward to take the stock, and pay the advance required upon subscription, is itself evidence satisfactory, of the confidence which is entertained in the excellence of the investment, and the success of the enterprise.

A new era is dawning upon the eastern section of the county of Wayne. This enterprize will render available immense advantages which have hitherto, been locked up and dormant. With a soil unsurpassed in fertility, and commercial advantages connected with Sodus Bay unrivalled on the south shore of lake Ontario, the canal will combine an immense and cheaply disposable hydraulic power, and a ready and direct communication with all the great thoroughfares of the State. Great Sodus Bay furnishes by far the best natural harbor on the sooth shore of Lake Ontario, and when the works at the mouth of the harbor shall have been completed by the general government, it will be as good a harbor as Oswego, and in many respects decidedly superior. The completion of the canal, with a trifling additional expense, a steamboat navigation from the Bay to Ithaca, through the heart of a rich and populous interior, and meet at that place, the Railroads which connect with the great southern Railroad, and thus form a communication with Lake Erie, the Ohio and Hudson Rivers, and the great internal channels of communication of Pennsylvania.

We know of no place in the State of New-York more desirable for the location of a town, than the margin of Sodus Bay. The Bay itself is a beautiful sheet of water extending several miles inland, and the points and indentations of its shore present prospects highly picturesque and agreeably varied. Its soil is fertile, and the situation eminently salubrious, and when the capacities of nature shall have been improved by art, and embellished by wealth and trade, we may expect to behold another of the creations of enterprize and improvement, a fair town which shall take an equal place among the thriving daughters of the west.

ANOTHER RAILROAD CONVENTION.

The delegates in the Knoxville Convention, from the State of Georgia, upon mature deliberation, believe it to be of the highest importance to the South of Georgia, that a Convention should be held at Macon on the first Monday of November next, for the purpose of consulting upon the expediency and practicability of building a railroad from some point on the Tennessee river below the Suck, through Georgia, to some point on the Atlantic. It is therefore earnestly desired that every county in the State should send delegates to this Convention equal at least, to the number of their Representatives in the Legislature. And in the mean time, it is hoped and desired that all the information touching this important enterprize, be collected and communicated either to A. S. Clayton, Esq., at Athens, Ga., Charles J. Jenkins, Esq., at Augusta, Ga., M. H. McAlister, Esq., at Savannah, Washington Poe, Esq., at Macon, Henry S. Mosley, Esq., at Clayton, Jacob M. Scudder, Esq., at Coal Mountain, Forsyth county, or R. H. L. Buchanan, Esq., at New-Eachota, Cass county, who have been appointed a Committee of Correspondence for that purpose.—[Miners Recorder.]

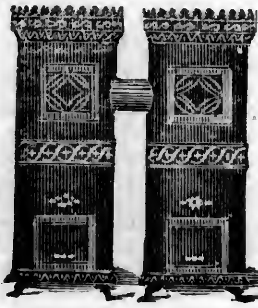
WORTHY OF IMITATION.

LIBERALITY OF THE RAILROAD COMPANY.—At a meeting yesterday of the President and Directors of the Richmond and Fredericksburg Company, the following resolution was adopted:

The board being informed that many persons have freely released to this company all claim to damages for lands used by this company in making the railroad, and being desirous of making some suitable return therefor, doth resolve, that all persons who have given such releases shall have the privilege of transportation on the railroad for themselves, when they may desire the same, for a term of five years from this date. In case of the death within the term of five yearsof any person who has given such release, the board will hereafter make such provisions as may seem reasonable.

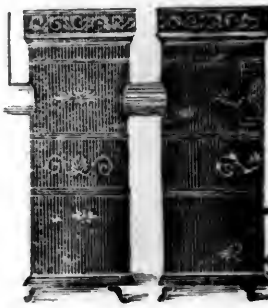
The President is directed to report to the board at its next meeting, a list of the persons who have given such releases, with a statement showing which of them have died, and who are the next of kin to those who have died.—[Richmond Compiler.]

Chamber Stove.



Parlor Stove.

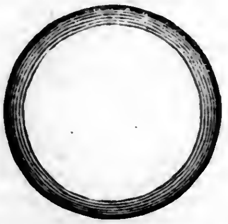
Hall Stove.



REMARKS ON THE STRUCTURE AND PRINCIPLES OF OLMSTED'S STOVE, FOR BURNING ANTHRACITE COAL.

The Plate (see Frontispiece) represents three varieties of this stove, adapted respectively to parlors, to chambers or offices, and to halls or large open rooms, as stores and churches. The *Parlor* and *Chamber* stoves are designed to stand close to the fire place, being connected to the chimney by short pipes which proceed from the back of each cylinder. The *Hall* stove is intended to communicate with a distant flue, by a smoke pipe.

In the construction, the inventor (Professor Olmsted of Yale College) was guided by principles strictly philosophical. After it was observed that the volume of aeriform products, arising from the combustion of anthracite coal, is excedingly small, when compared with that from wood and other kinds of fuel, it was perceived, that a great loss of effect must accrue from transmitting the heated current through a large open pipe. Thus in figure 1., which represents



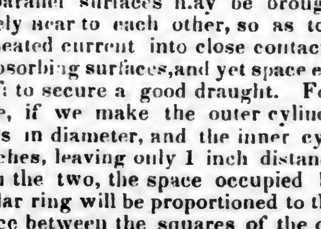
a pipe eight inches in diameter, it is obvious that the heated air, which is itself a bad conductor of heat, would part with its heat slowly except within a small distance from the surface, such as is represented in the shaded circular ring, while the large portion of the capacity of the pipe, constituting the vacant space within this ring would be nearly ineffectual. Hence, it would be only after circulating through a very long pipe, that the heat could be all absorbed and distributed to the apartment.

To remedy this difficulty, several different expedients have been adopted. Some have employed a *small* conducting pipe, or a series of small pipes, with the view of securing a greater amount of surface in proportion to the interior vacant space.* But although a comparatively small pipe will serve to convey off the heated air from an anthracite coal fire when well ignited, yet on first kindling, when the volume of gases is much greater, the draught of such a pipe is insufficient, and smoke and noxious fumes flow into the room. Such pipes also are peculiarly liable to get choked by the deposite of soot.

Others have attempted to obviate the difficulty in question, by using a *flattened* pipe, or some equivalent contrivance, where the opposite surfaces are made to approximate to each other, and the proportion of vacant space is greatly diminished. A fair specimen of this structure, is seen in the ascending cast iron pyramidal pipe of Doctor Nott's stove.

It occurred to Professor Olmsted, that the same end might be more conveniently attained by the combination of two similar figures, like two concentric cylinders. Here the parallel surfaces may be brought extremely near to each other, so as to force the heated current into close contact with the absorbing surfaces, and yet space enough be left to secure a good draught. For example, if we make the outer cylinder 14 inches in diameter, and the inner cylinder 12 inches, leaving only 1 inch distance between the two, the space occupied by the circular ring will be proportioned to the difference between the squares of the diameters, and consequently be proportioned to the difference between 144 ($=12^2$) and 196 ($=14^2$); that is, it will be as the number 52, and therefore proportioned to a pipe $7\frac{1}{3}$ inches in diameter.* In like manner, a seven inch cylinder within a nine inch, leaves a space equivalent to that of a pipe more than $5\frac{1}{2}$ inches diameter.

We have then, in this combination all we can desire, namely, an ample draught along with a great amount of surface, and yet a vacant space so narrow that the heated current cannot flow through it without being brought closely into contact with the absorbing surfaces. Indeed, so small is the volume of aeriform products arising from the combustion of anthracite coal when well ignited, that, by making a separate pipe for kindling, (which is closed as soon as the fire burns freely,) the two cylinders may be brought within *half an inch* of each other as is represented in figure 2, and yet, when free from soot, a good draught obtained. It has, however, been found preferable, on all accounts, to leave the distance ¾ of an inch. The employment of this principle, namely, *a greater proximity of the opposite absorbing surfaces* than has been heretofore used, constitutes the first peculiarity of Olmsted's stove.



But, secondly, it has been ascertained, by experiments in transmitting heated air through a pipe, that the absorbing effect of the pipe is increased by making the heated air descend and ascend, as in traversing a succession of elbows.* In drums somewhat resembling this *Radiator*, inasmuch as concentric cylinders have been employed, the usual practice has been to place the two cylinders so far asunder as to lose that signal advantage of *closeness of contact* between the heated current and the absorbing surface, an advantage which is gained only by a proximity of the parallel surfaces. Moreover, it has been usual to introduce the heated air in such a way as to make it ascend through the open space between the two cylinders, flowing loosely from a pipe in the bottom to one in the top of the drum. But a peculiar advantage, (which is remarkable considering the simple manner in which it is gained) is secured by employing a vertical partition,† which forces the heated air first to descend on one side, and then, flowing under the inner cylinder, to ascend on the other side, thus traversing the surfaces of the two cylinders in a manner the most favorable for the perfect absorption and distribution of the heat. But, thirdly, since the inner cylinder would thus become rapidly heated, it was necessary to introduce a current of cold air into the central space, which was easily done by letting an open pipe pass through the bottoms of both cylinders. By this means the colder air of the room, which is always nearest the floor, would flow into the vacant space, as air flows into the chimney of an argand lamp.

These three principles combined, namely, *a greater proximity of the absorbing surfaces* than had before been employed,—a *vertical partition*, causing the heated air to traverse those surfaces more effectually,—and *a current of air* flowing through the central parts of the radiator, constitute the peculiarities, and form the grounds of the claim to originality in this stove.

*The surfaces of cylinders are proportioned to their diameters, while their capacities are proportioned to the *squares of the diameters*. Thus, if we compare a six inch and a three inch pipe, their capacities are as 36 to 9; or the larger pipe has four times the capacity of the smaller, with only twice the surface.

* Let D be the diameter of the larger, and *d* that of the smaller cylinder. Then the corresponding circular sections will vary as D^2 to d^2; that is, putting C for the larger and c for the smaller cylinder,
$C : c :: D^2 : d^2 \therefore C-c : c :: D^2-d^2 : d^2$; or $C-c \propto D^2-d^2$. Q. E. D.

* See, particularly, M. Marcus Bull's Experiments on Fuel, where the efficacy of this principle is fully exhibited.

† Seen at *a a*, in figure 2, which is a horizontal section of the radiator, near the top.

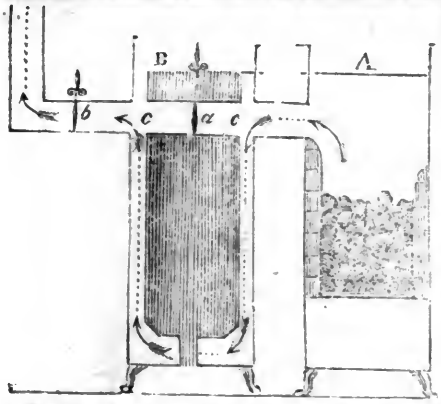


Figure 3 represents a vertical section of the "Hall Stove." The structure is composed of polished Russia sheet iron, and consists of two parts, the *furnace* A, and the *radiator* B. The furnace is lined with fire brick, and all the other parts of the entire structure which are exposed to the action of the heated gases, are protected by a wash which hardens by heat, and at once defends the iron from burning out, and prevents its being corroded by the acid fumes that are produced in the combustion of anthracite coal. For the ease of kindling, and to prevent smoke and gas, a pipe, open at both ends, is let through the inner cylinder, as represented at *c c*, forming a direct communication from the furnace to the smoke-pipe. As soon as the fire is well kindled, this pipe is closed by the damper *a*, when the current immediately takes the circuitous route indicated by the arrows. A copious radiation of heat from the whole external surfaces of the stove, with the addition of a constant current of hot air rising from the top of the radiator, diffuses warmth rapidly, and in a few minutes brings the room to the required temperature. When the fire is too intense, the damper *b*, which closes half the capacity of the pipe, is turned, and the fire continues to burn uniformly, demanding very little attention for many hours.

A singular *softness and purity of air* has been found to attend the use of this stove. This desirable quality has been secured by the following means. First, care has been taken not to suffer any part of the apparatus to become so hot as to contaminate the air of the apartment, by scorching the particles of animal or vegetable matter, that are always in greater or less amount floating in a family room. The furnace is lined with non-conductors, which do not permit the metallic surface to approach a red heat; and as soon as the heated current issues from the furnace, instead of traversing as usual, a narrow pipe, which in the parts nearest the furnace becomes excessively heated, the current on entering the radiator instantly expands over the extensive surfaces of the two cylinders, in contact with which, both within and without, the coldest air of the apartment is continually and freely circulating. Secondly, the *circulation* which is given to the air of the room by causing it to flow in at the bottom of the radiator, and, becoming rarified by heat, to flow out at the top, thus continually disturbing the equilibrium of the atmosphere of the room, has a signal effect in maintaining uniformity of temperature, and preserving the purity of the air. Finally, distributing the heat at the bottom of the apartment instead of the top, as is the case when given out from a common smoke pipe, contributes also a large share towards creating an equality of temperature above and below, securing warmth to the floor, and consequently to the feet, while the head is relieved from that oppressive sensation, which is experienced by many persons in a room whose temperature, near the ceiling, is a number of degrees higher than at the floor.

The testimony of two eminent physicians, of the cities of New-York and Brooklyn, attest the suitableness of this apparatus for the apartments even of invalids.

From JOHN NEILSON, M. D., of the city of of New-York, dated June 1st, 1836.

"Olmsted's Stove appears to me the very best contrivance to promote comfort and health, during our severely cold winters.—I have made use of two of these during the last winter,—one in our bed room, the other in the dining room,—with the most perfect satisfaction to the family. The warmth is uniform, comfortable, and not at all oppressive; and what is very desirable, furnished at a very small expense of fuel. The heat being diffused from a large surface, moderately heated, is preferable to that from a more limited surface intensely heated. The material, too, of which the stove is constructed, appears to give out a soft and pure air, and its circulation through the apartments is uniform as well as comfortable. Also, the method of regulating the heat by means of valves or dampers, is a very valuable improvement."

From ALFRED C. POST, M. D., of the city of Brooklyn, dated June 3d, 1836, (addressed to the patentee.)*

"It gives me pleasure to be able to speak of your invention in terms of strong commendation. Your stove appears to me to combine in a greater degree than any other with which I am acquainted the following desirable qualities, viz; ornamental appearance, cleanliness, easy management, economy in the use of fuel, and salubrity. With regard to the first of these qualities, the beautiful material of which your stoves are constructed, and the simple and elegant form which you have given them, seem to place them in advance of any other stoves which I have seen. When they are well managed, they are very cleanly, scarcely allowing any dust or ashes to escape into the room. It is very easy to kindle the fire, either with hard wood or with charcoal; and, by a little attention to the valves and doors, the heat may be regulated to almost any extent. The quantity of fuel which they consume is very moderate, in proportion to the amount of heat given off.—The last and most important advantage is, that they favor a *pure and wholesome state of the air in the room where they are placed.* By exposing a large extent of surface, they secure a sufficient amount of heat, without being intensely heated at any one point; and they thus avoid the unpleasant effects which result from the concentration of heat, which vitiates the air by the combustion of particles of animal and vegetable matter floating in the room, and probably also by the decomposition of the water, which is combined with the air, liberating hydrogen gas.

I think it, however, important to the salubrity of your stoves, as well as to that of all others in use, that water should be evaporated upon them."†

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*Dr. POST used two stoves during the season, a large Hall, and a Parlor Stove.

†The authority of Doctor POST on this point is entitled to the greatest consideration, although, on account of the great UNIFORMITY of temperature afforded by these stoves, most who have used them, have thought an evaporating dish unnecessary, unless the heat is raised above 70 degrees.

Although the radiator of this stove may be attached to a furnace of any construction, yet the best kind of furnace, and that usually employed, is one of polished sheet iron lined with fine brick. The less the portion of heat distributed from the furnace itself, the better. The smooth surface of sheet iron, and the non-conducting power of fire brick, unite to confine the heat of the furnace. By this means, the coal being kept from cooling, burns with increased intensity; and the air of the room is preserved from that contamination which results when the furnace is heated too hot. But if the heat is not distributed from the furnace itself, the apparatus employed for this purpose must have the requisite efficacy, or an unnecessary portion of the heat will escape into the chimney. A long pipe suggests itself as the first expedient. But this is attended with various disadvantages. It is expensive, unsightly, and cumbrous; and, as usually constructed, it gives out the heat in the upper parts of the room, while it ought to be distributed as near the floor as possible. For all these evils, the Radiator of Olmsted's stove furnishes an adequate remedy. In proof of this may be offered the following certificate of *Professor Andrews* of Boston, a gentleman who has paid much attention both to the philosophical principles, and to the practical management of heat.

From PROFESSOR E A. ANDREWS, of Boston, dated June 6, 1836.

"Having made use of Olmsted's Stove during the whole of the past season, it gives me sincere pleasure to state the result of my experience respecting it. Its advantages may be comprised, I think, under the following heads:

1. It is so constructed that, by means of its peculiar *Radiators*, all the heat not absolutely necessary to produce a draught through the funnel of the chimney, is made available in warming the room. In *economy of fuel*, therefore, no other stove is likely to surpass it.

2. As this advantage is gained without the use of a pipe, which is always an inconvenient and unsightly appendage to a stove, the two requisites of *elegance and cheapness* are happily united.

3. As the stove and its radiators occupy the lower part of the room, the cold air, which is always near the floor, soon becomes heated, and mingling with that above, produces *a uniform temperature* through the apartment.

4. Such is the peculiar construction of the whole apparatus, that no part of it ever becomes excessively heated; and *the air of the room, consequently, remains remarkably pure.*

5. *The heat can be more perfectly regulated* in this than in any other stove I have ever seen; and whether the temperature of the room requires to be raised five or fifty degrees, it may be done with equal ease and certainty, and maintained uniform for any length of time.

6. The construction and management of the fire in this stove is peculiarly easy; and if properly managed, *no dust can ever escape from it* into the room.

On the whole, then, I prefer this stove to any which I have ever used, or whose operation I have ever witnessed."

From the Journal of the Franklin Institute.

ON THE PRODUCTION AND MANUFACTURE OF SALID OR TABLE OIL IN THE UNITED STATES.

The following remarks are intended to apply to that strip of the United States, which is comprehended between the latitudes of Cape Hatteras and Boston Bay, extending westward.

Although there is no part of this extensive region in which the olive tree could be cultivated, except when protected by the green house, and therefore, the inhabitants are denied the advantages of this useful tree, it does not follow, that nature has denied them the means of procuring an excellent and pleasant substitute for olive oil, and one that could be brought into market at a moderate cost. Between them and this enjoyment, ignorance is at present a barrier, and in this case, as in many others, this is strengthened in its result, by prejudice.

In French Flanders, the farmers cultivate in large fields, and to a great extent the *White Poppy*. The seeds of this plant are collected and bruised in some way, and an oil expressed from them, which in all respects resembles olive oil, and is the source from whence is derived a large proportion of what is consumed in Paris. The poppy oil so much resembles olive oil, that strangers who visit Paris take it for that oil. These are facts as regards the consumption.

Of the state of this important branch of husbandry and manufacture, we the people of the United States know nothing. How is it cultivated, the seed collected, the oil preserved? Does the land require to be sown every year, or does it seed itself? What sort of a mill does it require? What is the product in oil, or in profit? In short, we have every thing to learn, except that, incidentally we have heard that fifty pounds of beet cake, after the sugar maker has got what he wants out of it, and ten pounds of poppy seed after the oil maker has done with it, will keep ten sheep a day and fatten them.

We know that since the article on beet sugar appeared in the Journal of the Franklin Institute, requesting those who knew any thing of the subject to favour the editor of the Journal or the public with information, a well quallified agent has been sent to Europe to acquaint himself with the whole agricultural and manufacturing business that produces sugar.

On the present occasion, we invite the patrons of our country's industry and resources, to communicate for publication, what they know on the above interesting branch of French husbandry, &c. And we therefore request the wealthy and patriotic, to consider whether the case of oil does not resemble that of the sugar from the beet, and whether the best course would not be to adopt a plan similar to that which the friends of beet super have chosen.

The time will come when American parents will send their sons to Europe and to other foreign places, to learn the manufacture of beet sugar, of oil, and such other branches of the arts not possed by us, in the same manner and with better reason that they now do to have them learn medicine and surgery. J. R.

June 4, 1836.

EFFECT OF THE VELOCITY OF AIR UPON ITS USE IN SMELTING IRON.

M. Teploff, one of the Russian Mining Corps, in an article on the improvements recently introduced into the smelting of iron in Russia, makes the following statement. In the smelting furnaces of the Ural, where the quantity and velocity of the blast are properly regulated, 1.4 of pig iron is obtained by 1 of charcoal fuel, while in other furnaces they obtain but 4. and 6. by the same consumption of fuel.

The velocity of the blast being increased, the heat within is increased, without a corresponding consumption of fuel. In an experiment made by order of the government it was found that one hundred cubic feet of air, under a pressure of two inches of mercury, produced the same effect as two hundred cubic feet, under a pressure of one inch, with this difference, that, in the latter case, twice the fuel was consumed, which was required in the former case.

In one furnace which is mentioned, 22,000lbs. of iron were obtained in twenty-four hours, by 16,000lbs of charcoal. Previous to the due regulation of the draught, they consumed twice this amount of fuel for the same yield of iron.

This economy is obtained by duly proportioning to each other the size of the blaste pipe, and the pressure of the draught. The relation of these to each other, varies with the furnace.

M. Teploff asserts that the results thus obtained exceed those with the hot-air blast, but it does not appear that any comparisons have been made under his examination, and with the charcoal fuel.

To regulate the draught, it is recommended to place two mercury or water-gauges, one near the blast-pipe, the other near the governor of the blowing-machine. By varying the pressure, and the diameter of the nozzle of the blast-pipe, making the latter smaller as the former is increased, and *vice versa*, the best proportion is to be ascertained.—[Annales des Mines, vol. vii.]

THE THAMES TUNNEL.—This stupendous undertaking is proceeding slowly, but steadily towards completion: nor has any obstruction occured since the works were re-opened. The men work night and day; there are three sets of men employed, which relieve each other every eight hours. Each set consists of 112 men, and there are numerous supernumeraries, ready to supply any casual vacancy. During the eight hours of work they are allowed only a single half hour for refreshment, which is brought to them on the spot. The wages paid are high, as much as 40*s*. and 45*s*. per week, and hence the engineer is enabled to command the services of first rate bricklayers. The men are not called upon to perform task work: all that is required is, that they keep steadily at work, and that the bricks be laid in a workmanlike manner. The cement furnished is of the very best quality, only about a barrel of fine sand being used to 100 barrels of cement. The concrete thus formed hardens very rapidly, and within two hours after any new work is completed, its solidity is put to a very severe test. The overseers go round with hammers of fourteen pounds weight, with which each separate brick is struck a hard blow. If the cement yields so as to disclose the smallest fissure between the bricks, the workman is immediately called back to repair the defect, and is, besides, fined one shilling to the sick fund. If the brick shakes in its place on being struck. nothing but a special plea in excuse can save the workman from an immediate discharge. With every exertion, from its peculiar nature the work is unavoidably tedious and slow. It is considered a good piece of work when at the end of twenty-four hours the shield can be advanced nine inches. The shield contains thirty-six boxes, and the work is being simultaneously carried on in each, so that the pushing forward the shield can only take place when the work of the arch is perfected to the extent from the bases to the key-stone. It will sometimes happen that a whole day is occupied in the mere work of pushing forward the shield. The extent of archway perfected is above 620 feet, and what remains to be done is about 1,200 feet, but of this extent a large portion being beyond low water mark, and through a solid stratum of earth, can be carried forward without such extreme caution as at the present part of the work, through a loose sandy soil, and under the very centre of the bed of the stream, is indispensably necessary.—[Morning Chronicle.]

EDWARD TROUGHTON, ESQ., F.R.S., L. AND E., F.R.A.S. AND F.R.S.C.E.

The late Edward Troughton was born in a small village in Cumberland, in the year 1754, where he received merely a common education in the village school. When seventeen years of age he came to London, and apprenticed himself to his brother John, a respectable mathematical instrument maker, carrying on business at No. 136, Fleet-street; and when out of his time was taken into partnership, and ultimately succeeded to the business, and ever after continued to reside there; and it is not a little remarkable, that the same spot has been successively occupied by mathematical instrument makers of celebrity of nearly two hundred years; and here a Sutton, a Wright, a Cole, and a Troughton, labored with unwearied zeal for the advancement of science. In a very short time after Mr. Troughton's arrival in the metropolis, he began to display that great originality of genius, which in the end made all scientific men look up to him for the means of prosecuting their pursuits with the fullest effect—for be it remembered, that the sublime study of astronomy must ever be obscure without instruments of the most acurate execution, because the theorems of ma-

thematicians are useless without data to act on—and with this he supplied them; presenting to all competent persons the means of *dividing* instruments with the most perfect accuracy, and by which they have been graduated to such a degree of exactness, that error is not to be discovered in them even by high optical powers; and many of his instruments of large dimensions are placed in various observatories, and by them a catalogue of the fixed stars, and the sun, moon and planets, are now ascertained, and published in the *Nautical Almanac.* Many other skilful artists have also acted upon his improvement. The stability, accuracy, and commodious arrangement of his instruments leave nothing for the astronomer but to use them with care, as it is a fact, that the *declination* of some of the fixed stars have been ascertained by them to one third of a second. It is unnecessary to follow Mr. Troughton step by step, but a reference to a few of his great undertakings cannot be without interest. The Royal Observatory is furnished with a mural circle, a transit instrument, and a zenith sector, all of his contrivance; and the last was completed by him when in his 79th year: also, an equatorial instrument, for Trinity Colelge, Dublin; and which is now stationed at Armagh: and a meridian circle (made for Stephen Groombridge, Esq.,) now belonging to Sir James South; the whole of which are specimens not perhaps to be equalled either in beauty or figure, or perfect accuracy. He also remodelled the continental instruments so as to make the repeating circle of the Chevalier Borda, and the reflecting circle of Mayer, almost original iventions of his own. His nautical instruments, also, both as to construction and accuracy, are beyond all praise; and by them the mariner is now indeed enabled "to mark a road on the trackless ocean." Nor were his great labors wholly unrewarded; for the Royal Society, in 180-, presented him with the Copley Medal, for his elegant and valuable paper on Dividing. On the 7th of April, 1823, he received the freedom of the Clock Makers' Company; and in January, 1830, the King of Denmark presented him with a valuable gold medal, as an acknowledgment of his great and important improvements. In his latter years he devoted himself entirely to severe study and scientific pursuit; and labored not merely in abstract theory, but for the improvement and direct benefit of the civilized world. Retaining his faculties to the last, he died on the 12th of June, 1835; and, according to his request, his remains were deposited in the General Cemetry, Kensall Green; and were followed by many, and deeply regretted by all the scientific world.—[New Monthly Magazine.]

New Orleans.—Decisive measures are about being adopted to pave New Orleans with wood, on the principle adopted between Murray and Chambers streets, in this city.

From the Journal of the Franklin Institute.

EXPERIMENTS ON THE RESISTANCE OF SAND TO MOTION THROUGH TUBES, WITH ESPECIAL REFERENCE TO ITS USE IN THE BLASTING OF ROCKS, MADE AT FORT ADAMS, NEWPORT HARBOR, UNDER THE DIRECTION OF COL. TOTTEN. BY LIEUT. T. S, BROWN, OF THE CORPS OF ENGINEERS.*

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen.—The great quantity of rock excavation required at Fort Adams, Newport, R. I., created, at an early period of the operations, an earnest desire, on the part of the officers of engineers charged with the construction of that work, to devise some method of loading and securing the drill holes which would be less dangerous to the workmen than the one which had been usually employed. For this purpose resort was had to the use of clean dry sand in the manner which will be hereafter described, it being understood that that expedient had been successfully tried at other places. It was found, however, that great prejudices existed among the workmen on this subject, and that from their belief of the inefficiency of the new method, they required to be constantly watched, to prevent them from jeoparding their own safety, by returning to the old practice of filling the holes with fragments of stones and bricks, driven in with violence above the powder. It appeared to be important that the doubts of the workmen should be put at rest, and that several practical questions connected with the use of sand, in blasting, should be solved, and it was the intention of Colonel Totten, the superintending engineer, that experiments should be made for these purposes. This intention was confirmed by the appearance, in the "Journal of the Royal Institution," and in the "American Journal of Science," of brief notices, of a paper describing some interesting experiments on the flow and pressure of sand, which had been made in Europe. I was accordingly directed to institute a series of trials, having for their object, to determine the degree and nature of the resistance offered by sand when it is attempted to force it through a tube by direct pressure, and it was intended, at the same time, to investigate, more thoroughly, some of the properties of this substance which were developed in the European experiments just mentioned.

The experiments made in consequence of these instructions were prosecuted at distant intervals of leisure during the year 1829 and 1830, but they were interrupted before all had been accomplished, which had been originally designed; nevertheless, the results obtained were interesting, and it is thought that a brief account of them may be acceptable to the readers of your Journal.

Having, subsequently to making the experiments, procured, through the kindness of my friend, Professor A. D. Bache, a copy, in French, of the original paper above referred to, which has been several times re-published in Europe, I have translated it at length, from the "Annales de Chimie et de Physique," vol. XL, page 159, and prefix the tranrlation to the summary of my own investigations.

*We are compelled to divide this interesting paper. The first part, consisting mainly of a translation of the essay of M. H. Barnard, is now given, and the experiments which form the more important part of the paper, will follow in the next number.—[Com Pub.

TRANSLATION.

Letter of M. Huber Burnand, to Professor Prevost, on the flow and pressure of sand.

[M. Huber Burnand, two years since, presented to the Society of Physics and Natural History of Geneva, an anemometer, in which the force and duration of the wind, were measured by the quantity of sand which escaped from a variable opening, proportioned in size to the force which it was proposed to measure. On this subject, M. Prevost proposed the following question. Does not the sand in its flow, correspond in a certain degree with a liquid, and is not its discharge in consequence, more rapid, as the head in the vessel which contains it is greater? He indicated at the same time, the further researches which might be made as to the mode of action of the sand, in regard to the pressure which it exerts. Such is the origin and motive of the experiments submitted by M. Burnand to M. Prevost in this letter, which has been kindly communicated to us for publication.]

By preliminary trials, I ascertained that the two following precautions are necessary to obtain a tolerably regular flow of sand. First, it is indispensable that the sand should be sifted with the greatest care, but that it should not be as fine as flour.—The sand used by founders would be too fine for this purpose; its fall would be irregular and would be frequently interrupted without any assignable cause. If, instead of this, we take the sand used in making tiles, and carefully sift it through a cotton gauze, the holes of which are produced by a web, which presents thirty-eight threads by forty-five in the space of one square inch, we shall find it flow with the greatest facility. The second condition necessary to the uninterrupted flow of the sand, is that the opening should have a diameter of at least $\frac{1}{12}$ of an inch.

These first questions settled, I could proceed to the researches which I had in view. For this purpose, I had made two wooden boxes, one thirty one inches high, with a bottom twelve inches square, and another forty-seven inches high, with a bottom only four inches square. They were open at the top, and provided at the bottom with four small boards, sliding in grooves disposed in the form of a cross, so as to permit the aperture to be widened or lengthened at pleasure.—The slides were made thin, so that the flow should not be affected by the thickness of the wood, a circumstance the inconveniences of which, I had already discovered. These two boxes were raised on four legs, for the convenience of experimenting, and I procured an excellent stop watch to ensure accuracy in the results. The volumes were measured in a graduated glass tube, and I had also obtained a very sensible balance, with very exact metrical decimal weights.—I must add that all my trials were repeated several times, and that I had acquired by long practice, such skill in these experiments, that an error of a quarter of a second in time, would have been detected in the results.

In the most delicate experiments, I introduced metallic slides graduated to $\frac{4}{100}$ths of inch, instead of the wooden ones: they

were however, still by no means as exact as was desirable.

I shall divide my researches into two parts; those which have for their special object the flowing of sand, and those which refer more particularly to its pressure, as serving to explain the phenomena ascertained in relation to the first subject.

I. THE FLOW OF SAND.

1. The quantity of sand which flowed in a given time from a given opening, was absolutely the same, both by volume and weight, whatever the height of the sand in the box at the commencement of the experiment. There were nevertheless, occasional variations, more or less, of two or three grammes.* They were caused, most frequently, by the difficulty of introducing and withdrawing, at the proper moment, the vessel which was used to receive the sand.—The errors compensated for each other, and disappeared when quantities as great as from four to five hundred grammes were employed. Three minutes were ordinarily employed in an experiment. The quantities obtained during the consecutive ninety seconds, were weighed, and when the weights were equal we called them accurate.

The weights were placed together, and compared afterwards with others obtained in the same manner, with columns of sand often times the height. The results were always perfectly alike.

2. The quantity of sand flowing through a hole from $\frac{1}{8}$th to $\frac{1}{12}$th of an inch wide, was always in direct proportion to the length of the opening, a fact which is susceptible of very useful applications in several Philosophical instruments. But the least variation in the breadth of the opening; caused in the quantity of sand flowing out, an increase, which exceeded the simple ratio of the surfaces of the orifice, as far, at least, as I could judge with the imperfect means which were at my disposal.

3. The sand escaping through openings in the side of the box, flowed with the same velocity whatever the height of the column was. But if the holes were placed horizontally, and had not a vertical dimension about equal to the thickness of the board, not a single grain of sand fell from them, whatever its height in the box.

4. Sand poured into one branch of a tube bent twice at right angles, does not rise in the opposite branch as a liquid does; it only extends a very small distance from the elbow into the horizontal part.

6. Whatever may be the pressure to which sand contained in a box is subjected, it does not influence in any manner, the quantity which flows out through a given opening situated at the bottom of the box or in the sides. The experiment was made successively with masses of iron weighing from twenty-six to fifty-five pounds.

6. A graduated rod inserted perpendicularly in the top of the column of sand, and precisely in the direction of an opening below, descend in and with the sand without inclining in any direction, and with a motion nearly as uniform as that of a clock.—A rod fifteen inches long, was made at pleasure to descend $\frac{4}{10}$ths of an inch per minute or per second. An overshot wheel placed in the interior of the box, and provided with an index outside, also moved with astonishing regularity, but very slowly. If the rod, instead of being placed in the axis of motion, was placed nearer the sides of the box, it inclined with great uniformity, but at the same time descended and advanced towards the centre with a very slow motion. The velocity of this rod depends, then, principally on its position in the sand, and next on the size of the orifice. The velocity is probabably also proportional to the ratio which exists between the surface of the orifice and the horizontal section of the box, since it depends upon the quantity which flows out during each instant, compared with the whole quantity.

With more care and several modifications of the apparatus, it would probably be possible to produce more regularity than I have attained, in the progress of moveable bodies, carried along by the friction of the sand.

I will remark in passing, that there probably does not exist any other natural force on the earth, which produces of itself a perfectly uniform movement, and which would not be altered by gravitation, by friction, or by the resistance of the air. We see that the height of the column has no influence on the velocity of motion of the sand, neither increasing nor diminishing it. As to friction, far from being an obstacle, it is itself the direct cause of the regularity and uniformity of the movement, as will be shown in the sequel of my experiments; and the resistance of the air in the interior of a column of sand in motion, must be very small indeed, since none of the grains fall freely. The hour glass, a time piece, which preceded all others, was thus founded on a much more philosophical basis than has been supposed, and I venture to flatter myself that my researches may be of some use to it, in its application to the arts and to science.

7. After having studied sand in motion, I examined its mode of action when distributed in heaps upon a plane.

For this purpose I began by placing isolated grains of sand on a moveable plane, susceptible of being inclined at will; they hardly rolled until the plane was inclined at least, under an angle of thirty degrees, and some remained at an inclination of forty degrees, but beyond this none remained at rest. Sand never assumes a level of itself; the angle, or the angles under which it usually presents itself, after a part of its mass has crumbled, are almost always between thirty and thirty-three degrees; it rarely maintains itself at thirty-five degrees.

In a well sifted heap, the inferior layers, themselves inclined at thirty degrees with the horizon, serve naturally as supports to the superior ones: but the greater part of the weight of these latter, is supported by the portion of the horizontal plane against which they terminate or abut. If we take away this portion of the horizontal plane or bottom, these outer layers immediately roll off, leaving those on which they rested, undisturbed and inclined under an angle of from thirty to thirty-three degrees. This explains why sand does not flow out of a horizontal opening, if the thickness of the body, through which the opening is pierced, is equal to or greater than the height, or vertical dimension of the orifice. In this case the superior layers find points of support on the sides of the containing vessel, and an absolute obstacle in the inferior layers.

Is this property connected with the form of the grains of which the sand is composed? If they had more regularity we might conjecture so, but upon looking at them through a microscope, we see such a variety of figures and dimensions that it is impossible to admit this idea. The greater part of the grains are crystalline laminæ, white, flat tened and variously terminated; other particles are grey, yellow, brown, &c. with such different forms that they cannot be arranged into distinct classes.

In order to decide whether the form was of any importance in the arrangement of the parts, I tried other substances besides sand, and found that peas or small shot, although with a little more difficulty in forming them into slopes, took nearly the same angle, and followed in all respects the same laws.

II. PRESSURE OF SAND AND OTHER SUBSTANCES COMPOSED OF GRAINS.

1. An egg having been placed at the bottom of a box and covered with several inches of sand was loaded with a mass of iron weighing fifty-five pounds. The result was precisely what I had anticipated; the egg remained unbroken under the great weight which was placed above it.

I repeated this experiment, putting the sand in motion by means of an orifice at the bottom of the box. The result was the same, whether the egg was placed at the bottom or in the middle of the mass of sand.

These trials proved that the pressure excited by the mass of iron was deflected laterally by the interposition of the sand.—They proved also, that a body placed in a mass of sand, is protected by it as it would be by a liquid, although the sand has a different kind of action from the liquid, on the sides of the vessel containing it.

These conclusions being somewhat paradoxical, I resolved to have recourse to more decisive proof.

2. I took a tube of glass open at both ends, and inserted it, vertically into a small horizontal tube of wood near one end, the other end of this horizontal tube being exactly fitted into a vertical cylindrical box, $\frac{4}{10}$ths of an inch in diameter and eight inches in height.

I filled this box with mercury, as if it had been the cistern of a barometer; the mercury naturally assumed its level in the vertical tube of glass. Its height in this tube was marked. I then adapted to the box, or cylindrical cistern, a large tin tube twenty-seven inches long, and one inch and one-third in diameter. I filled this large tube with sand, taking care to pour it in very slowly, so as not to agitate the mercury.

Here was a true barometer for measuring the weight of the sand; there was an equal pressure of air on each side, so that apparently nothing prevented the equilibrium between the sand and the mercury. Although I had in part expected the result, I was surprised to see that the sand had added nothing to the weight of the mercury; the liquid kept its level to within $\frac{1}{12}$th of an inch, a difference which was produced by an accidental shaking of the apparatus during the experiment; for having changed the place of the apparatus, the mercury resumed its level as before the experiment, and preserved it as long as I maintained this state of things.*

I afterwards took the sand from above the mercury; it had not penetrated into the liquid. I substituted in its place dried peas; the large tube was completely filled with them, their weight being more than three pounds. I added an iron weight of upwards of two pounds, and lastly a pressure of the hand as great as I durst apply without endangering the apparatus. The mercury kept its level in the glass tube; not rising $\frac{1}{24}$th part of an inch. The apparatus remained several days on trial without any other result. Thus the mercury had not been acted on by the weight of the sand, nor by that of the peas.

*A GRAMME is about 15¼ grains.

* The experiment would have been more simply made with a tube bent like a syphon with parallel branches; but M. Bernand had none at his disposal.

This absence of pressure on the bottom of a vessel was still better proved by the following experiments.

3. I took the same tube of tin and suspended it from a very sensible balance; I counterbalanced it exactly, and arranged it so that it reached nearly to the floor. I placed on the floor itself, a small solid cylinder of wood, about two inches high, and a little less in diameter than the large tube, so that the tube inclosed the cylinder, and could play freely in a vertical direction. As the tube was perfectly equipoised, and suspended to the arm of the balance vertically above the small solid cylinder, it moved upwards and downwards along this latter without any sensible friction.

I next weighed out a quantity of dried peas and introduced them into the large tin tube. It lost its mobility instantly, as if it had become more heavy notwithstanding that it had no bottom, and the peas had a solid support on the top of the cylinder of wood.

I afterwards put into the opposite dish of the balance a certain number of grammes successively, until the dish descended, when the tube separated from the cylinder, allowing the escape of the peas which it had contained.

The weight required to raise the tube from the top of the cylinder was within a very few grammes, equal to the weight of dried peas which I had poured into the tube; the difference was not more than twenty grammes, whilst the weight of the peas was more than three and a quarter pounds.—The tube, therefore, appeared to be loaded with all the weight of the peas to which it gave its support.

The experiment repeated with different quantities and with additional weights always succeeded, and often within eight or ten grammes.

But it might be still objected that the lower cylinder had in some way supported the weight of the column. I therefore made the inverse experiment.

4 and 5. In this experiment I fastened the tube by two cords to two supports laterally, and suspended the small cylinder from the dish of the balance, in such a way that being equipoised before hand, it was introduced freely half an inch into the tin tube, and by the least additional weight it fell and permitted the escape of its load.

I then poured about three and a quarter pounds of peas into the tube, and finding that the wooden cylinder, which was perfectly free, did not fall, I added a weight of two and a quarter pounds and other weights, without even moving it. It might still be objected, however, that the small cylinder adhered to the sides of the tin tube. To answer this objection, and to render this experiment more striking, I removed the cylinder, and made use of a simple disk of wood of greater diameter than the tube, and supported against its bottom by placing in the balance just weight enough to keep the two in contact. This weight was commonly from ten to twelve grammes.

I then filled the large tube with from three to four pounds of sand, and placed additional weights upon the top of the column nevertheless the disk retained by the small counterpoise of ten or twelve grammes, did not move. If this same weight of a few grammes had been laid on that part of the disk which projected beyond the tube, it would without doubt have caused it to fall for it alone retained the disk in its place A slight touch of the finger, caused the sand to pour from the lower end of the tube, and fall into a basin placed below to receive it. The disk was therefore instrumental in retaining the sand, but did not sustain the weight of it, which was all transferred to the sides of the large tin tube. Ten grammes would have caused the disk to separate from the tube, and since it remained adhering to it, the disk was not loaded with the mass of the sand.

6. To remove all kind of doubt, I gave up the use of the balance, and placing a tub of water near the large fixed tube, floated the disk of wood on the water with the smooth side upwards; I then brought the end of the tube down upon the disk, and poured water into the tub. The disk was pressed by the weight of the water against the end of the tube. I next filled the tube with dried peas but the disk did not move. It, however, was essential in retaining the peas, which without it would have fallen through the tube, but the peas did not press upon it, since a very small force would have sufficed to make them fall from the tube and thus derange the whole apparatus.

7. Leaving every thing in the same condition, I poured water into the large tube; it was kept there with the peas, for a considerable time, until an unforeseen motion produced by the compressed air, which was disengaged from the bottom of the tube, caused the machine to incline. The peas then escaped into the tub, and the water flowed out at the same time. The same trial was made with sand; a considerable quantity of water was poured on the sand, fully impregnating it, and during a very long time it was supported without flowing out.

In another trial made a little differently, the sand took such a consistence with the water, that it caused much trouble to get them out of the tube, which therefore entirely supported the weight of the sand and of the water, together with the force necessary to expel them.

8. We can make these experiments by simply causing the large tube to rest on a small conical heap of sand, whilst it is still suspended from the disk of the balance.—The sand does not escape when the weight put into the other disk is nearly equivalent to the weight of the tube and its contents.

The same trials succeeded with grain: I have repeated them with shot with equal success, although this has a very great weight. They may also be made with a simple roll of paper tied with two small strings; they are then much more striking as the weight acquired by the paper tube contrasts better with its original lightness.

9. I have repeated these experiments with a tin tube widened at the bottom and much larger than the great tube; the result was the same, although there can be no doubt that there is a limit beyond which the sand would receive no further support from the sides of the tube. This will be the case when the inclination of these sides to a horizontal plane is the same as the slope assumed by sand in a heap, that is to say about thirty degrees. I have also repeated several of these trials with a cylindrical tube four inches in diameter, with the same success.

10. From all that I had seen I presumed that it would be very difficult to force sand through a tube even by means of a direct pressure. I made the trial in the following manner. I filled the great tube with sand and laid it in a horizontal position, and with a cylinder of wood, several feet in length, and a little less in diameter than the tube endeavored to force out the sand at one end by pressing it at the other, but without success. It appeared to me that it would be easier to burst the tube than to move the sand a single inch. The tube being inclined to the horizon about twenty degrees, and the effect being thus aided by the weight of the body, the sand still could not be expelled; the same result followed in inclining the tube in the contrary direction. This explains very clearly why a blast confined with sand is as effectual as any other.

Yverdun, 15th January, 1829.

P. S. If in the experiment in section 2, under the head of the pressure of sand, we pour water into the tube which contains the peas, the mercury will rise in the glass tube one-fourteenth of the height of the water; a proportion which corresponds with that of the specific gravities of those liquids.—The water acts as usual, but the peas exert no pressure.

2nd. There is another way of making the experiment with the tube which is within the reach of every body. Procure a tin tube an inch in diameter and as long as is desired, open at both ends. Take a sheet of fine paper and apply it against the end of the tube pressing up the edges with the hand so as to make it take its form; then moisten the edges of the paper with water and cause them to adhere to the sides of the tube. Place the end on the table and fill the tube with sand Raise it with care, and notwithstanding the slight adherence of the paper. the sand will be sustained while the tube is freely moved about.

3d. It would be desirable to place a vessel of sand provided with an orifice for its escape, under an air pump. in order to determine whether the velocity would be affected by its flowing in a vacuum.

Biblioth. Univ. XL. 22.

(To be Continued.)

AGRICULTURE, &c.

From the New-England Farmer,

FARMERS' WORK.

CULTURE OF TURNIPS.—If a top dressing of quick lime, soot or ashes be applied to turnips, soon after they make their appearance above ground, their growth will be forwarded, and it is said they will be secured against the fly. Some advise, and it may be well, if the time and labor can be spared to leach soot, and sprinkle the plants with the liquor. M'Mahon, in giving directions for the culture of turnips, says: "the plants should be left from seven to twelve inches apart; this must be regulated according to the strength of the land, the time of sowing, and the kind of turnips cultivated; strong ground and early sowing always producing the largest roots.

The width of the hoe should be in proportion to the medium distance to be left between the plants, and the distance should be according to their expected size.

The proper time for the first hoeing is, when the plants, as they lie spread on the ground are nearly the size of the palm of the hand, but if weeds are numerous and grow rapidly, they should be checked before the plants have attained that size, lest being drawn up thin and slender they should acquire a sickly habit.

SOILING LABORING OXEN AND HORSES.—Instead of turning oxen and horses, which you have occasion to use frequently into a large pasture, in which it is difficult to find or to take them, you may do better to *soil them*. By soiling, we mean to keep them in stables, stalls, yards, &c. and mowing and carrying to them grass and other green or dry food. You should in such case, take care that they have always water at

hand, and plenty of litter to absorb the liquid manure, unless you have reservoirs. &c. to prevent its waste. Arthur Young declared that "Lucerne is the best plant for soiling, and an acre of it will go farther than anything else." But clover or any other grass, green or dry, oats or Indian corn, cut up near the roots, cabbages, &c. &c. may often be economically disposed of in feeding cattle and horses, whose services are needed for the prosecution of the daily and hourly labors of the husbandman.

FALLEN FRUIT.—Be very careful to gather all punctured or decaying fruits, whether on your trees or on the ground, and give them to your swine. If you do not, the worms which such fruits contain, and which have been the cause of their premature decay, will make their escape into the ground, and you will find the evils, which wait on their visitations will increase on you another season.

GRAFTED TREES—Look over your fruit trees, which were grafted last spring, or budded this summer, and suffer no shoots from the stocks to remain; lest they rob your grafts of their nourishment.

WORMS IN THE HEAD OF SHEEP.—There exists in some parts, if not in all parts of the country, a species of fly, which naturalists denominate *oestrus ovis* or *sheep-bot*, of the ame genus though of a different variety with the fly which deposits eggs on the hair of horses and causes bots in those animals. This fly attacks sheep from about the middle of August to the midele of September, deposits eggs in the nostrils of the animals, and cause those *worms in the head*, which so frequently destroy them. The Mechanic's Gazette recommends as a preventive, "covering the nostrils of the sheep with a gauzy substance, through which the animal can breathe, and keeping it in its place by some adhesive substance. We doubt, however, the practicability of keeping a gauzy substance in its place by any adhesive matter.

Another precaution which sheep owners assure us has been found effectual, is to keep the noses of sheep constantly smirched with tar from about the middle of August to the latter part of September. If the sheep swallow some of the tar, so much the better, as it prevents or cures the rot and confirms their health. In order the better to effect the smearing of the sheep's noses, the following process has been recommended: Mix a little fine salt with tar, just enough to make the tar agreeable to the animal, and place the mixture under cover, where the sheep can have access to it, and they will keep their noses sufficiently smeared to prevent the insect from attacking them.

From Hovey's Gardener's Magazine, for August

GENERAL NOTICES.

METHOD OF PRESERVING PLANTS DURING A LONG VOYAGE.—The following letter was communicated to Messrs. G. C. R. and W. Fox & Co. by Capt. R. Gillies, of the ship Hibernia:—

In accordance with your wishes, I have much pleasure in describing to you the mode in which the plants brought by me from Calcutta were put up. The plants were all intended for the green-house in England, and, I presume, were of a delicate kind. Each plant was in a box, six inches square by one foot in depth, filled to the top with a kind of clay; and, no doubt, well saturated with water, previously to being put into the large outer box, which contained eight of these small ones.

The large box was constructed in the usual way; that is, a glazed roof about two feet high, the glass strong enough to resist the fall of a small rope, or other light body. It was hermetically closed with the common *Chunam* (a sort of lime, used in India as a cement for plastering houses, &c.) of the country, and was never opened during a voyage of five months. When we arrived in England the plants were all in beautiful health, and had grown to the full height of the case, the leaves pressing against the glass.

In dry weather, I always observed moisture within the glass, which was caused, no doubt, by the evaporation of the earth, and was again absorbed by the plants.

It is difficult to account for the perfect health of the plants, without the full admission of the atmosphere; but oxygen sufficient was probably admitted, either through the pores of the wood, or otherwise. It is however, a fact, that no water was given to them during the voyage, and that they were landed in excellent order.—*Robert Gillies. Hibernia, Falmouth Harbor, October 2, 1835.* (*The Third Annual Report of the Royal Cornwall Polytechnic Society*, Falmouth, 1835. 8vo. 2s. 6d.—Gard. Mag.)

THE HOUSE FLY.—At the Entomological Society, on Monday, a paper by Lieut. Col. Sykes was read, on excluding the house-fly. The mode adopted was a net made of different colored meshes, of about three quarters of an inch square, and which, when placed against a window, was found quite effectual in excluding the visits of these troublesome insects from the outside of the room. The same experiment was tried with meshes made of the finest black thread, one and a quarter inch square, which proved to be equally effectual. The approach of wasps was also prevented by the above mode, very few finding their way within the boundary This was accounted for by an optical illusion in the eyes of the insect, of the highly magnifying power of vision, and the small focal length.

Now that netting can be procured at the low price of 2*l.* 1*s.* 3*d.* for thirty-three square yards, gardeners might try whether, by covering a hot-house with such a net, they could not exclude both birds and wasps.—They might also apply it over standard cherry trees, and over various kinds of newly sown seeds; and, lastly, they might place it before the windows of their own cottages, to exclude the common house-fly.—(Ib.)

WATER-PROOF STRANDS OF BAST, FOR TYING TREES, and WATER-PROOF BAST MATS.—In our Second Vol., p. 192, a mode of rendering ties of bast water-proof is mentioned by Dr. Van Mons; and, while recommending a trial of metallic ties, it is but fair that we should remind our readers of this very simple mode of increasing the durability of bast. To make bast ties water-proof, it is only necessary to wet them first with a solution of soap, and next with a solution of alum. A neutral compound is formed from the soap and alum, joined to the albumen of the wood of which the bast is composed, which is insoluble in water. It has often occurred to us, that, if common matting could be woven in Russia, with the weft of pack-thread, and the woof of strands of bast, mats would then throw off the rain nearly as well as canvass; and the whole might be tanned, or rendered water-proof, by Dr. Van Mons's process. Perhaps our friend at Cronstadt might be able to induce some of the Russian mat manufacturers to try this process.—(Ib.)

CHENOPODIUM QUINOA.—This plant is cultivated in the warmer parts of North America, and extensively in Chili and Peru, its leaves being eaten as spinach or sorrel, and its seeds as rice. It is also used in the preparation of a kind of beer. Dombey, on his return from Peru, endeavored to introduce the plant as a culinary vegetable into France, but without success. From a dried specimen of the plant grown in England last year, and exhibited at a meeting of the Linnæan Society, by A. B. Lambert, Esq., V. P. L. S., it appeared, in habit, very like the strong growing British *chenopodiums*, but we should think the seeds are far too small to be ever equal in value to any of our cereals; and certainly inferior to the white beet as a substitute for spinach.—(Paxton's Magazine.)

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 11th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

JAMES G. KING, President.
21—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Louis'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames'	superior	back-strap Shovels
150	do	do	plain do
150	do	do	caststeel Shovels & Spades
150	do	do	Gold-mining Shovels
100	do	do	plated Spades
50	do	do	socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. 4—ytf

RAILWAY IRON, LOCOMOTIVES, &

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350	tons	2½	by	⅝,	15 ft in length,	weighing	$4\frac{68}{100}$	per ft.
280	"	2	"	½,	"	"	$3\frac{50}{100}$	"
70	"	1½	"	½,	"	"	2½	"
80	"	1¼	"	¼,	"	"	$1\frac{25}{100}$	"
90	"	1	"	¼,	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON.
28—tf Philadelphia, No. 4, South Front st.

OFFICE PONTCHARTRAIN, RAILROAD CO.
New Orleans, 19th May, 1836.

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,
JNO. B. LEEFE, Secretary.
28—3m.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co.,
July 25th, 1836.

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cut stone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unknown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.
E H. GILL, Chief Engineer. 30—to10

TO CONTRACTORS.

Sealed proposals will be received at Jackson, until the 15th day of September next, for the graduation masonry and bridging of the 3d division (50 miles) of the Mississippi Railroad.

This road is located on a pine sandy ridge, the country is healthy, and provisions can be readily obtained at all seasons of the year.

The whole line (150 miles) will be placed under contract, as the location advances next fall; and it is believed that no institution can offer greater inducements to good Contractors than this.

F. H. PETRIE, Chief Eng.

ENGINEERS OFFICE,
Natches, June 10, 1836.

28—till Sep. 5

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] | SATURDAY, SEPTEMBER 10, 1836. | [VOLUME V.—No. 36.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, SEPTEMBER 10, 1836.

Particular attention is called to the notice of the opening of the books of the New-York and Albany Railroad; and the extraordinary receipts on the Utica and Schenectady Railroad, pages 568 and 569 of this Journal.

NEWBURGH, OR HUDSON AND DELAWARE RAILROAD.—We commence in this number, and shall complete in the next, the Report of JAMES B. SARGEANT, Esq., in relation to this important work.

On referring to the early numbers of the Journal it will be found that a notice of this work was amongst the very first given to the public.

The Report of 1831, by H. G. Sargeant, Esq., was published at length—from which it became evident that this would be found a highly favorable route for the terminatian of the Eew York and Erie Railroad.

On further examinations it has become still more certain, notwithstanding a track will terminate at Tappan, that *Newburgh* will be the outlet for a large portion of the produce of the west, as the distance to tide water, at Newburgh, from the junction of the two roads will be only about 25 miles, with an aggregate rise and fall of 538 feet, 430 feet of which is favorable to the heavy or descending trade, whilst on the other route the rise and fall is 1308 feet—and on examination it will be found that the distance to New York, via Newburgh, is only 3¾ miles greater than by Tappan.

These facts must, we think, satisfy every one that the *natural* route from the Shongum Mountain, is by Railroad to Newburgh, and thence on the Hudson in *Tow Boats*, which serve also as store houses for grain and many other articles until they are sold and transferred to those vessels in which they are to leave the port.

A knowledge of these facts have recently given an impulse to speculations in Newburgh which have fairly amazed some of the worthy citizens, who cannot imagine how property can be worth more than the amount upon which it will pay 7 per cent. interest. The Report is unavoidably omitted in this number, but will appear in the next.

NEWBURGH.—How is it that the thousand and one eagle-eyed-speculators have so long overlooked the beauties of this place? With a beautiful bay of vast extent in its front and on its right and left—a mountain scenery unequalled for its boldness, variety and beauty; it has some of the most beautiful prospects ever beheld.

Who that has ever ranged along the more elevated streets north of the academy or strolled over that delightful eminence in the vicinity, and a little south of the mansion of S. Powell, Esq., or gazed from the still more elevated point called "Mount Prospect," and occupied by Isaac Vanduzer, Esq., has not been delighted and charmed by the beauties of the surrounding scenery and prospects? Who can say that they have beheld scenery more beautiful? Few—very few.

The attention of capitalists, as well as of those who desire beautiful residences, has we perceive been directed to Newburgh—and a sale of valuable lots is to take place on Tuesday next, the 13th, which will we are sure, attract the attention of many New-Yorkers.

We publish the following from the Times. This is truly an age of internal improvements. Whilst such estimates are presented, backed by actual receipts on the Utica and Schenectady Railroad, at the rate of two per cent. per month on all their disbursements, it will not be called a mania, the avidity with which such important stocks, are saught after. We hear that it is the expectation, of this Company to declare a dividend of seven per cent. for the first six months, and that they will then have a handsome surplus, over and above the many extraordinary expenses, attendant on opening a new road. They now take from 600 to 1000 passengers per day, at $3 each, and

so soon as they complete their *open* cars, to carry passengers at 1 to $2 each, their receipts will be doubled, and we may add trebled, so soon as the *direct line to the west*, by Oswego is completed. The distance is within 70 miles. The capital, $750,000,—which by an estimate of Judge Wright, will complete the road with one track—and grade it for two. The Oswego Railroad has the important privilege of carrying merchandize, which we have no doubt a liberal policy will extend to all the Railroads in the State.

"The Oswego Railroad certainly presents great inducements to invest capital for fifty years—the term of its charter, should even half of the following statement be realized, and of its correctness we have been assured, from a respectable source. The main item, passengers, is corroborated by the returns of the Utica and Schenectady Railroad. The profits on this Railroad have been so great, thus far, that we are informed by a prominent director, that for the first six months, they will be enabled to divide seven per cent., paying all expenses, and still leaving a surplus fund. Their receipts since the opening of the road, up to this time, exceed the rate of two per cent. per month, on the entire disbursements by the company. On reference to the charter of the Oswego Company, we find it is for fifty years, and gives the privilege of carrying goods, and passengers, at 5 cents per mile —free of tolls in the winter, paying tolls "during such portions of the year, as the Erie and Oswego Canals shall be *navigable*," and not exceeding the rates of toll, upon the canals.

The completion of this road, as contemplated, in two years, is highly important to this city. It is singular that we have not earlier directed our attention, to this road and Ontario steamboats, to fill up *promptly* one of the lines to the "Far West."

ESTIMATE OF THE INCOME FROM THE OSWEGO AND UTICA RAILROAD.

From the Utica Observer.

There are now 100 passengers per day passing each way from the middle of April to the middle of December; eight months, 209 days, deducting Sundays, at 200 passengers, is $41,800

During the winter months, the travel may be estimated at 50 per day, each way, say 100 passengers for 100 days, 10,000

51,800 a $3 $155,400

The above estimate is not one-third of the passengers that now daily pass between Utica and Schenectady; it is but reasonable to calculate, that half of these passengers to vary the route, will go to the west one way and return the other. Another consideration presents itself in favor of the Oswego route; passengers taking the night boat from New York, will the next evening take the Oswego night boat for Lewiston, and, while sleeping with comfort, are the next morning at Lewiston, and can either breakfast in that place, the Falls or Buffalo, by a railroad now nearly completed. The amount of merchandize that will be carried on this road it is difficult to state with any precision. The Comptroller's report of the last year states 60,000 tons, as the amount that passed during the season of navigation, to and from the Oswego canal to Syracuse; $\frac{1}{10}$th of this amount, in all probability, would pass on the railroad to Utica; 6000 tons at $3 50* $21,000

There are six mills containing 33 runs of stone, that during the time of suspended navigation, say 4½ months, can readily grind an average, for 100 days of this time, 35 barrels per diem, to a run equal to 115,500 barrels; it is safe to calculate, that the half of this would find its way to Utica, at 25 cents per barrel, to be then forwarded by the Utica and Schenectady Railroad to the New England States, by their great Boston and Western Railroad, 57,750 barrels at 25 cents $14,437

$190,837

an amount equal to 25 per cent on the estimated cost of the road by B. Wright, Esq., civil engineer.

Should the contemplated law pass Congress the ensuing session, (favorably reported on by the late comptroller of the United States) to extend the drawback system to the transit of foreign goods through our country, under bonds, the amount of passengers and goods to Upper Canada, would be quadrupled. This trade of itself would pay a handsome interest on the cost of the entire railroad to Utica.

Water power abounds on either of the routes to saw up the fine timber with which the centre of Oswego county, and west part of Oneida is covered. The amount, therefore for lumber, in fact cord wood itself, cannot be calculated with any certainty, but may be safely taken into view, as affording an important item in the income of the railroad.

There are now two cotton mills in Oswego, calculated for 7800 spindles, and a number of manufactories of different kinds going up, that will require a daily trade and intercourse, to and from New-York, the extent of which, with the travel to and from the far west, it is impossible to foresee or predict. The calculations of the most sanguine have been more than realized by the results of the western travel and trade; to this must now be added, on this railroad, nearly the entire travel to the seaboard, from Upper Canada, on the completion of her railroads centering at Toronto; and other points, on Lake Ontario, daily brought in connection with each other, by means of the splendid steamboats, passing and repassing on this inland Mediterranean.

One of these roads at least will shorten the distance between Utica and the centre of Lake Huron, 600 miles, over the Lake Erie route.

ILLINOIS.—The following article from the Globe is written with a just appreciation of the importance of the public work to which it alludes, and with liberal and enlarged views as to the true interest of the public. The State of Illinois has already in the course of construction one of the most important public works in this or any other country.

The canal from Chicago to the navigable waters of the Illinois river, is a work of unusual dimension, and will cost from $7,000,000 to $10,000,000, and connecting as it does the "inland oceans of the west with its running seas," is not less important than any other public work—and only inferior to this is the great central Railroad from the mouth of the Ohio river through the point of junction of this canal with the Illinois river to Galena. These works, together with others to be undertaken by private corporations, are rapidly developing the resources and promoting the growth of this large and fertile spot.

ILLINOIS CENTRAL RAIL ROAD.

We have read with much interest and satisfaction the bill reported to the House by Mr. Casey from the Committee on Public Lands, granting a pre-emption right to this Company for a certain quantity of land, for a limited time, lying upon the route of a contemplated Railroad in the State of Illinois, commencing at the confluence of the Ohio and Mississippi rivers, running through the heart of the country, and terminating at Galena, a distance of near 500 miles. This proposed internal improvement unquestionably is of greater importance to the State, the government, and the whole Union, than any similar work yet projected. It will open the most speedy and direct communication at once from the navigable waters of the Ohio and Mississippi, from Pittsburgh and New-Orleans, to the farthest frontier settlement in the northwest, *at all seasons of the year.*—Such an highway to the Far West, must be of incalculable importance to the whole country, in the event of war upon our frontier borders; for, in a short space of time any number of troops, with all necessary munitions of war, could be transported from one section of the country to the other, and such a facility of transportation would render unnecessary a large standing army, or expensive fortifications, in the west, as was clearly and ably shown by the lucid report of Mr. Grundy. Those who may have travelled in Illinois in the winter season will attest to the almost impracticability of passing through that fertile State, excep on horseback. And when the Mississippi river is closed with ice, which is the case for several months in the year, to near the mouth of the Ohio, (the commencement of the said Railroad) the communication with the Northwest Territory is almost suspended, except for the transportation of the mails. The expense and difficulty of constructing permanent roads will, until those immense tracts of land and prarie, owned by Government, are sold, and the country densely populated, prevent the construction of suitable post roads.

It is estimated that exceeding twenty millions acres of public lands will be sold in *one fourth the time* than it otherwise would, without the construction of some such highway through the State. As a pecuniary consideration alone, this would justify the construction of a railroad through the public domain, *at the sole expenee of Government*; but we deem the road more important, as offering the most certain and economical mode of protecting our extensive northwestern frontiers, by the rapid facility it will afford for the transportation of troops

* The freight on merchandize per canal is $6 per ton on ascending, and $5 per ton descending.

and munitions of war, in times of danger throughout the year.

We have reflected, however, upon the subject in a still more interesting and important light, as connecting the SOUTH and NORTH with the WEST by the continual and rapid intercourse, and thus cementing the social feelings in more close and united compact.

It will be seen by reference to the map that the long desired project of uniting the Mississippi river with the Atlantic and Gulf of Mexico, by a railroad, will be accomplished by the extension of THIS central railroad to Nashville; and uniting there with the projected railroad to Charleston and New-Orleans, and connecting by branch railroads with the internal improvements commenced in the States of Virginia and Maryland, as it necessarily must, will make an uninterrupted line of railroads from the seaboard to the frontiers in the west, a distance, of upwards of thirteen hundred miles, which may be travelled in sixty-five hours. Missouri and Illinois will be peculiarly favored by the improvements now making to secure the vast trade of the Mississippi Valley. Besides the proposed railroad to the seaboard, in use all the year, the Illinois canal, now constructing to Lake Michigan, and the canal through the State of Indiana to Lake Erie, will open a direct water communication the whole distance to the city of New-York for two thirds of the year.

Emigration is fast pouring into Illinois, and the people of that State are looking forward with intense interest for the passage of the bill reported to Congress, as it will guarantee at once the commencement and completion of this grand enterprise. Seeing the effects of this extensive railroad in all its relations, we do not hesitate to predict that it will have a more important bearing upon the whole interest of the country than any internal improvement yet projected, and we trust that this bill, with others of a similar character now before Congress, will be favorably acted upon, before its adjournment, in order that surveys, as contemplated, may be made the present year.

EXTRACTS FROM THE

REPORT

OF WALTER GUINN, ESQ. ENGINEER,

To the President and Directors of the Wilmington and Raleigh Railroad Company.

GENTLEMEN:—I have the honor to submit the results of the reconnoisances and surveys, necessary for a selection of the route of the contemplated Railroad between Wilmington and Halifax.

A careful examination of the country led to the adoption of the following lines for survey:

WESTERN ROUTE.

This route commences at the "Dry Pond," in the South-East suburbs of Wilmington, thence running nearly due North to the head of Market street, it takes an Easterly direction to a favorable site for crossing Smith's creek at "Love Grove." After crossing Smith's creek, the route passes over a level plain, only broken by Prince George's creek, which it crosses between Mr. Burgwin's dwelling and the mill house to the North-East branch of the Cape Fear river, near the old bridge. The graduation of this portion of the route, consists of slight excavations and embankments in clean sand, and will be extremely easy of execution. From the Cape Fear, it may be run straight forty-seven miles, to Hackleberry pocosin, at the head of Bear swamp. Within this distance, the route will cross Rockfish and Stewart creeks. With the exception of the bridges and embankments across these streams, the surface of the ground is so very level, that the chief work in the road-way formation, will consist of slight cuts no where greater than ten feet in depth, and embankments from two to three feet in height. The route traverses the ridge dividing the waters of Long creek from those of the "North-East," and passes about two miles and a half to the West of South Washington; and about seven miles to the West of Kenansville. From the head of Bear swamp, the country continues unbroken, until the route reaches Goshen; which is one of the head branches of the North-East. Here the first undulation in the plane of the road worthy of notice occurs, a descent and immediately an ascent of 30 feet to the mile is unavoidable, and some comparatively deep cutting, and heavy embankments are encountered. Immediately on ascending from the valley of Goshen, the route reaches a dry, level, open woods, through which it passes to Brook's branch. The formation of the Railroad on this portion of the route will consist, chiefly, in cutting down the large trees which overspread the track, and hewing and preparing them for the reception of the iron rails.— After making a slight undulation in crossing Brooks' branch, which is a very inconsiderable stream, it arrives at the same level, on which it continues to the head of Yellow Marsh; along the margin of which it descends to the valley of the Neuse river, encountering in its descent, some heavy cuttings, which consist, however, entirely of sand. It crosses the Neuse at a very favorable place, just below the bridge on the stage road from Halifax to Fayetteville; thence passing near Waynesborough, the country wearing the same level aspect, with the exception of the breaks occasioned by the Nauhunta, Acock, and Black creeks, the surface being almost perfectly smooth. It reaches Contentnea creek, about half way between Woodward's and Rountree's bridges. After crossing the Contentnea, until the route reaches Enfield, the country may be characterized as bold, compared with the uniform level aspect heretofore presented.

The soil also undergoes some change.— From sand to a substratum of clay, mixed with sand, which will be encountered in some of the excavations. On this portion of the route, Tossnot, Town, and Cokey swamps, the Tar river, Swift and Fishing creeks are crossed. These occasion a multiplicity of low summits, and an undulatory profile. The grades are, however, gentle, and the cuttings and fillings no where exceed fifteen feet. After leaving Enfield, the route gradually descends to a favorable site for crossing Beach swamp, just below the mouth of Bear swamp, along the borders of which, with very little variation from a level grade, and no other expense in the formation of the road-way, than the raising of a bank two or three feet in height, the route runs until it reaches Quaukey creek. Here occurs the highest embankment on the line of the road. It is, however, very short. From Quaukey, which is only a mile from the termination of the road, the route ascends very gradually until it unites with the Halifax and Weldon Railroad, about half a mile from Halifax, and seven miles from Weldon. At Weldon, the Portsmouth and Roanoke Railroad crosses the Roanoke river by a bridge—it also crosses the Petersburg Railroad about two and a half miles from Weldon, where the two roads can be easily united; and thus a connection of your road may be formed with the Petersburg Railroad, or with the steam boats which now daily ply between Weldon and Blakely, they may be connected. In any event I can see no difficulty in the way of both passengers and goods, destined for Petersburg, by passing from your road to the Petersburg railroad, with as little delay and inconvenience, as to the Portsmouth railroad.

A description of the line which was run on the West side of Long creek to Bear swamp, and which will be brought into comparison with that portion of the Western route, from Wilmington to the same point, will appropriately precede the estimates of the "Western route," and will come in here. This line commences at the timber pens, and runs upwards along the margin of the river about a mile; thence it crosses over and passes along the dividing ground between the Cape Fear and its North-East branch, to nearly the head of Long creek. The road-bed in this distance will be formed of alternate excavations and embankments, consisting entirely of sand. Thence the line will pass on the dividing ground between Long creek and Moore's creek; and between Moore's and Rockfish creeks, and throughout to the head of Bear swamp, the ground is extremely favorable. Stewart and Turkey creeks are the only streams that are crossed.

Summary of the excavation, embankments, and superstructure.

69 miles, 1191 feet, at $483,815:97

From this, there should be deducted the cost of six miles of superstructure, at $3,800 per mile, this being the reduction which will occur in the actual location; which leaves $411,015 97, the cost of this line.— This, compared with the first three items in the following estimate of the Western route, and the result in favor of the route on the East side of Long creek to Bear swamp, will be in the first cost, $49,593 09; and in distance upon the probable line of location, 4950 feet. A comparison of the grades and curvatures, results in favor of the line on the East side of Long creek.— I have, therefore, based my estimates for the Western route of this line, supposing that the same reasons which have influenced me in the selection may also operate with the Board in according it the preference.— I have now to proceed with the estimates of the

WESTERN ROUTE.

Summary of the costs of excavations, embankments, superstructure, locomotive engines, coaches, cars, water stations, wharves, shops, contingences, and steamboats.

161 miles, 3189 feet of Railroad, and 150 miles of Steamboat communication, $1,500,000.

Careful and minute inquiries, with the view of ascertaining the practicability of a route through Rockymount, and also through Kenansville, by Rockford, resulted in the conviction of their being less eligible than either of the routes selected. It now remains to describe the character of the

EASTERN ROUTE.

This route pursues the trace of the western route to station No. 176; thence it takes a more Easterly direction, and traverses the ridge dividing the waters of the North-East branch of Cape Fear river from those of the New and Neuse rivers, until it reaches the Neuse at Rockford. On this portion of the route, we cross Smith's and Prince George's creeks, and several small

streams, which make into the North East. The general aspect of the country is extremely level and favorable to the contemplated work. From Rockford to Edwards' bridge, where the route crosses the Contentnea, there are no difficulties or streams to cross worthy of notice. From Contentnea the route ascends gradually to a level which is maintained for several miles; when it descends to effect a favorable crossing of Town creek; thence several undulations are necessary in crossing small streams, until the route reaches Tarborough.—Thence a level grade may be had entirely across Tar river. A favorable site for crossing which, is found about a mile and a half North of Tarborough. Thence the route alternately ascends and descends to lessen the excavations and embankments in passing Deep creek, Connecanary creek, and the ridges between them, until it enters the Western route five miles from Halifax, which it pursues to the Halifax and Weldon Railroad.

Summary of the cost of excavations, embankments, superstructure, locomotive engines, coaches, cars, water stations, wharves, shops, contingencies and steamboats.

162 miles—1504 feet of Railroad, and 150 miles Steamboat communication $1,512,853 80—making the whole line of communication, by Railroad and Steamboats 312 miles.

This shows the difference in cost in favor of the Western route of $12,853 80. A comparison of the grades, length of curvatures, and straight lines, exhibits also a slight difference in favor of that route. On the Eastern route, however, there will occur a thousand feet less bridging, this, in the annual repairs of the road will operate in its favor, by lessening the amount some four thousand dollars per annum. The superiority of the one line over the other, in a professional point of view, is so very slight that an expression of my preference under this head, could not be a decision of the question of choice between them. The Board may, then, consider that I lay the routes before them as equal under all the aspects in which under my province I have been called upon to view them. Their familiarity with the resources and interests of the country bordering on the lines, will enable them to estimate and compare the amount of trade on each; a preponderance of which may very justly form the basis of a preference. I would beg leave, however, to add, that looking to a connection with the works which are contemplated between the Western parts of the State, and the seaboard, and to the lateral branches which are authorized by the charter, the Western route is decidedly to be preferred. But whether the Eastern or the Western route be selected, I can confidently assure the Board, that no portion of the United States, certainly for the great extent of country embraced, offers so many facilities for the construction of a Railroad. Timber of the best quality is found on every part of the line; the soil consisting either wholly of sand, or a proper admixture of sand and clay, affords as good a foundation as can be expected from earth alone. Granite occurs on the Tar river, and on Fishing and Quauky creeks; and will be used in forming the abutments of the bridges across these streams; and for the construction of drains within convenient hauling distance. Where rock is not convenient, wooden structures will be used in the passage of the water courses and ravines, to be substituted hereafter by stone or brick, which can be delivered much more economically after the completion of the road.—The entire elevation of the road above tide water, is 189 feet. This is overcome by grades rarely so great as 30 feet to the mile. The whole length of curvatures on the road does not exceed thirteen miles; and in every instance, the departure from a straight line is effected on curves described with a radius exceeding a mile. So slight indeed are the grades and curvatures compared with many other roads in the country, that yours may be considered as straight and level; certainly as presenting every facility for the most extensive and economical application of swift locomotive power, to which Railroads owe their undenial superiority wherever, as will be the case here, gravity has but a small share in the resistance.

[Concluded in our next.]

FIFTH ANNUAL REPORT TO THE STOCKHOLDERS OF THE WINCHESTER AND POTOMAC RAILROAD COMPANY.

Mr. Bruce presented the following Report, which was read and accepted:

At the last general meeting of the Stockholders, an expectation was encouraged by the Board of Directors that the road would be open for transportation as far as the Island of Virginius, a short distance from the Potomac, before the succeeding winter. This hope was expressed with much confidence, because all the materials required for its construction had been previously engaged; contracts for the superstructure, some of which were then almost completed, were made to expire in November following, and every arrangement was placed in a train likely to effect the desired object. It is true, that part of the iron, most essential to the superstructure, had not then arrived, though the Board had no reason to apprehend a failure, for a sufficient quantity had been long ordered and paid for in England. In that hope, however, disappointed, they purchased from a private importer one hundred tons at an increased price, in order to satisfy the expectations of the stockholders and community, and were upon the point of procuring more from the same quarter, when the long-looked for vessel, detained by adverse weather, arrived with the balance of the iron. When the quantity of materials which enters into the construction of a railway, and the distant quarters from which they come, are taken into just account, the reflecting stockholder will see cause for making due allowance for the delay of active operations, which none felt more than those charged with the immediate superintendence of the work.—This delay may have affected somewhat injuriously the interests of the community, but it is doubtful whether it had a similar influence upon those of the stockholder, who, with his associates of the company, must otherwise have incurred a very considerable expense in keeping the road open during a winter of uncommon severity, and remarkable for its depth and continuance of snow. Many settlings, which might have been apprehended from the passage of heavy engines with trains over untried embankments, on the dissolution of winter, were thus most probably avoided and the superstructure allowed time to acquire greater stability, so desirable at the commencement of heavy transportation.—Notwithstanding postponements repeated more than once, the interest felt for the successful opening of the work had but little abated; for our citizens welcomed the arrival of the Tennessee on the 9th of March with as much cordiality, as if she had made her promised visit in the preceding December. On the 14th of that month regular transportation and travel commenced, with but one locomotive, and less than thirty burthen cars. This very limited supply of motive power, the Board could at that time alone command, owing to the unprecedented numbers of orders to be filled by the English workshops, before those of the Winchester and Potomac company were received. An agent sent, in part, for this purpose, and provided with funds deemed necessary, had ordered three locomotives, and iron work for such a number of cars as was thought sufficient for the first years of transportation. The tried merits of the English Engines, as the stockholders were informed at the annual meeting, induced the Board to adopt this course; indeed the machine shops attached to but few of the railroads in this country are adequate to the supply of their own immediate demands, no reasonable hope, therefore, of obtaining a supply for our wants was left in the United States—even if superior workmanship in the locomotive, and adaptation to security and economy in the cars, had not directed us to apply to foreign mechanics. With so small an array of machinery, it was soon found that the accumulate produce at Winchester, and merchandise at Harper's Ferry, could not be transported with reasonable expedition, though double duty was often exacted of both engines and cars—the Tennessee frequently running 128 miles a day. On the 31st of March, the day on which the road was opened with appropriate ceremony, the Baltimore and Ohio Railroad company, whose interests are identified with ours, and whose experience and zeal have uniformly enlightened and cheered us, promptly loaned the use of a powerful engine—and the timely assistance of the "Thomas Jefferson" will not soon be forgotten, in the history of our operations. Considerable disappointment to traders, was the consequence of the limited force of the company; and it is probable, that with those, not duly informed of the causes, this disappointment may have operated injuriously to the company's interest. A protracted and severe winter had crowded the early commercial business of the year into a very limited period of transaction—merchandise was thus suddenly accumulated at the various outlets of transportation—and the impatience of merchants was increased, with the well known anxiety of expectant dealers at home, for their spring supply of goods. We stood in the breach, urged on the one hand by the Baltimore importer, overwhelmed with business, and eagerly importuned on the other by the Valley merchant and distant Tennessean, greedy to realize the gain of their purchases. In addition to this unforeseen crowd of business, a difficulty, scarcely to be provided for, presented itself in the portage between the termination of our road and that of the Baltimore and Ohio Company. The room at the east end of the bridge at Harper's Ferry, always contracted, had been still more reduced by the two improvements which unite there; and the wagons which assembled at that point, to receive or deliver the neighborhood trade, greatly interrupted the drays and other conveyances employed to transport commodities between the two railroad companies. Had some of those merchants, loudest in the expression of their disappointment, visited that confused spot, on those days of scuffle for goods, and the

laborious turmoil of loading and unloading, they would have found cause to soothe their feelings; while it is readily allowed, that the interruption of the trade was in part chargeable to the inexperience of the company's officers, suddenly met by an overwhelming business, under an arrangement we may be permitted to say, susceptible of improvement by the Baltimore Company. A supply of cars, with the continuance of the engine loaned from the Baltimore railroad, enabled the company soon to meet with promptitude the demand for transportation. Early in June, grateful for the favor, we returned this locomotive, and soon after received a new and powerful one, imported on private account from England, in anticipation of the two others, ordered last year, and speedily expected on the road. A very considerable addition has also been made to the number of our cars, so that entire reliance may now be place on our ability to transport with despatch all produce and merchandise consigned to our care.

With the exception of these early interruptions, referred to with regret, no disappointment has occurred in the regularity of our transportation of burthen, and scarcely any has married the pleasure of the numerous travellers who have passed over our road. The depot bell has failed on but one or two occasions, when incessant rains had drenched our fuel, to sound its cheering note at the appointed hour of arrival; not one trip, however, has been lost, and the mail carried by the Company has always been delivered within the specified time.—In these days, when we hear of accidents on railroads, seldom diminished as they circulate, by report,—it is not unworthy of a passing notice, as it certainly is a source of much gratification, to state, that no casualty, worthy of being mentioned, has occurred, either to affect the safety or comfort of the traveller, or the security of goods transported over the Winchester and Potomac railroad. The engines have performed uncommonly well,—one of them with an amount and continuity of service rarely known in the history of locomotives. The "Tennessee," for some time our only dependence, frequently ran over the road, 32 miles long, four times a day. Since first placed on the track, she has been, on but two or three occasions, slightly repaired by the machinist, and at an expense of not more than $20. She has continued to run with great satisfaction, and with a speed and precision not to be easily excelled—having passed over, with burden and passenger cars combined, not much short of 10 000 miles in 130 days. Engines there are, no doubt, of much greater power, but we question whether any requiring less repair and less fuel, important elements in calculating the value of an engine, are to be found, combining at the same time equal efficiency with the "Tennessee." Though our superstructure is of stronger materials than those of railroads generally in the United States, our string pieces being 5 by 9, and sills 11 inches in diameter, we have seen no cause for regret, that our engines weigh less than those commonly used elsewhere—being well assured that high velocity and great weight are neither compatible with their own durable efficiency, nor the stability and duration of the road on which they move. Should our engines fail to transport the heaviest trains, we hope they will make up the deficiency, and save the levelling and repair of our superstructure, a serious item of expense to railroad companies. The untiring ingenuity of the American mechanic, stimulated by the high premium offered for all inventions to diminish labor, and the wide field for the display of skill, free as the political atmosphere in which it grows, will doubtless soon discover a style of locomotive, better adapted to the localities of our railroads, and the mode of their construction, than any that are imported from engineers, denied a personal acquaintance with the wants of this country. Engines have been manufactured by American citizens possessing valuable qualities—those used upon the Baltimore road, are particularly distinguished for their power,—but the fuel they are designed to consume, renders them far too expensive for our inland region. From repeated observation, it is believed that, with little more than a cord of pine wood, our engines will generate as much power of steam, as a ton, of anthracite coal was found to produce in the one belonging to the Baltimore Company, while in our employment—that quantity of good dry pine being found sufficient to transport to Harper's Ferry from 250 to 300 barrels of flour and return with the weight of 20 barrels. The best pine wood ought not here to exceed $2,50 per cord, while anthracite coal cannot generally be obtained for less than $10 the ton, delivered at Harper's Ferry. With the imported iron mounting for our burthen cars, the Board have had reason also to be satisfied—fixed upon springs they can be moved at the rate of twelve or fifteen miles the hour with perfect security to the freight, generally two and a half tons to each car. The economy which has attended the union of them with the passenger cars in the same train, has fully convinced the Board of its propriety—while the safety and speed of the whole train, moving on uniform springs, and wheels banded with wrought iron, have, it is believed, in no instance, failed to command the confidence of the traveller,—no fracture in any wheel, though all much used, having yet been discovered. On railroad thoroughfares of much greater travel than be expected over ours for some time to come, the power of locomotive can seldom be fully employed in propelling passenger cars only,—the waste of power, thus incident, to such roads is not felt on ours, in a country where produce is generally plenty, and the business and the ability of our population furnishes a very considerable amount of neighborhood travel.

Commodious depots have been erected at each end of the road; but want of sufficient means of transportation, until recently, has prevented the Board, together with other causes, from accommodating to the extent of their wants the various neighborhoods designed for places of deposite. An increased supply of cars will soon supply the demands along the line of the road: and it is in accordance with the design of those heretofore charged with the management of the Company's concerns, that warehouses be constructed, particularly at those points provided with double tracks, by the Company, or by private individuals, under their authority—the latter system, it is thought, will happily blend individual enterprise with a just promotion of the interest of the company—better acquainted with the resources of the adjacent country. Owing to the difficulties of obtaining the right of way through the public grounds at Harper's Ferry, and providing the supply of timber of unusual size, of which part of the work there is necessarily constructed, that portion of the road between the Island of Virginius and the Potomac is now reaching its completion. The drayage required between this Island and the Baltimore railroad, which has caused very considerable expense as well as obstructions, and other inconvenience incident to transhipment will soon be avoided. The cars will be enabled in a few days to pursue their course to the bank of the Potomac, and it is intended that a temporary track, thence over the present bridge to the end of the Baltimore road, shall be immediately laid down, which will allow the convenient transfer of freight from the cars, placed side by side, of the two companies—so that merchandise from Baltimore need be detained but an hour or two at Harper's Ferry, on its way to Winchester. It will not be, however, until the viaduct, at present constructing by the Baltimore Company, is completed, that the mutual interests of each company will be entirely accommodated. That period is sincerely to be desired, and would have been nearer its arrival, but for the frequent high waters which have retarded the progress of the stone work. The piers have now attained their proper height—the superstructure is commenced—the timber for the whole is provided—one arch is in part raised, and one track at least is promised to be ready for the passage of cars, before the coming winter. Whether loading of particular merchandise may not then continue to Winchester, with the change only of motive power, will be matter for future deliberation—all delay at any rate can be avoided, and the agents of the two companies at the Ferry will be enabled to harmonize the interests of both, by united personal inspection.

Though much of the time, since the opening of the road, has been what is termed the most favorable season of the year for the prosecution of such works—it may be asserted, that weather more trying to the stability of the road, could scarcely have happened. The breaking up of winter was indeed succeeded by a track of dry weather, but a continuance of heavy rains followed, which seriously injured and impeded the operations of railroads much longer constructed than ours. The Shenandoah, during the highest swells, had almost re-taken the ground, we had stolen from its contracted channels—but our embankments resisted its formidable assaults, and although part of the work was at one time in considerable jeopardy, no damage of consequence was incurred, nor any delay to transportation.—However difficult it may be to graduate a railroad through a limestone region, our limited experience would seem to pronounce, that if well constructed at first, it will be easily kept in repair—by its freedom from slips at excavations, and washing of embankments, and above all by its ready drainage through the numerous fissures which abound in a limestone formation.—Elevated about nine inches above the graduated bed, upon trenches filled with broken stone, placing it beyond the general reach of frost—having sufficient fall at deep cuts to carry off the water which the crevices of the rocks may refuse—our promises to require but little expenditure in repairs. This property is deemed important, and ought to afford some atoning satisfaction to the stockholders, if the work should have exceeded the expenses originally estimated.

[Concluded in our next.]

From the Newburgh Journal.

NEWBURGH RAILROAD.—The resolution passed at the last meeting of the Directors of this Road, has given confidence to our citizens—has called public atten

tion to the importance of our advantageous location upon the Hudson—and has materially raised the price of our property. That this road will be constructed is now certain. Mr. Sargent, the Engineer, has this week advertised for contracts for making the section between Chamber's Creek and Washingtonville, a distance of 10 miles. Sealed proposals will be received at the Company's Office, over Oakley and Davis' store, in this village, until the 10th of October, when they will be passed upon and the road will be commenced forthwith—and it is our full belief that in less than 18 months cars will be running into our village. The Directors are amongst the heaviest landholders in Newburgh, and their interest and long established character requires that this road should be finished as soon as possible.—They feel that it is all important that the section extending from Newburgh west to the Erie Road, should be made *now*, so that it can be used for the transportation of persons and materia's to and from the New-York and Erie Railroad during its construction, for if our road be made it will offer advantages to the Erie Company of which they will be glad to avail themselves, and if they should eventually extend their road to Nyack, (an idea which we have always considered ridiculous,) who cannot see that, running through the rough, barren and mountainous lands of "Rocky Rockland," it will never be able to compete with the Newburgh Road, which will be shorter, and will pass through the rich fertile fields of Orange. Will passengers prefer the Rockland route? No. For ours would be more expeditious—far more varied, interesting and commodious, and will enable passengers to view Washington's Head Quarters, rendered almost sacred by historical associations—the beautiful Bay at this place—the Highland peakes and recesses—and West Point with its many attractions.—Would produce be taken on the former route? No. For the cost of carrying produce to market would be much less, for the reason that water communication is always cheaper and safer than land carriage of any kind. We would say then to the Directors, you have deserved high commendation for your recent resolutions and when you shall have carried them into execution our now prosperous village will become a city; and in place of six, will contain sixty thousand inhabitants.

THE CENTRAL RAILROAD.

We are gratified to learn that the President and Directors of the Central Railroad Company have engaged Mr. John Randall, of Delaware, a gentleman of high standing and great experience in his profession, as principal Engineer, and Mr. L. O. Reynolds, late of this city, and favorably known to our fellow citizens, as assistant engineer of the contemplated Railroad from Savannah to Macon. Mr. Reynolds is expected to arrive here with a party in the course of a fortnight, and will under the direction of Mr. Randall immediately commenced the survey of the road at Macon. Mr. Randall will be in Georgia on or before the first day of November next, and he will continue to reside in the State superintending the work until its completion. As the funds of the company are ample, there can be no doubt of the vigorous prosecution of this important work and of its completion in the course of three years.

The Central Railroad Bank has commenced operations under the most favorable auspices. The building occupied by the Corporation on the Bay has been fitted up in a style creditable to those employed, and has advantages that probably no other edifice in the city presents, as it combines spacious rooms for all the requisite offices of the Company with a convenient site for public accommodation.

If we look beyond our city we find the Georgia Railroad Company successfully carrying on its banking business under the charter granted at the last session of the legislature, and the work on the road from Augusta to Athens rapidly progressing.

These two roads can and will, we think, be accomplished without pecuniary aid from the State.

That portion of the surplus revenue, in the Treasury of the United States on the first of January next, which will fall to Georgia, can (if accepted in the terms of the Deposite Law) therefore be made auxiliary in effecting the grand communication from the west and northwest to the seaboard of our State.

From the recent Report of Mr. Thompson, Engineer of the Athens Road, and from information derived from other sources, we are induced to believe that the proper point for the entry of the road from Knoxville is in Murray county. Georgians ask but for a proper spirit on the part of her Legislators. We trust that we shall at least, see a company incorporated by our next Legislature, with liberal aid from our State Treasury, to construct a road from the Tennessee line in Murray county, to a point on the Chattahoochee whence the road can branch—one way to Athens—another to Forsyth. By such a scheme, two-thirds at least, of the counties in Georgia, and a large proportion of citizens would be directly benefitted, while the people of the West would have the three important markets of Savannah, Augusta and Macon opened to their trade.

While on this subject, we take the opportunity to say, that we most cordially approve the contemplated Convention at Macon, in November next, and feel it to be highly important that this city and county should be ably represented there. Our fellow-citizens will doubtless send to the Macon Convention a delegation equal in talent and public spirit to that which so ably represented us at Knoxville.

We have already announced the projected iron Railroad from Milan to Venice. This gigantic undertaking is the first of the kind contemplated in Italy, and will be carried over the lagunes on an elevated causeway. Nature and every local circumstance combine to render this road without a rival in Europe, either in utility or beauty; as this part of Italy has some of the finest towns—as Milan, Verona, Vicenza, and Venice—is enriched with a most fertile soil, is inhabited by seven millions of people, active and industrious, and having the safest and most capacious port in the Adriatic, it, consequently, presents the most favorable elements for the advantageous application of an iron railroad.—Though the distance between Milan and Venice is 150 miles, it will be run in the short space of seven or eight hours. Travellers, on descending the Alps, will hasten to offer the homage of their admiration to the former mistress of the sea, who will see revived that ancient commerce and industry which made her so renowned, and she will again be numbered amongst the most flourishing cities. We likewise learn that iron railroads are projected in the kingdom of Naples. Nothing can be more delightful than the idea of being able to travel through Italy in a short space of time; but nothing can be more certain, unhappily, than that this can never be accomplished by means of railroads, on account of the insuperable obstacles of the mountains, and the extent of the distances. In Austria, likewise, plans are laid for bringing its capital into more immediate communication with Lemberg, Trieste, and other interesting points of that country; but they must be without effect, and end in a total loss to the speculators who may make the attempt on a surface so mountainous, and having such a paucity of resources. Experience has already proved that railroads are only suited to level, wealthy and populous countries, as England, Belgium, and Italy, and are not calculated to traverse the rocks, snows and solitudes of mountainous regions. It is to be truly lamented that an invention so prodigious, and which is the glory of the age, should have bounds beyond which it is impossible it can ever be carried; that is, that it can only be applied to certain favorable parts—it being neither prudent, nor indeed possible, to travel along iron railroads in the night, and therefore they cannot be hoped to be advantageously substituted for the ordinary roads between places whose distances from each other exceed 150 or at most 180 miles, which may be easily accomplished in one day; for where the distances are great, and the difficulties presented by the ground to be gone over are much greater, the steps necessarily made during the night, and the delay of conveyances, take away entirely all the benefits of economy of money and time, which are the only important gains arising to travellers from this new mode of conveyance.—But for these restrictions, we should probably be soon able to travel round the world in six weeks.

Internal Improvement.—We are gratified to learn that Gov. Schley has conferred on Col. Brisbane, of South Carolina, the appointment of Engineer, (under a resolution of the last Legislature,) to survey the route of a Railroad (to be connected with the Cincinnatti road) through

Georgia to the Seaboard, and that Col. B. will proceed forthwith to execute the duties imposed on him. Col. B.'s public and private character eminently qualify him for the task.—[Georgian.]

From the Repertory of Patent Inventions.

ON THE SOURCES AND COMPOSITION OF THE DIFFERENT KINDS OF GAMBOGE. BY DR. CHRISTISON; AND ON THE BOTANICAL ORIGIN OF GAMBOGE. BY DR. GRAHAM. The papers of which the official abrtracts are subjoined, were lately read before the Royal Society of Edingburgh.

Gamboge was first made known by Clusius abcut the commencement of the seventeenth century, as a concrete juice from China. About the middle of the same century. Bontius conceived he had traced it to a particular species of *Euphorbia*, growing in Java and in Siam; from the latter of which countries the whole gamboge of commerce was at that time obtained. About the close of that century Hermann announced that gamboge was produced by two species of trees growing in Ceylon, which have been since often confounded together, but which are now designated by the names, *Garcinia Gambogia*, and *Stalagmitis gambogioides*. About the middle of last centry, gamboge was referred Linnæus to the former of these plants, and his reference was generally admitted; but about thirty years later, Professor Murray of Gottingen conceived he had traced it satisfactorily from the specimens collected by Koenig in Ceylon, and information obtained by the same botanists in Siam, to a new species which he called *Stalagmitis gambogioides*.

Dr. Graham shows, from specimens and drawings sent from Ceylon, both by Mrs. Colonel Walker to himself, and by David Anderson Blair, Esq. to the late Dr. Duncan, that the plant producing Ceylon gamboge is neither *Garcinia gambogia*, as Linnæus thought, nor *Xanthochymus ovalifolius*, as conjectured by Dr. Wight and Mr. Arnott, nor *Stalagmitis gambogioides*, according to Murray and Koenig, but is a species described by Lamarck and Gartner under the name of *Garcinia* or *Mangostana morella*, although it differs from all of these genera in the structure of its stamens, and, therefore, probably ought to be considered a new genus among those producing a gambogioid juice.

Dr. Christison proved, that, at the present time, Ceylon gamboge is not an article of European commerce, and that the whole gamboge of the markets of this country comes, as in the time of Bontius, from China. After mentioning the analysis of fine gamboge made by Braconnot in France, and John in Prussia, he stated the following as the mean composition of the several varieties of gamboge he has hitherto examined:—

Pipe gamboge of Siam:

Resin	72·2
Arabin	23·0
Moisture	4.8
	100·0

Cake gamboge of Siam:

Resin	64·8
Arabin	20·2
Fecula	5·6
Lignin	5·3
Moisture	4·1
	100·0

Ceylon Gamboge sent by Mrs. Colonel Walker:

Resin	70·2
Arabin	19·6
Fibre of wood and bark	5·6
Moisture	4·6

Ceylon gamboge adhering to a specimen of the bark sent by Mr. David Anderson Blair:

Resin	75·5
Arabin	18·3
Cerasin	0·7
Moisture	4·8
	99·3

The proportion of the gum to the resin varied somewhat in each variety, but never differed more than two per cent. from the means given above.

The author added, that he had found the resin to be the active principle of gamboge.

He inferred from the composition of the different kinds of gamboge, and other circumstances detailed in his paper, that the cake gamboge of Siam is not entirely a natural production, but a manufactured article: that Ceylon gamboge, if freed from incidental fibrous matter, corresponds almost exactly with Siam gamboge: that therefore, they are probably produced by the same plant: that Ceylon gamboge possesses precisely the same medicinal properties; and that this variety, if more carefully collected, may, in all probability, be applied with equal advantage to every economical purpose which is at present served by the finest pipe gamboge of Siam.

A. T.

ON THE MATHEMATICAL FORM OF THE GOTHIC PENDANT. BY PROFESSOR FORBES. The following is the official abstract of a paper read before the Royal Society of Edinburgh, on the 1st of February last, as given in the "Proceedings" of that learned body.

The author commenced by stating the general proofs of the knowledge of the principles of equilibrium displayed by Gothic architects in the structures (especially) of the Pointed style. The adaptation of their edifices was to the combined ends of elegance and strength. The extension of this principle to the case of the Gothic pendant is the chief object of this paper. Sufficiency in point of strength, without redundancy of material, is considered by the author as the primary source of architectural beauty, which he has demonstrated to be the case when the depending Gothic drop is generated by the revolution of the logarithmic curve round its axis. The condition of maintenance of a depending body, is, that the increment of the section may be in a constant ratio to the increment of weight of the body to be sustained. This is shown to be attained in the case of bare support, when the modulus of the logarithmic curve is equal to twice the modulus of cohesion of the substance of which the pendant is composed, in feet. Under these circumstances, the depending mass would be just within the limit of disruption, but its strength would be uniform throughout, and the tendency to separation would at no one point be greater than at another. It is not imagined that the Gothic architects could have had a mathematical knowledge of a curve, which was not attained till long after, but the degree of *tact*, by which the eye is guided in the selection and adaption of symmetricel forms, seems quite capable of explaining such an approximation to theory, which, it is believed, has not been before noticed. Thus, a depending cylinder appears overloaded at its inferior extremity, a cone towards its middle, and so of all figures which are not concave outwardly.

From the Journal of the Franklin Institute.

ON CALCAREOUS CEMENTS. BY JAMES FROST, CIVIL ENGINEER. NO. IV.*

Having seen the intense affinity between lime and water, we will now endeavor to examine the superior affinity between lime and carbonic acid, with which lime is always found naturally and definitely combined in the proportion of twenty-eight lime and twenty-two carbonic acid. It is also, generally or always found mixed, and seemingly in combination with other substances; for, in the purest white Italian marble I have always found some minute silicious particles. Yet, carbonate of lime we shall hereafter find is never chemically combined with those other substances—whatever may be the hardness or specific gravity of the mass;—and as this is seemingly a position of some importance in geological investigations, it will be hereafter adverted to in connection with another part of equal importance, when we have had the advantage of considering some other combinations of lime.

In England, lime is generally procured by calcining the carbonates in two different modes. The one and most frequent, is the cheapest and easiest in practice, but the lime obtained in this way is generally found inferior in quality to that obtained by the more troublesome and expensive process.

As lime of as good quality may be obtained by the easier process, we will endeavor to describe the necessary conditions. In the first mode, the carbonate is interstratified with the smallest and cheapest coal, in inverted lime kilns, and the fuel being in actual contact, acts with the greatest effect. The kilns are of the cheapest construction and maintenance, and being daily emptied of a portion of calcined lime, and daily charged with an equal proportion of fresh materials, the business is regularly conducted in the easiest manner—but the lime thus obtained is of a variable quality, from some causes which must be explained in order to be avoided.

* No. III. was published in the April number of this Journal, page 234, vol. XVII.

In the second mode the carbonates are piled in kilns so constructed that the fuel is burned in furnaces, and only the flame thereof admitted into the kilns to calcine the lime. In this mode, the coals used are large and of the dearest kind; more of them are required, as they do not act with so much effect: constant attendance is required night and day during the calcination; the kilns are more costly in construction and maintenance, and much expensive iron work is required.

If we calcine some limestone in an iron tube, or retort, set in a brick furnace, and then allow the retort to cool very slowly, while another portion of limestone is being calcined in a similar retort which is connected by an iron tube with the first, so that the carbonic acid gas may be conducted into the first retort, it will be there absorbed by the hot lime, which thus becomes uncalcined as it were, and is recarbonated more or less, according to the care taken in conducting the experiment.

If we now inquire why the first mode is so uncertain, we shall find that the kilns are commonly constructed about equal in diameter and depth, and that the most careful workmen find it difficult, or impracticable, to draw the calcined lime, so that portions of it do not intermix with portions of the uncalcined and of the fuel. In which case, a portion of uncalcined lime escapes calcination, and a portion of that which is calcined becomes more or less uncalcined, and a very irregular article is thus produced.

If lime kilns were always constructed of two or three diameters in depth, careful workmen might always draw without intermixing the calcined and uncalcined strata in the kilns, and a good article would always be produced at the least expense of time and trouble, and that this mode will succeed in practice with any description of limestone, will be apparent, when we state that the most difficult carbonates to calcine are those employed in the production of cements, which must be sufficiently calcined to become tender for grinding, while from their chemical qualities they are easily fusible with a small excess of fuel; now as these carbonates are well calcined in such kilns, it must be evident that all may be so, as no others can, from their nature, be so difficult to manage.

In either of the two modes of calcination the lime is allowed to cool in contact with the atmospheric air, and this we have already seen is essential to the production of lime. For, if having calcined lime in a reverberatory furnace, wherein coke has been used for fuel, and if then a fresh supply of fuel be added, and the supply of fresh air prevented to the furnace and to the chimney, by closing the apertures thereto, and the lime be thus allowed to cool, it will absorb and condense much sulphuretted hydrogen as well as carbonic acid gas, and when cool, will be incapable of slacking with water, and if pulverised and tempered with water, it will set as cement, for a long time thereafter, exhaling the peculiar odor of sulphuretted hydrogen.

If, when the lime is about to be thus cooled in a reverberatory furnace, a portion of pine wood is added to the other fuel, the lime when cool will be found nearly black throughout its whole substance by the vapor of carbon which has penetrated and been condensed therein; a black cement has been thus obtained, colored probably, as some black marbles are found by analysis to be; the Kilkenny or black Irish marble, owing its color to its containing two per cent more carbon than white marble, which always holds twelve per cent combined with oxygen in its carbonic acid, and Kilkenny marble holds only two per cent more, but being uncombined, it acts as coloring matter, showing what a great difference in sensible qualities is made by a small difference in the quantities and chemical arrangement of the elements of solid bodies.

Every different species of carbonate requires a different quantity of fuel for its due calcination, the argillaceous varieties requiring a quantity very nearly proportioned to the carbonic acid in them; hence, the inference is, that the heat evolved is essentially employed in converting the acid into permanent gas. Thus, two measures of small Newcastle coals, are required for the calcination of ten measures of Thames chalk, and is sufficient for fifteen measures of Roman cement stone; but as this latter substance is about one third ferruginous and argillacious matter, it would seem to require the expenditure of little fuel for that portion. As a measure of chalk is about twice as heavy as a measure of coals, it follows that ten pounds of coals are required to calcine 100 of carbonate, or one pound coals to 4 4 pounds carbonic acid; but as eighty-four pounds of the live coals would heat and evaporate twelve cubic feet of water, one pound of coals would heat and evaporate nine pounds of water. We thus find by rather a rough process, but from facts correct enough for general reasoning, because derived from operations conducted on the large scale, that the latent heat in carbonic acid gas is about double the latent heat of steam.

If 37 parts hydrate of lime is placed in contact with 22 of carbonic acid, the nine parts of water in the hydrate will be all expelled, and the carbonic gas combining in a solid form with the lime gives out its latent heat, which being taken up by the water, it escapes in the form of vapor, or steam of superior elasticity to the atmospheric pressure, although its temperature is insensible, this very curious or rather wonderful fact, and others, hitherto, I believe, wholly unnoticed, we shall see amply verified when we examine the properties of cements.

New-York and Albany Railroad.—It should not be forgotten by the friends of this important Railroad, that the books of the Company will be opened at the Farmers' Loan and Trust Company, No. 34 Wall-st., 15th, 16th, and 17th, of the ensuing week The importance of this stock and Railroad, as the terminating link on both our great lines to the West, as well as to Boston, on the East, is too evident to require a remark from us.

We annex the following from the Albany Daily Advertiser and New-York Times—and call upon every friend of the work to come forward.

New-York and Albany Railroad.—The subjoined is from the Albany Daily Advertiser.

There is no reason why our intercourse with the metropolis should be cut off for four months in a year. Let the road be made, and Albany will be as thronged in the winter as it is in the summer, and it will do as much business. It is computed that at least 1500 passengers a day traverse the Hudson between the two cities. This number, at $5 a passenger, (which is only half the fare asked by the stage proprietors,) would give the enormous revenue of $720,000 for the four months alone. During the remainder of the year the travel would be large, because passengers for pleasure or health would take this route either up or down, while the way travel between the numerous and flourishing towns inland, would be astonishingly increased.—We really hope the project may be successful.

The New-York and Albany Railroad will form a most important link in the chain of internal improvements, extending from this city to the far west. From Albany westward, as far as Buffalo, charters have been granted to private companies for the construction of railroads, and in the course of a very few years, there will be a continuous line from that city to Buffalo, and other points at the western extremity of the State. The importance of the construction of this road is so obvious, that it is unnecessary—in these days of internal improvement, when the advantages of that glorious system are daily developing themselves more and more—to dwell on it. It is not alone, however, as a medium of conveyance between this city and Albany, and as a part of that great line, which has the far and fertile west as its goal, that this railroad is of importance to our citizens. There is a fertile territory nearer home, a region of country rich in resources, and inhabited by an industrious and intelligent population, within a comparatively short distance from our city, which has heretofore been, to a certain degree, a comparatively isolated section. The construction of the Erie Canal gave to the inhabitants along its line, advantages equal to those possessed by many, who, so far as geographical distance is concerned, were in the vicinity of our city. The inhabitants of the eastern sections of our river counties, and of western Massachusetts and Connecticut, have, so far as facilities for a market are concerned, been as far from the city of New-York as the farmers at the western extremity of the

Erie Canal. One of the advantages of the New-York and Albany Railroad will be, the furnishing facilities for transportation to the most fertile part of Massachusetts and Connecticut. Both of these States will construct branches to meet this main line, and add to the income estimated by the Albany paper. We learn that the inhabitants along the proposed line of road, are so deeply impressed with its importance to their interests, that they are determined to secure the subscription to the stock. Our citizens should step forward and lend their pecuniary aid to this noble work. It will give a new impetus to our fast increasing business, and add, as the opening of every new avenue must add, to the wealth and population of our city. The estimate of the Albany Daily Advertiser takes into consideration but a small portion of the business which must be transacted on this road. We trust that we shall soon be able to announce that the work is in the course of construction.

New-York and Erie Railroad.—The Directors of the Company, at their meeting on Tuesday, decided finally upon Tappan Landing, as the point on the Hudson where the road should terminate. It is about 24 miles from this city.

Extraordinary Receipts on the Utica and Schenectady Railroad.—We perceive by the Report of the Treasurer, G. Hawley Esq., that the number of passengers carreid through during the month of August amounts to 12,146, and the *way* passengers to 6,340, and the receipts in tolls for passengers alone—as this road is not *yet* allowed to take freight—amounts to the enormous amount of $43,676 91: exceeding 3 per cent. upon the entire disbursements of the company to this time.

This fact alone must give courage and spirit to the friends of Railroads in every part of the country.

From the Albany Evening Journal.

Utica and Schenectady Railroad.—It will be seen by the following official statement, that the Utica and Schenectady Railroad earned upwards of FORTY-THREE THOUSAND DOLLARS in the month of August. This sum is much larger than its most sanguine friends ever anticipated:

Statement of the number of passengers, with the amount of money daily on the Utica and Schenectady Railroad, from the 2d of August to the 1st of September, 1836—being for one entire month.

	Day.	No. of passengers thro'.	No. of way passengers.	Amount received.
	Aug. 2	365	120	$1,327 86
	" 3	371	139	1,256 43
	" 4	355	216	1,261 87
	" 5	361	126	1,270 43
	" 6	348	239	1,275 66
Sunday	" 7	149	108	538 24
	" 8	321	244	1,209 36
	" 9	387	217	1,382 15
	" 10	443	135	1,574 53
	" 11	440	181	1,520 86
	" 12	431	180	1,402 67
	" 13	403	220	1,426 67
Sunday	" 14	148	106	563 62
	" 15	375	265	1,405 55
	" 16	573	283	2,044 37
	" 17	462	224	1,729 44
	" 18	481	259	1,722 10
	" 19	462	198	1,692 52
	" 20	412	86	1,447 42
Sunday	" 21	222	215	781 36
	" 22	265	257	3,314 48
	" 23	402	244	1,468 92
	" 24	577	236	1,981 68
	" 25	571	280	2,015 43
	" 26	436	213	1,530 55
	" 27	415	256	1,485 68
Sunday	" 28	141	93	528 36
	" 29	371	275	1,443 85
	" 30	411	251	1,493 02
	" 31	492	256	1,748 98
	Sept. 1	533	215	1,832 85
	Total	12,146	6,340	$43,676 91

A true statement,

Gideon Hawley, Treasurer.

Albany, Sept. 5th, 1836.

A magnificent edifice.—There are 3000 workmen at St. Petersburgh, engaged upon the new cathedral of St. Isaac. The outside of the cupola is to have 24 columns of granite; the portica is 100 feet in length, and supported by 41 columns, with bronze capitals and vases.

Analysis of Raw Silk. By Mr. J. W. Laidlay.—A. A hundred grains of yellow raw silk were digested in moderately strong alcohol, which soon assumed a fine orange tint. At the end of some days, much color remaining unremoved, heat was applied, and the solution boiled. The alcohol was then decanted, and successive portions of the same solvent were employed, till the silk appeared perfectly decolorized [decoloürated]. The solutions were then reduced to a moderate compass by distillation, and on cooling, deposited a feeble, cloudy precipitate, which subsided slowly. The clear fluid being decanted, and evaporated at a gentle heat, to dryness, left a deep orange brown mass which weighed 0.9 grains. This substance was adhesive, fusible, scarcely, if at all, soluble in water, but readily so in alcohol, to which, in small proportions, it communicated a fine orange tint. A concentrated solution deposits on cooling a vast number of minute shining crystals, which subside to the bottom in the form of a brilliant orange-brown powder. When this precipitation has ceased, the solution lets fall, by spontaneous evaporation, a few filamentous bunches of a white color, and apparently fatty nature; but in quantity too small for more particular examination.

B. The flocculent precipitate above mentioned, being collected and dried, weighed, 0.1. It had the consistency, fusibility, and other sensible properties of wax.

C. The silk, still perfectly elastic, was now transferred to a deep silver vessel, and boiled with successive portions of distilled water as long as any sensible action was produced. A colorless, opalescent solution was obtained. It was frothy and viscid; and exhibited scarce any tendency to deposit the particles it held in suspension. A solution of bi-chloride of mercury, cautiously dropped from a graduated tube, threw down a bulky coagulum, which, after boiling, became much condensed, and permitted the easy decantation of the clear fluid. This precipitate, well washed, and dried, weighed, (deducting 1.4 grains, the amount of metallic salt employed) 8.9 grains. It had all the well known characteristics of albumen.

D. The clear fluid decanted in process C, being evaporated to dryness in a steam-bath left a nearly colorless, transparent, brittle mass, resembling gum. It weighed 13.0 grains, and had a tendency to soften, from the presence of a small quantity of deliquescent salts. It dissolved readily in water, from which neither the bi-chloride nor tan threw it down. It exhibited no tendency to gelatinize, however concentrated; and was copiously precipitated by sub-acetate of lead.

E. Alcohol now took but a feeble tinge from the silk, which still retained a little harshness. A very dilute solution of caustic potash was accordingly exhibited; and after a few hours digestion, was poured off, exactly neutralized with muriatic acid, and treated with the bi-chloride as in process C. The precipitate of albumen thus obtained weighed 0.4 grains.

F. Finally, the silky fibre, which had now attained its full lustre and flexibility, weighed 76.5; exhibiting a loss of 0.6 upon the total, attributable to hygrometric moisture; the whole of the products being dried at a steam heat immediately before weighment. The following are the results of the analysis:

A. Resinous coloring matter, and white filamentous substance,	0.9
B. Wax,	0.1
C. and E. albumen,	8.9
D. Mucus,	13.0
E. Bleached fibre,	76.5
F. Hygrometric moisture,	0.6
Grains,	100.0

An analysis of white silk gave identical products; and in amount differing only fractionally from the above; except in the particular of the resinous coloring matter, which was indeed present, but in a very much smaller proportion. It is probable that the varieties of color observable in cocoons, the yellow, the orange, the buff, the white, and the greenish hues, depend only upon the greater or less amount of this resin in the fibre.—[Journal of the Asiatic Society of Bengal, vol. iv., p. 710.

A. T.

AGRICULTURE, &c.

We have received the Edinburgh Quarterly Journal of Agriculture for June, from which we make copious extracts.

HORTICULTURE—COMMON CABBAGE, EARLY YORK CABBAGE, LONDON NEW YORK CABBAGE, SAVOY, BROCCOLI, AND EARLY WHITE WARWICK PEA.

By Mr. Towers, Author of the Domestic Gardener's Manual, &c. C. M. H. S.

The *Brassica*, or cabbage tribe, presents us with the most important crops of the season, I mean the period included between the first of June and the two succeeding months. It is proposed to select three of the numerous species, namely, 1st, Common round-headed or hearting *Cabbage*,—2d, The *Savoy*,—3d, *Broccoli*.

1. THE COMMON CULINARY CABBAGE, *Brassica oleracea*, Sect. 4. of Decandolle, No. 4. *elliptica*, the early York and particularly that fine improved variety, now called London *new* York Cabbage. All the members of the tribe belong to one family or genus, termed *Brassica:* they are found in the natural order *Cruciferæ*, the leading characters of which are four opposite petals, ranged in the order of a cross; there are four petals or calyx-leaves, six stamens, two of which are rather shorter than the other four, and this latter circumstance gave rise to the name selected by Linnæus to designate the members of his 15th class *Tetradynamia*, a compound Greek word, which indicates the power or *supremacy* of *four* out of six fertilizing organs. It may be of some importance to the farmer and cottager to be informed that, among all the plants of this class or natural order, not one perhaps is possessed of any really deleterious property. Among nearly one thousand species, as Dr. Lindley observes, "scattered over the face of the world, all are harmless, and many highly useful."

The varieties of the cabbage are numerous, but he *who possesses* the best early York, has that which combines most of the valuable qualities of that excellent vegetable,—compactness of heart, firmness, sweet flavor, and convenient size and form; it is also hardy, of very ready culture, and occupies but little space. I do not recommend it merely as a *culinary* vegetable; it might, and I think should, be made to rotate with the crops of the farm. It is not my desire now to digress, but I hope on a future occasion to adduce facts which will go far to prove that every farm throughout the kingdom would be improved, and the agriculturist proportionably benefited, by a greatly enlarged rotation. The land has powers and capabilities to double its productive return: We southerns are much indebted to our northern brethren for the lessons of wisdom which their refined system of agriculture has already taught us, but these cultivators, skilful and persevering as they have effectually proved themselves to be, may still advance; and with this conviction before me, I hope I may not be deemed presuming, if, at the earliest opportunity, I venture to attempt to fulfil the intention which I have alluded to above, and for which I am collecting the requisite documents.

The *soil* for cabbage should be a sound mellow loam, of a quality usually termed *fat*, or unctuous, wherein the *silex*, which forms its chief constituent, is in a state of extremely minute division, and united to a greater proportion of argillaceos earth (*alumine*,) than most common, gritty soils are; but the chief deisderatum of an unctuous loam is the impalpable state of the silex; for I have analyzed one of the finest loams I ever saw, without being able to detect in it more than five or six per cent. of clayey substances, and scarcely a grain of chalk. But the cabbage will do well in most soils, provided it be exposed to the full influence of light and air, and be not shaded or stifled by trees, shrubs, or buildings.

SEED.—This will retain its vegetative power for three or more years, but it is always better to employ that produced in the preceding season, or if two or three year old seed be used, it should be tried in heat, sown in a flower-pot: a serious loss of time may be occasioned by a failure of the seed-bed. An ounce of seed will suffice to sow forty square feet, if scattered broadcast, but less will be required, if it be sown in drills, six or seven inches asunder; and this method is always advantageous, because the Dutch or thrust-hoe can, at any time, be passed easily between the rows. If cabbage be cultivated in *the field*, it is calculated that half a pound of seed will afford more plants than will grow on an acre; and it is stated, in recommendation of the vegetable for the purposes of the farm, that if the cabbages be cut, freed from bad leaves, and carried to the cow-yard, "they are more beneficial than hay, given in any proportion, when only combined with straw."

"In the *fattening* of neat cattle, an acre of good cabbages may be nearly sufficient for three beasts of from forty to fifty stones each, which have been grazed in the pasture during the summer. A middle-sized bullock, in general, consumes about 100 lb. in twelve hours."* "Half an acre will be nearly sufficient for 100 sheep, when the crop is good: a sheep consumes nearly 10 or 12 lb. in twelve hours."—(*Baxter's Agric.*) I have repeatedly tried cabbage in cow feeding, and on every account recommend the substitution of *York cabbages* for the coarser and more bulky varieties.

In *garden-culture*, we have to consider the object of the cultivator; if spring or early summer cabbage only be required, one sowing of a single long row or a small bed will suffice. In the southern or middle counties of England, it is usual to limit the period of sowing between the 6th and the 12th days of August; but in the north, I presume that the third or fourth week of July should be chosen. Experence has proved that seed sown early in July, will produce plants which are liable to run to seed in the following spring; while, on the contrary, the plants of late sowings rarely acquire strength sufficient to resist the rigors of the winter. *The soil for a seed-bed* ough to be lighter than that used during the future growth of the *plants*; it should be moved to the depth of a few inches, and made very fine: then, the line being strained tight, the first drill is to be cut by drawing the angle of a the in hee direction of the line, with its edge resting against it. An inch or less in depth is sufficien; but, as all seeds rise better if they rest upon a true surface, and be closely embraced by the mould, it will be proper to level and compress the bottom of the little drill by patting it with the back of a wooden, round-headed rake, or by placing a long pole, like the handle of a rake, into it, so as to form a sort of groove. In this, the seeds are to be scattered as regularly as possible, after which it would be as well to dust them over regularly with a powder composed of two parts (say *pounds*) of powdered quick-lime, one part of coal-soot, and one sixteenth part (one ounce) of flour of sulphur. This mixture is inimical to insects, and does not injure the young plants. The groove is next to be filled up with fine earth, which is to be made firm and even, by pressing it down with the flat of the spade. In like manner, all the other drills may be made and finished. If the weather be showery, and the ground in a moist state, but still free and open to work, nothing more need be done. It sometimes happens, however,—as was the case to a very injurious extent throughout the summer of 1835,—that the soil is found dry even to dustiness. In that case, as it will not answer to let the critical period pass over, the intended bed sholud be watered copiously for three successive nights, till it become completely moist, and a mat or two must be thrown over it during the intervening days. Seeds sown in soil thus prepared, will vegetate very rapidly; for warmth and moisture are the prime actuating agents of vegetative life, as direct *solar* light is that of maturation. Waterings, or rather the ordinary sprinklings, so termed, will prove of no avail, if the seeds have been sown in arid soil, as was fatally proved last year. In hot sunshine, the mat ought to be used till the seeds vegetate. *The seedling plants* will be liable to the attacks of slugs and other enemies; to guard against which, they may be sprinkled with a little of the powder mentioned above; or the spaces of soil between the rows may be covered with dry saw-dust or chaff; but thick sowing is perhaps the most effectual means to secure a sufficient supply, and it is always prudent to practise it, because many seeds are inert; and it is better to displace the supernumeraries by timely thinning, than to have a paucity of plants, nine-tenths of which may perish by accidents. When the first true leaves appear, and acquire a little strength, much of the danger will be past, and the plants ought to be thinned out, so as to stand an inch asunder. Again, as they advance in growth, they ought to be reduced in number till double that space intervene between plant and plant.

*There must surely be some error in this statement, of an acre of cabbage being able to fatten nearly three beasts of from 40 to 50 stones each: 100 lb. of cabbage in twelve hours, that is the average number of hours of day-light in each day, for twenty weeks from the end of October, will amount only to 6 tons 5 cwt. Now a middle-sized ox will, in that time, consume 30 tons of Swedish turnips. Do 6 tons 5 cwt of cabbage yield as much nutriment as 30 tons of Swedish turnip?—ED

TRANSPLANTING.—Some gardeners have attempted to obviate this operation; but the roots first produced are few in number, though strong, and of considerable length: the plants also acquire a tall and shanky growth; and above all, it is evident that, if cabbage plants be made to perfect their growth on the site where the seeds were sown, the allotted space must be very great, because they *must* be thinned out so as finally to stand one foot asunder at the least. Transplanting, therefore, should be practised, and that, too, as soon as the young plants have become three or four inches high, and begin to crowd each other. The operation effects two or three good objects. It causes the roots to produce a number of short fibres, or, as it is termed, to become "stocky:" it dwarfs the plants, and, while making them strong and compact, secures them to the soil; and it enables the grower to protect those left in the seed-bed (as some always should be) by coverings of mats thrown over arches, formed of hoops or pliable rods, in the event of very severe weather.

In transplanting, let the bed or plot be a good firm loam, if possible, pretty well manured, thoroughly digged, and in a free, open situation. Select strong plants of nearly equal growth, and insert them in rows by means of a dibble or trowel, fixing each firmly in the soil, eighteen inches apart *every way*, if the variety be a free grower; but the small Yorks will do very well if the rows be that distance apart, the plants standing only twelve inches asunder in the lines or ranks. It is indispensable that the soil be brought closely to the roots, and made to press them firmly in every part; and should the weather be dry, much time will be gained by making the holes so deep as to receive the plant to the full length of the stem of each, and filling every hole brimful of soft water: then, by pressing the soil laterally and on every side with the tool, the roots will become puddled in, and secured at once. The period for the work must depend upon the growth in the seed bed; and if the season be early, and the weather warm and showery, the transplanted cabbages may grow so rapidly as to require the check of a second removal, or at least to be raised up and re-set; but in general, and under ordinary circumstances, it will be sufficient to leave them undisturbed, as then the crop will be ready for culture at a more early period of the spring. In the south, it is no uncommon circumstance to cut fine-hearted cabbages in April, and very good ones in May. In the north, the growth must be more tardy in most situations.

The *seed-bed* will require care and attention. I have said that some plants ought to be left in it; and I urge the practice, because, in severe winters, the entire crop is sometimes cut off. The seedlings remaining ought, however, to be raised up; the longest roots cut back nearly one-third, and the plants be re-set in regular order and distances. Thus, supposing that 200 plants remain in it, and be made to stand four inches apart in rows which are six inches asunder, a bed little more than twelve feet long and about three feet wide, including its edges, will contain this valuable stock, which in severe weather could be covered by by three or four garden mats, and thus secure a pretty ample supply of plants for the spring. Another precaution may always be resorted to. In transplanting, deep drills or grooves can be formed by the hoe or spade, and along these the plants may be set so deep, that the lowest leaves may stand just above the soil. I adopted a still more efficient plant of security last October, though I do not recommend it because I think the growth in the early spring months is thereby retarded. Having a piece of ground set up in ridges, nine inches high, and the time pressing, I planted my young cabbages in the bottom, of the trenches between the ridges. On three occasions the thermometer fell twenty-two degrees below the freezing point, and not a plant has been touched, though no covering was applied at any period of the winter.—My broccoli, also, has stood in perfect security, in consequence of the stems being lower than the level of the edges of trenches made expressly for them. However, as cabbages ought to be hoed freely in the autumn, and the spaces between the rows digged once or twice, as soon as the plants resume growth in the early spring, it is evident that the ridges present an obstacle to these important operations. If the winter prove mild, the cabbages will progress in some degree; but if by cold they be rendered torpid, they will start into growth with the early return of solar influence: a few may fly up to seed, but the greater part will form hearts, and can be cut in succession. In cutting, it will be prudent never to take off the green and healthy leaves. those that are inert and yellow, will scale off of themselves, or with the slightest effort: but the green and firm ones have still an important office to perform, in perfecting the axillary buds which produce young sprouts. These secondary cabbages, or "greens," affect an open growth, and in themselves furnish a delicious vegetable, but they may—that is a portion of the best formed among them—be devoted to another purpose of considerable utility in garden economy. The shoots when about five or six inches long, are to be gently twisted off from the stem, and the lacerated heel of each being trimmed perfectly even and smooth with a very sharp knife, but not shortened; the young plant thus rendered a cutting is to be very carefully planted in lightish, sandy, fresh moved loam, so deeply as nearly, but not quite, to include the entire stem. The setting-stick or dibble is to be thrust diagonally into the ground in three or four places, in the direction of the heel, so as to fix it firmly in th soil, and then a little water should be given to each plant to wash the earth closely about the stem. Detached shoots so treated, will frequently produce roots speedily, and bring a supply of excellent secondary cabbages, true to the original varieties *seeds* are apt to sprout, owing to cross im pregnations.

To sum up the chief points of cabbage culture for spring and summer main crops it must be observed that the *period of sowing* should be strictly attended to: the *seed beds* are to be slightly hoed to keep the ranks clear of weeds; the stronger plants are to be timely removed to the final beds, wherein two autumnal hoeings and a moderate earthing up must be given during the progress of growth. On the approach of spring, the intermediate spaces are to be digged or forked, after the removal of the inert leaves, and the operation should be repeated when the plants evince the tendency to fold up their inner leaves for hearting.—By a careful attention to these needful processes, a bed of fine cabbages will, in favorable seasons, be secured. Having thus dwelt so minutely upon the routine culture of the cabbage for the main spring and summer supply, I shall only allude to that part of the treatment of succession crops, which refers to the summer and autumnal months.

It is usual to give directions for sowing the seed at several distant periods; but my object is to obviate trouble, and to simplify operations as much as possible; and as I have proved that, by attentive management, a regular supply of fine plants may be obtained from one extra sowing, I shall presume that an extensive seed-bed or plot exists, having been prepared late in March or early in April. The mode of culture will be understood by the directions already given: what, therefore, remains to be said, will apply to the order of routine which ought to be observed subsequent to the *first of June*. At that time, we may suppose that the greater part of the cabbages have been cut, the stems remaining being left for the production of sprouts. The seedlings of the April bed that are in a state to be transplanted, should be carefully selected, and set in a bed of rich soil, watered, and attended to in every respect as were those of the spring crop. This first bed, with the cuttings of the sprouts and the other shoots yielded by the old stems, will produce an ample supply of a second crop during July and August.

After the removal of the seedling plants, those which remain in the seed-bed should be gently lifted and replaced, but at regular distances three or four inches apart; the ground should be moved, cleared of weeds, made level, and well watered if the soil be in a dry state. Should the plants be very numerous, a hundred or two of the best might with great advantage, be moved to a succession bed to stand in rows, six inches apart, plant from plant. Thus they will acquire stocky roots, and be checked for a time; while the seedlings will gain strength from the additional space afforded them.—If a bed be formed and planted for cabbaging in June, and thence every two months; and especially if—as I must presume—a previous transplantation had already been made during May, it is obvious that a succession of crops will be secured during every favorable season till the end of October; and I may add, from positive experience, that if the weather be then fine, and the succeeding winter prove open and mild ("a green yule"), any remaining stock in the seed-bed, however long-shanked and ungainly they may be, if set deep in the soil of a well prepared bed, may make good

progress to the end of November, survive the winter, and produce excellently hearted and sweet-tasted cabbages in April. Small they will be, and some perhaps will fly to seed; but those which do succeed, will amply reward the attentive care of the grower. My experience applies, of course, to the latitude of London, though in a county far westward, and much later in its productions; but I presume that in the north also these hints may be rendered to a certain extent available.

2. The Savoy, Brassica oleracea bullata of De Candolle,—a variety distinguished from all other hearting cabbages by the puckerings of its leaves. It is one of the prime winter vegetables, and well merits the attention of every one who has a garden or kail-yard. There are three subvarieties—the large yellow, the green, and the smaller *green*, which is the hardiest of the three.

The savoy must be sown pretty early in the spring, and therefore I say nothing now of the early processes of its culture; but as it will require transplanting to plots where it is finally to remain, it will be needful to observe, that, as in all respects the intermediate culture will, as nearly as possible, resemble that of spring sown cabbage, the directions above given will apply to it. In England it is customary to transplant at two or three periods of July for the winter supply; but it will be proper to commence the work earlier in the north, and to finish by the middle of that month. The ground should be well digged and pulverized; the texture rather light, and the quality rich.—Draw drills or shallow trenches about thirty inches apart; tread along the drills or press them with a broad pole, till the soil become smooth and compact; then plant the savoys eighteen inches asunder, filling the holes with water, and fixing the roots firmly in the soil. After they have become established, and begin to grow, the spaces will require the hoeings and diggings which are so essential to the progress of plants of all the cabbage family, and have been before alluded to. As winter approaches, the earth ought to be brought up to and about the stems.

The planting in open, manured trenches, in *dry* weather will not only secure the growth of the plants, but greatly tend to protect them from frosts during winter.—*Savoys* are not considered to be in perfection, till they have been exposed to a degree of frost; and they will subsequently furnish the table throughout the winter months.

3. Broccoli.—This variety of the cabbage tribe is divided into a number of subvarieties, all of which are excellent furniture for the garden. By Professor De Candolle it is placed in the sixth division of his arrangement, *Botrytis* (*Brassica botrytis*) *i. e.* resembling a bunch or cluster of grapes, but this grape-like species or variety admits of another sub-variety, as No 1 is the cauliflower, *Cauliflora*, or flowering cabbage; but No. 2 is the broccoli, and is designated as *Asparagoides*, or asparagus-like cabbage. Though the similitude of broccoli to asparagus may appear somewhat fanciful; yet as precision of classification is obtained, it will be perceived that it is far better to enter into minutiæ closely, than to persist in a mode of arrangement which is equally ill-defined and undiscriminating.

This delicious vegetable is perhaps without its rival in the garden, and its culture is very simple; it is too late, however, in the season to raise it from seed, and therefore I defer to enter upon a regular detail till the spring of next year. I have, however, raised some of the finest *Portsmouth* cream-colored, from seeds sown after the 10th of June, which produced compact and exceedingly large heads in the following April or May: it may therefore be worth while to try a small sowing as early as possible in June, following the directions, in as far as concerns the mode of preparing the soil, &c., which are given under the article cabbage, and transplanting into manured trenches, six inches deep, and ten or twelve inches wide, not later, if possible, than the third week of August. In the event of frosts, before November, no time should be lost to bring the earth that was thrown out, and lay as a ridge on each side of those trenches, to the stems of the plants, as is done in earthing celery.

But if we may trust some modern writers of new discoveries, *broccoli may* be propogated by slips, with the most successful results. Every one ought to try the method who has in his garden the stems of plants, the heads of which having been cut show a tendency to protrude sprouts. In *the middle of June*, says a writer, whose article is now before me, (or for Scotland, say *as early as possible in June*,) "I slipped off a quantity of the side shoots, and planted them. I had them well watered and well secured in the soil. They struck root in a very short time, and made strong plants which produced heads of a fine size at the usual season." "I am persuaded the plan is well deserving attention, not only with broccoli of the same kind I have cultivated (*late flowering purple*) but with many other kinds; thus an excellent variety might be perpetuated without the risk consequent upon seed."

I have not myself had an opportunity of experimenting upon this vegetable, since I saw the article quoted from, but have reason to believe the plan has been proved to be feasible; in fact, there is nothing in the analogy of the species with its type, which is unfavorable to the operation.

4. Pease.—At this season of the year it may appear almost too late to speak of the cultivation of the pea; but I am inclined to notice it for a reason which will be shortly explained.

The *garden-pea*, of which there are many varieties, is found in the fourth tribe, *Vicieæ* (that is among the vetches) of the great suborder Papilionaceæ of the natural order *Leguminosæ*, and in the 17th Class, 4th Order of the Linnean System, Diadelphia, *Decandria*. Every one is aware of the peculiar shape assumed by the blossoms of plants of the pea tribe; which, it is evident, can readily be made to constitute the type of a very natural class, in which most of our esteemed leguminous or pulse-bearing vegetables are to be found.

At some future day, I intend to enter at large upon the characters of all the favorite pease for table use; but on the present occasion I only allude to one, which is a great acquisition, and of very recent introduction, the early white *Warwick*. It is adapted to field, as well as garden culture, is moderately prolific, hardy, extremely early, rapid in its course of growth, soon off the ground; and of a high peculiar flavor, that to some persons is extremely agreeable, though others do not affect it.

The seed, two years since, was dear, its price is now reduced; and it is stated that three crops may be produced on the same land, and leave it open for wheat. This, however, I have not seen proved: but having grown the pea, I can recommend it to every one who wishes a rapid grower. A crop sown in a long drill very early in June, may be succeeded by another sown in July, with every prospect of success. If the ground be dry, from a continuance of hot weather, the best method to ensure a vigorous plant is to dig a moderately broad trench, to saturate the soil at the bottom with water, to return the earth into the trench, and make that very wet; then, after covering the earth with mats, or green boughs for a day, just to permit the earth to settle, and so far to drain itself as to become in a workable condition, to strike a drill three inches deep, to sow the seed along it pretty thickly, but not in the crowded state too frequently seen; water should then be poured from the spout of a pot over the pease, and the loose earth returned upon the seeds, and pressed or trodden firmly over them. One liberal preparatory watering thus given, is of more avail than fifty subsequent sprinklings. *Mildew* so common on the plant of autumnal crops, is, as Mr. Knight truly observes, obviated. He has had perfectly fine pease on his table in October, and it is certain that where disease can be prevented, pease in that season are a delicacy of the first-rate excellence. The Warwick, I think, promises to prove a valuable species for the purpose of a late crop, because the course of its entire culture is more rapid than that of the "frame" or early Charlton pea. When the plants rise above the soil one inch, the earth near the roots ought to be loosened by the thrust hoe. Another hoeing must be given when the plants are three inches high; and then, after drawing the lightened earth to the stems, to the height of an inch and a half, as a ridge on each side, branching sticks a yard high are to be applied. Nothing favors pea culture more than judicious sticking: the plants are brought to the light, are supported, and at the same time protected. *Mildew* is the bane of autumnal crops: it seems to be promoted by a droughty state of soil, high solar heat during the day, and cold dews at night: rapidity of growth produced by a deep moist bed, procured by preparatory and *profuse* waterings, appears to be the only effectual security from this fungus.

From the Quarterly Journal of Agriculture—for June

ON PRESERVING POTATOES, AND RAISING THEM FROM SEED. BY SIR G. S. MACKENZIE, BART.

The Highland Society, always anxious to procure information, has offered a premium for the best and approved account, founded on experience, of the most successful method of preserving potatoes in good condition, in their natural state, for a period of not less than ten months from the time of their being taken up. I hope to be able to give to the Society satisfactory information on the above subject, having paid long and particular attention to the potato, and to state some circumstances which do not appear to be so generally known as I presumed they were until I saw the offer above quoted.

Of various methods I have tried for preserving potatoes from frost, that practised most commonly seems to be the best, viz: Making a shallow pit about a foot and a half deep, on a dry spot, and heaping the potatoes like a roof to the height of about four feet. On the heap thus formed, straw is laid to the thickness of about eight inches, and over this the earth taken out of the pit, the whole being beaten firm by the back of a spade. Some time about the end of February, or beginning of March, the pit is opened and the potatoes turned over, all the shoots being picked off. I may here remark, that where a few side roots have proceeded from the shoots, I have planted them, and had almost as large a produce as from sets. The mode of planting them is to cut a drill with a spade so deep that the shoots may be covered about two inches. They are laid inclined upwards towards the soil, covered, and another drill made, and so on. The only risk is from frost; for if once nipt down, their shoots do not recover so readily as those from sets. On this subject I beg to add, that for early potatoes it has long been my practice to spread sets on the floor of a vinery, or on a hot bed in March, with a little sand over them. By the time there is little risk of frost, the shoots are long enough for the sets to be planted out about the middle of April. I have frequently had the shoots nipt down, but they always recovered; that is, new shoots sprung up in a very short time, and I never observed that this made any difference in the period of the tubers becoming fit for use. The early potatoes I use are the London early for the first crop; some of my own, which is a little later, and remarkably mealy for an early potato. After the heap is turned over, as I stated above, it may be again covered, and the potatoes allowed to remain a month longer, after which they should be removed to a barn or shed, and picked.—They should now be frequently turned over, and picked free of shoots. If the eyes of a potato are scooped out, it will gradually dry, if properly exposed; and it may then be scraped into flour though not very white. In this state they will keep for an indefinite time; and there is no risk of their becoming mity, as flour does, dried potatoes might be found useful during long voyages, though potato flour is better.

It ought to be made generally known that there are varieties of the potato which, though sufficiently protected from frost, will not keep, *under any management*, for more than a few months. Do what we will they decay, owing to their natural constitution; other varieties again will keep very long without any trouble. Hence the Society's proper object is not to offer a premium such as the one which has given occasion for the present communication, but to offer one for raising new varieties, and producing one or more with as many as possible of the qualities which a potato is desired to possess. The same observation applies to the keeping of apples and pears, and various fruits and roots. Long keeping is a particular property belonging only to some, and not to all varieties.

Some varieties of the potato are best for the table early in winter. and others are best in spring. Instead of having the trouble to raise different sorts for different seasons, it is best to sow seeds and to procure a number of varieties in this way for selection. It is now about twenty years since I first began to raise new varieties; and I will now state my mode of proceeding, that others may follow it if they think fit.

I first noted down the qualities which it was desirable a potato should have. These are, 1, dryness or mealiness; 2, agreeable taste; 3, moderate size; 4, regularity of shape, not having deep eyes; 5, not bursting when boiled; 6, not having a tendency to shoot at an early period; 7, long keeping; 8, productiveness. Among hundreds of varieties I have not found one possessing *all* of these qualities, but I do not despair.

Having gathered the apples from different varieties, I keep them till spring, when I open them, take out the seeds, and dry them. A piece of ground being prepared by digging in some manure, but sparingly, and the surface being finely raked, the seeds are dropped thinly into shallow drills, two feet asunder. When the plants appear, they are thined out to eighteen inches in the rows, and I have usually selected the strongest. Those taken out may be transplanted to another spot. As the plants grow, the earth is heaped round them, I have observed that, with some exceptions, those plants which flower the same season, seldom produce tubers. My experience has proved that the produce of the first season is not to be relied on as an indication of future productiveness; therefore no seedling should be rejected the first year. I recollect a plant that produced but one tuber, about the size of a walnut; this produced the second year one hundred and twenty tubers of good size; but this degree of productiveness did not attend succeeding generations. I have observed in general, that rough or scaly skinned potatoes are the driest, and often too the earliest. I plant every tuber produced the first season that is not less than a pea, for should one hit on a good variety, it is then more rapidly increased; it is but a lottery, and some space of ground must be allotted to the drawing of it. I have had as many as three hundred varieties growing at once.—Of course, each variety must be tallied, and a memorandum kept of every thing connected with each. Each variety should be tested the second year, at the time it is taken up, and again in the spring, and those that are good at both seasons preferred for future trial. Indeed all may be rejected but the one that has the greatest number of the qualities noted. In this way every one may procure sooner or later, a good variety of potato. It is of the greater importance to procure in this way; for difference of soil, and even perhaps of situation, seems to have singular effects, a fine potato in one soil proving bad in another, and *vice versa*. I have one variety that possesses the 1st, 2d, 4th, 5th, 6th, and 7th qualities, which I have cultivated for about eighteen years, and I have not yet succeeded in raising a better. It seldom, however, yields above twenty bolls an acre, of old Ross-shire measure, the peck being fifty-six pounds. Though there are many sorts more productive, yet this potato keeping very long under the management already described, has brought it into very general use in this quarter. I have had young potatoes of this sort, of tolerable size, at my table along with tubers of the previous year. It is ripe by the middle of September. During the two last seasons, the sets of potatoes decayed in many places. None of my own were affected, but some of my tenants lost large patches. I observed a wire-worm on some of the decayed sets, but whether this worm was the cause of the failure, or the failure of the sets induced the insect, from whose eggs the worm proceeded, to lay them on the set, I could not ascertain. It often happens that effects are regarded as causes in such matters. It is my practice to have the potatoes cut into sets, and spread out to dry during ten days or a fortnight before planting them. This serves to prevent risk of their rotting in the ground. But I have known sets of some varieties rot soon after the appearance of the plant above ground; and others I have taken up sound when the crop was ripe. Thus it is clear that long keeping does not depend on the *mode* employed to preserve potatoes, but on the natural quality of a variety; and the varieties ought to be increased from seeds until the qualities I have enumerated are found in one, or at least the most important of them. It is the opinion of some that the productiveness of potatoes decreases by long cultivation. I doubt this, at least it has not occurred to my observation. If a variety be planted on a soil different from that in which it has succeeded, it may fail, and I have known this to happen.

On the whole, I conceive that the object of the Society can be best attained by the recommendation to every one interested in the culture of potatoes, to raise new varieties from seeds. Seedlings rejected, I mean the second year's produce, need not be thrown away, but given to cattle or pigs, so that the space occupied by the plants cannot be said to have been misapplied.

Since the above notices were written, extensive and accurate experiments have been made in the garden of the London Horticultural Society, in reference to the question, whether it is best to plant sets or

whole potatoes. I had long since found that sets were best. The first set of experiments made seemed, however, in favor of whole potatoes; but I pressed a repetition, and also repeated the experiments myself, and the question has now been finally decided in favor of sets. It migh perhaps be of use that a well prepared abstract of the papers in the Horticultural Transactions should be drawn out for the *Quarterly Journal.** A great deal of non sense has been published about the remarkable failures of the potato crop in different places. The thing is still a mystery, which may not be cleared up for some time. It appears that early planting gives heavier crops than late planting.

From the British Farmers' Magazine.

HISTORY OF THE NUTMEG.

The tree called *myristicha moschata* by botanists, grows naturally in a group of islands forming a part of the Moluccas, called the Isles of Banda, in the Indian Archipelago: a cluster which seems to have been thrown up by the sea in some volcanic effort, as there is now upon one of them, named Gonong Api, a volcano, constantly emitting smoke, and often flames. The first island, Banda Niera, is the chief settlement, and contains two forts: its harbor is spacious, but difficult of access. The second is Banda Lantoir: the third and fourth in importance are Puloway and Pulovun. These four islands were the only places where the cultivation of the nutmeg was allowed by the Dutch, but there are several others under the same government. What these islands produce in superfluities, they want in necessaries. The soil is a rich black mould, but it produces no corn, the natives subsisting chiefly upon sago. The nutmeg tree grows like a pear tree in form and size; its leaf resembles that of the laurel. being of a bright green color on the upper surface, and grayish underneath: when bruised, it diffuses an aromatic perfume. The flowers are white, small and scentless. The fruit is similar to a wal nut in form, but more fleshy and full of juice. The external pulp dries up to a crust of a deep yellow color, which, opening at one side, discloses a membraneous coat of a beautiful red tint, known to us by the name of mace, which lies immediately over the thin and brittle shell of the nutmeg. This is the time to gather the fruit; if left longer on the tree, the mace would get loose, and the nutmeg would lose that oil, which preserves it, and which is one of the great excellences of the fruit. The nutmegs, which are gathered before they are perfectly ripe, are preserved in vinegar or sugar. The tree yields three crops annually, the first in April, which is the best, the second in August, and the third in December, yet the fruit requires nine months to ripen it: thus the tree is constantly bearing flowers and fruit at the same time. After the fruit is gathered, the outer covering is stripped off, and the mace being carefully separated from the kernel, is laid in the sun to dry. The nuts require more preparation; they are spread upon hurdles, and dried for six weeks, before a slow fire, in sheds erected for the purpose. After this they are separated from the shell and thrown into a strong mixture of lime and water, which is a necessary precaution to preserve them from worms: with the same intention the mace is sprinkled with salt water. After this process, the fruit is cleaned, and packed up for exportation.

It appears, from experience, that only one third of the nutmeg trees bear fruit, but this cannot be discovered until the twelfth or fourteenth year of their growth; therefore, thep must not be cut down at an earlier age. The fruit-bearing property is of short duration, as the tree will yield only from the twelfth to the twentiety year, and generally perishes at the age of twenty-four years.—The nutmeg tree delights in a damp soil, overgrown with weeds, and even shaded with large trees, provided it be not stifled with them. Under the shelter of the *canmarium commune* (?) it thrives very well, and bears the cold of the tops of the mountains. The fruit differ in quality according to the age of the tree, the soil, and the method of culture. The round nutmeg is preferred to that which is oblong, though they are specifically the same. It ought to be fresh, moist, heavy, of a good scent, and an agreeable, though bitter flavor, and it should yield an oily juice when pricked.—The islands are divided into a number of plantations, under the management of a mixed race of Europeans and Indians.—The Dutch made use of many illiberal means to secure to themselves the exclusive possession of these valuable productions; many trees they destroyed, reserving only sufficient to produce a certain quantity of nutmegs; but finding the climate of Banda very unhealthy, and that a great number of their servants fell victims to it, they attempted to transfer the culture of this spice to Amboyna; these experiments have, however, proved unsuccessful.

In 1774, the English navigator, Forrest, found in a small island near New Guinea, called Manaswary, a nutmeg tree, the fruit of which was of an oblong shape, but well flavored. This enterprising man plucked up about a hundred stems of the tree, and slanted them in 1776, on the island of Bunwoot, which had just been ceded to him for the East India Company, by the Sultan of Mindanao. Bunwoot is situated to the north east of Borneo, and is a healthy spot, covered with beautiful trees.

Libilliadiere also found the nutmeg tree upon the little island of Cocos, near the northern extremity of New Ireland. The fruit, when he saw it, was unripe, and of an oblong form. The island is covered with evergreen trees, among which the *Barringtonia speciosa* is conspicuous. It extends its branches laden with flowers horizontally a great way over the sea.* There are few cocoa-nut trees, but many figs of different kinds. Fruits of several species of the screw pine, of the *Barringtonia*, and of the *Heritiera*, which trees stretched their branches and even their trunks, in a very remarkable manner over the sea. It is thus, no doubt, that the seeds of plants are conveyed from one island to another without the assistance of man. Where there are no rills to carry fruits to the sea, the want of moisture prompts these trees to bend over the ocean, and obtain from its evaporation the nourishment they require.

The principal of the Molucca islands are Amboyna, noted for the cultivation of the clove-tree; to which may be added Ceram, Ternate, Tidore, and Batchean.—Ceram is a large island to the north of Amboyna. Several chains of mountains run parallel to each other in a direction from east to west, and separated by fertile vallies containing luxuriant vegetation. In ancient times the peninsula of Hoewamochel produced large quantities of nutmegs, but the trees were extirpated by the Dutch about the year 1697. At present it is covered with sago trees (*cycas circinales.*) The wood usually called Amboyna, and the Salmoni, both of which are exported from Amboyna for the purposes of ornamental cabinet work, are mostly the productions of Ceram. Along the shores of this island, uncommonly fine shells are found.

Ternati is only about twenty-four miles in circumference. Larger nutmegs are found on it than any procured at Banda: but the culture of them is discontinued.

Tidore, the next of these islands, lies to the south of Ternate, and, like that island, is mountainous, and well watered by streams from peaks which are generally capped with clouds. In 1521, Juan Carvallo, one of the surviving companions of Magellan, arrived at Tidore, where he was well received, and allowed to load two ships with spices for Spain. The Portuguese and Spaniards after this traded to the island. In 1579, Drake arrived there and began to gather spices without having permission from the king, who was at first greatly incensed, but was afterwards appeased by presents. The inhabitants of all these islands are Malays.

The Chinese landing upon the Moluccas were the first discoverers of the clove and nutmeg. These new acquisitions were soon admired all over India, whence they were conveyed to Persia and Europe. The Arabians repaired to the islands but were driven out by the Portuguese, who, in their turn, yielded to the Dutch in the year 1621. After being alternately in the possession of their conquerors and the English, they were finally taken possession of by the latter in 1810. I have named those of the Moluccas only which are noted for their spices. Among the numerous small islands comprehended under the same government, are several producing various articles of exportation.

When we reflect upon such productions of nature as those of which I am treating, we must admire the beneficence of the Almighty, in having provided us with the means of varying, according to our particular taste, the flavor of the food necessary to our sustenance: how much more grateful ought we to be for those higher blessings of intelligence and industry, without which the treasures of the east would have remained confined to the dis.

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*This circumstance is remarked by every voyager passing through among these islands.

tant spots where they grow. We import from these and other lands, luxuries which by constant use almost become necessaries to us: we ought at least to bestow in return, the blessings and virtues of civilization. Many Europeans have and are attempting this, but it is to be feared that, until by some great revolution in the moral world, the degrading traffic in slaves be entirely abolished, civilization will make but slow progress in the three quarters of the world thus disgraced.—We are assured that the "knowledge of the Lord shall cover the earth as the waters cover the sea," and although we shall not see that period, we must trust that it will arrive; and that then the gentle Hindoo and the savage Malay, shall be united in the bonds of Christian peace and brotherly love.—[Mag. of D. E.]

RECLAIMING WASTE LANDS.

When we look about us in different parts of the State, we cannot help being struck with the amount of waste lands on every side. These appear in the shape of pastures grown up to bushes—in the form of swamps full of alders and birches, and in bog land which would bear excellent grass if the moss and the hardhacks were destroyed. Many, who undertake to redeem some their lands do it but partially, and as a consequence of not going thorough, have it to do over again every year or two.—For instance, we know a man who has mowed or cut down his alders four or five times, and they as often sprung up, and soon gave him another crop. A better way to manage this kind of growth is to pull them out by the roots, by means of ox labor. A chain put round them near the roots, and so fastened as to form a noose which will slip up when pulled upon, and a hand to bend the tops over the contrary way from which the oxen pull, will eject them root and branch. They will never start again. Another method is to have a large stout iron hook made for the purpose; an eye may be made at one end into which to fasten the chain. This may be hooked into the roots, and thus they may be *twitched* out with ease and despatch. A yoke of oxen and a couple of hands will clear up, and most effectually too, a goodly piece in a day. In regard to bogs—after they have been ditched in a proper manner so as to make them sufficiently dry—the application of fire in the spring, will in a few years effectually clear off such foul stuff as encumber them, and hinder the growth of better productions. In this way much of the waste lands which now disfigure the face of the State, and are comparatively useless, may be rendered smooth and profitable in a short space of time.—[Maine Farmer.

PLOUGHING BY STEAM.—The following is from a late English paper:—

"Some experiments were tried on Friday week at Red Moss, near Bolton, in this county, in the presence of Mr. Handley, M. P. Lincolnshire, Mr. Chapman, M. P. for Westmeath, Mr. Smith of Deanston, and other men interested in agriculture, with a complete and very powerful steam plough, constructed by Mr. Heathcorn, M. P. for Tiverton. About six acres of raw moss were turned up in a few hours, and turned up in a most extraordinary style; sods eighteen inches in breadth, and nine inches in thickness being cut from the furrow, and completely reversed in position, the upper surface of the sod being placed exactly where the surface had been before. The possibility of ploughing by steam has thus been established, though, as the employment of the steam-plough, in preference to one drawn by horses, will depend on the comparative cost of the two powers, and on that of the implements used, and as there are not at present any sufficient data for judging what the difference of the cost will be, it is not possible to say how far steam is likely to be applied to this department of agriculture. The plough of Mr. Heathcote, though a very powerful machine, appears to us to be much too complex and costly for common agricultural purposes, though we have little doubt that it might be used not only with effect, but advantage; in reclaiming large portions of moss land—such as the bogs of Ireland. Indeed, it is the opinion of Mr. Heathcote himself, that it would not at present answer to employ it in reclaiming a smaller portion of bog than 1500 or 2000 acres, though it may probably be cheapened and simplified, so as to make it ultimately useful on a smaller scale."

We have seen, this week, at Leeds, a specimen of bleached flax, prepared by a York chemist, which appears to present a decided improvement in the manufacture of that article. It has created a great sensation amongst the manufacturers, and been taken for silk. It is capable of being manufactured into the finest thread for veils, lace, cambric, etc., and will supersede those articles of French manufacture. The texture is most beautiful. [Doncaster Chronicle.]

IODINE IN CONSUMPTION.—The external application of iodine to the chest is a mode of employing it, at an early stage of consumption, which I consider at once safe and efficacious. When an ointment, prepared by mixing together two parts of hydriodate of potash, one part of iodine, and ten or twelve parts of ointment, is applied to the surface of the chest, especially over the parts corresponding to that which is deceased of one or more lungs, in such quantities as to give rise to a considerable degree of cutaneous inflammation, it will mostly be found to produce a great improvement in the state of the affected portion or portions of the lung or lungs, provided its use be continued for a sufficient length of time. I have repeatedly found after the continued application of Iodine ointment to the chest for some months, that the general local symptoms and all the physical signs of the presence of tubercular formation of the lungs, were completely removed.—[Dr. Little on Consumption.]

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. (20—ta18) C. E. Jr.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories o every description.

ALSO—Steam Engines and Railroad Castings o every description.

The collection of Patterns for Machinery, is no equalled in the United States. 9—1y

NOTICE OF THE NEW-YORK AND ERIE RAILROAD COMPANY.

THE Company hereby withdraw their Advertisement of 26th April, in consequence of their inability to prepare in time, the portions of the line proposed to be let on the 30th June, at Binghampton, and on the 12th of July at Monticello. Future notice shall be given, when proposals will be received at the above places, for the same portions of the road.

JAMES G. KING, President.
21—tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do.
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
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N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron. 4—ytf

RAILWAY IRON, LOCOMOTIVES, &

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2¼ by	⅝,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"	"		$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"	"		2½	"
80 "	1¼ "	⅜,	"	"	"		$1\frac{25}{100}$	"
90 "	1 "	¼,	"	"	"		⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

OFFICE PONTCHARTRAIN, RAILROAD CO.
New Orleans, 19th May, 1836.

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,
JNO. B. LEEFE, Secretary.

28—3m.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to

MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co.,
July 25th, 1836.

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cut stone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unknown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.

E. H. GILL, Chief Engineer. 30—to10

TO CONTRACTORS,

Sealed proposals will be received at Jackson, until the 15th day of September next, for the graduation masonry and bridging of the 3d division (50 miles) of the Mississippi Railroad.

This road is located on a pine sandy ridge, the country is healthy, and provisions can be readily obtained at all seasons of the year.

The whole line (150 miles) will be placed under contract, as the location advances next fall; and it is believed that no institution can offer greater inducements to good Contractors than this.

F. H. PETRIE, Chief Eng.

ENGINEERS OFFICE,
Natches, June 10, 1836.

28—till Sep. 5

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, SEPTEMBER 17, 1836. [VOLUME V.—No 37.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, SEPTEMBER 17, 1836.

HARLEM RAILROAD.

We are glad to learn from the following letter, that daylight has been made to shine through the tunnel of this road. We paid it a visit the other day while the men were at work, and never have we seen so apt a likeness to Pandemonium as we have figured it in our minds.

The smoke was so dense that each member of the party, six in number, was obliged to hold his candle close to the ground in order to discover his path.

The miners were furnished with fresh air by means of a blowing apparatus.

The rock is of an unusual hardness, and has offered great difficulties. The undertaking has now assumed a more pleasing character, and we look forward to its speedy termination.

To the President of the New-York and Harlem Railroad Company.

YORKVILLE, Sept. 12th, 1836, 9 o'clock, A. M.

SIR:—I have the satisfaction of informing you, that this morning, at 3 o'clock, the miners succeeded in piercing the remaining part of the tunnel rock, so as to pass lights from the south to the north entrance of the tunnel; and it is probable that by 5 o'clock this afternoon a free passage will be opened to walk through. This event, which has been brought about earlier than was anticipated by several days, entitles the miners to much praise for their steady and unwearied efforts for a fortnight past; and considering the extreme density of the rock, which in some parts almost defied the temper of the drill, will be regarded, I trust, by yourself, and the public, as a very extraordinary evidence of the power of human labor and skill over difficulties which were apparently insurmountable. I beg leave respectfully to remind you that the 15th of September (the day you have heretofore predicted would be the era of this event) has not yet come.

Very respectfully, your ob't serv't.

JOHN RUTTER,
Superintendent of the Tunnel Section.

P. S. Although lights have been passed through the opening, the miners wait for the Board of Directors before any person will be permitted to cross the barrier. A raw hand incautiously attempting it this morning, was saluted, according to the custom of miners, with a bucket of water, and had to retreat with a wet jacket.

For the Railroad Journal.

The following is handed us by one of the Commissioners in this city. Mr. Johnson fully coroborates Judge Wright as to the feasibility of the Oswego route to the West:

OSWEGO AND UTICA RAILROAD.

We have much pleasure in laying before the public the following letter of E. F. JOHNSON, Esq., Civil Engineer, on the subject of this contemplated Railroad. Mr. J. is now employed as Chief Engineer on the Hudson and Erie Railroad, and his opinions on any subject connected with Civil Engineering are entitled to much weight. From his recent survey of the route for a Ship Canal from this village to Utica, he is enabled to speak of the route with a view to the construction of a Railroad with much confidence—and his opinion on this subject, taken in connection with that of the veteran Benjamin Wright, Esq., must, we think, be regarded by the public as conclusive evidence of the eligibility of this route.

To G. H. McWhorter, C. J. Burckle, T. S. Morgan, and A. P. Grant, Esq'rs, Commissioners.

GENTLEMEN,

In reply to your request that I should give you my views relative to the proposed railroad from Utica to Oswego—I would state, that having been employed to make an examination and estimate of cost for a canal on a large scale, between the points above mentioned, I am somewhat familiar with the general shape of the country, and with the facilities it affords for the construction and profitable operation of the contemplated road.

The Utica and Schenectady Railroad, at its termination in Utica, is 19 feet below the surface of the Erie Canal at that place; and as the canal is one continued level to the Rome summit, the total rise to the latter point from Utica is only 19 feet; and the distance being 15 miles, the average ascent will probably not exceed two feet per mile; or, supposing the road to run directly through Rome village, which is elevated thirty or forty feet above the canal, the average will not vary much from three feet per mile.

From the Rome summit to the surface of the Oneida lake the descent is seventy feet

or if estimated from Rome village, about one hundred feet, and distance thirteen miles.

The land on the north shore of the Oneida lake rises gradually from the water, and to obtain the best ground it may be necessary to preserve an average elevation of say twent-five or thirty feet above the level of the lake, which gives for the thirteen miles above mentioned an average descent per mile not exceeding five feet.

In proceeding along the north side of the lake the line will be moderately undulated—not however deviating necessarily very much from a level for a distance of thirty-five miles, until it attains the vicinity of the Oswego river, between Three River Point and Fulton. The remaining distance to Oswego is about fifteen miles, and the descent to the village about one hundred feet, or to the level of the lake, about one hundred and forty feet—making an average of not more than ten feet per mile, and not exceeding, as I imagine, more than thirty feet per mile, for the maximum.

The shape of the ground (with the exception of the portion last mentioned, near the lake,) is very favorable, and will be found, as it regards cost of construction, level character of the grades, straightness, and all the facilities for a cheap and rapid transit, superior to most other lines of Railroad in the country.

The route, the general features of which I have described, will be seen by an inspection of the map, to be very direct—the total distance not varying much from seventy-eight miles, whereas, the distance by the Erie and Oswego Canals is ninety-eight miles.

You will understand me as expressing no opinion as to the location of the road.—There may be other and more favorable routes than the one above mentioned, with which I am not acquainted, all of which I presume will be duly examined before the final location.

The section of country through which the road will pass is rich in natural resources, and is rapidly improving; and when the favorable position which Oswego occupies by nature for concentrating the trade and travel to and from the north and west is taken into consideration, there is little doubt that the road in question will ultimately become one of the great leading thoroughfares of the country.

Yours, very respectfully,

EDWIN F. JOHNSON,
Civil Engineer.

New-York, Aug. 30, 1836.

From the New-York Times.

ENLARGEMENT OF THE ERIE CANAL.

Messrs. Editors—I embrace the first moment of my return from the country, to thank you for your editorial remarks in your paper of the 22d, and in your just rebuke to a writer, with the signature of "S.," requiring him to confine himself to facts and arguments, instead of "individual merits or demerits," they are not, as you truly observe, "subjects of newspaper controversy."

"S." states that a "careful perusal of the several articles published in your paper will exhibit a gross medley of folly, inconsistency and ignorance," and confidently appeals to them, for the truth of his assertions, and would wish to convey the idea "that they are evidently written to create false impressions, in relation to the enlargement of the Erie Canal." The newspaper discussion of which, appears to create so much sensitiveness in some parts of this State.

From an intercourse with you, of some years, and your intimate knowledge of the rise and progress of "the ship canal project," I trust I can appeal for the honesty of my purpose and purity of motives, in defending from attack, the able report, survey and estimates of E. F. Johnson, Esq., Civil Engineer, to the Legislature of 1835, Assem. Doc. 195. That I take this gentleman, (or Oswego senior,) for my oracle, as stated by "S.," instead of the reply of the "Delphic Oracles," in the employ of the State, is very natural. We were early co-laborers in the same much abused work, viz:—A Ship Canal around Niagara Falls, to be continued from Oswego to the Hudson. But to test "S.'s" sincerity as to "the gross medley and folley of 'Oswego Junior's' arguments, and attacks on the Canal Board," (which I deny,) I tender the proposition to "S.," to reprint, at mutual or entire expense, the articles in pamphlet form which have appeared in your paper, and will also print, at the same time, if accepted, a second edition of Oswego Senior's "appeal to the last Legislature," in relation to the proposed enlargement of the Erie Canal, and then leave the public to judge, if a single argument and statement, that the friends of "the ship canal project" have been answered by those who have attacked it as "visionary," and only use hard names instead of arguments. First—we say, and challenge a reply to the statements we have made, that a cheaper, better, and more effective work, for transportation, can be constructed from Buffalo via Niagara Falls, Lake Ontario, Oswego River, Lake Oneida, Utica, and through the valley of the Mohawk to the Hudson, to secure to this city the trade of the "Far West," in preference to first enlarging the Erie Canal—as we say, with the evident, if not certain risk, of interrupting the trade upon it, consuming double the time and money it will take to make a separate and more perfect work.—Second.—We have stated our conviction, in which we are supported by the opinion of able engineers, that the enlargement of the Erie Canal to a Ship Canal, (7 feet by 70,) cannot be progressed in "without interfering with, or interruption to the trade upon it," with the certain destruction of a large portion of its present fixtures, and at an unnecessary expenditure of at least two dollars for one, over what would be required for a separate canal, as indicated, instead of the enlargement of the Erie Canal, which after all is nothing but a patch-work, and unworthy the character of the Empire State, in offering facilities to the west, to approach this great centre of commerce of the United States.

Third.—We state and prove, on better data and estimates than was before the Legislature of 1835, when they passed their "Carte Blanche" law to enlarge the Erie Canal, without a sufficient examination of the subject, involving, as it does, with damages, the expenditure of at least fifteen, to twenty millions of dollars, and 12 years of time! that a more perfect work can be constructed, via the Falls, &c., at about one half the expense it will take to enlarge the Erie Canal; that then we shall have two channels of trade to provoke competition, and last, not least, have two canals instead of one, and at a less cost than to enlarge one, and we give as a reason, the fact, that by the Oswego River, Lakes Ontario and Oneida, &c., there is only about 150 miles of artificial navigation to be made, instead of 363 of enlargement,—Providence in his bounty having, on the Oswego route, provided natural waters, conceeded in this country to be the cheapest for transportation, although denied by Mr. Brindley, and it was only on the authority of Mr. Western, an English civil engineer, (who pronounced the Oswego route impracticable for a canal, and deficient in water for a feeder,) that carried the Erie Canal alongside of Lake Ontario to Lake Erie!!!

Allow me to conclude by saying, that in my view, it can only be selfishness, that can argue against opening the Oswego route—at all events, simultaneously with the proposed enlargement of the Erie Canal to Buffalo. Certainly its "Mud Lock," (the scarecrow of the West the last winter,) with its tow path, should be promptly replaced, and put in repair. Let the canal be also enlarged, and we will trust to the enterprise of Oswego forwarders, with the liberality of our Canadian neighbors in the use of their Welland Canal to secure to this city the commerce of the West and "Far West," and to break up the real monopoly and combinations that exist on the Erie Canal to the serious injury and division of much of our trade from New-York to Philadelphia, and particularly from Ohio. That there have been combinations with the Erie forwarders, after this State reduced its tolls to secure the Ohio trade, is too notorious, (spread on our public documents,) to be seriously denied.

Such has been the delays of transportation through this State, from the crowded state of our canals, that it has called forth "public meetings" in Chilacothe, in Ohio, to consider and remedy their difficulties.—Why then delay an hour, the construction of a separate channel, and "let well alone," the Erie Canal, with its million and a half of tolls, instead of risking its usefulness, whilst enlarging in the summer, or building houses over any part of it, to do "necessary mason work with the stoves, at a proper temperature in the winter," as is gravely proposed in Assem. Doc. 99, pages 8 and 10, of the last Session. J. E. B.

REPORT OF THE SURVEY OF THE ROUTE OF THE HUDSON AND DELAWARE RAILROAD, BY JAMES B. SARGENT, ESQ., ENGINEER OF SAID ROAD.

To the President and Diretors of the
Hudson and Delaware Railroad Co.:—

GENTLEMEN—Having in pursuance of your instructions, examined the country from the Hudson River at Newburgh, through Orange County, to the east line of the State of New-Jersey, with a view to selecting the most feasible route for a Railroad, and having made such selection, and carefully designated the same upon the ground—a map of the country traversed, together with a profile of the line, are herewith submitted, and I beg leave to report—

That the route so designated and surveyed is very favorable in all its leading features; that the grades adopted not only come within the useful, but the most effective range of Locomotive power; that the curvature will not in any instance conform to a radius of less than fourteen hundred and thirty-two feet; that the soil over and through which it is proposed to construct the work is generally of a firm and durable material, while it is intermixed with less rock and other hard substances than is ordinarily encountered on lines of like extent; that a spirit of kindness and liberality is manifested by a majority of the landholders through whose lands the line has been traced, which, with their gratuitous cessions of the right of way, affords a flattering earnest of their future confidence in, and liberal support of the project.

The line commences at the junction of Liberty and Washington streets, in the village of Newburgh, at an elevation of 112 feet above the steamboat docks, and runs in a south-westerly direction, and crosses Chamber's Creek about four hundred feet above Reid's paper mill, thence pursuing a similar and very direct course to Tooker's Gate, on the Blooming-Grove and New-Windsor turnpike, thence in a more southerly direction skirting the Bog meadows and passing into the valley of the Otter Kill or Murdiner's Creek about two miles below Salisbury, and near John M'Gill's house.—Thence along the immediate valley of the Kill passing the villages of Salisbury and Washingtonville, Brooks and Thompson's Mills, and the Kill itself seven times; thence the line bears more west and again crossing the Kill leaves Campbell Hall half a mile on the south, and passing through a part of Tamerack swamp reaches the low summit between the Otter and Wallkill vallies at Legrange. And thence passing the summit, pursues the east bank of the Wallkill until opposite Boges Island, passing Phillipsburgh, George Phillips' Mills, &c. At Boges Island the line crosses the Wallkill and enters upon the broad flats, usually known as the Drowned Lands, and continues near to the west-margin of them to the Jersey line, at times occupying the high lands that extend into the valley, and at others following upon the flats themselves.

A line has also been traced from the dock in front of the United States Hotel, to connect with one described above at Chamber's Creek. This was examined with a view of establishing a track for the conveyance of freight directly to and from the river without the aid of stationary power. That its adoption will effect the object and afford an acclivity upon which the motive power employed upon the main part of the road may act successfully is undoubted, since the ascent is but 100 feet to the mile, and the distance 6260 feet; and since the engines and horses may be employed at intervals between the arrival and departure of trains, in moving freight upon this, and in getting it ready for shipment, or passage on the road.

It should also be borne in mind that by far the greater quantity of freight would descend, and, of course, would require no power except the empty cars: as the loaded ones would descend by gravity, and be controlled by the brakes or clogs attached to them, hence no additional power would be required, except to haul up the freight destined for the west.

Commencing the line so far south as Washington-street was not with the design of terminating the passenger track at that point, but because the line from it could be so directed that it would have command of an entrance into either Montgomery, Grand, or Liberty streets, and thus enable the company to establish their depot at any point in either of the three that they might deem proper or most advantageous.

The main course of the line above briefly described is believed to be preferable to any other, general one, that can be obtained through Orange county; from the fact of its central position, and passage through the only uninterrupted valley that traverses it from east to west. But, aside from these natural and evident advantages, sufficient in themselves to satisfy any disinterested observer, the undersigned has had before him the surveys of 1831, by H. G. Sargent, Esq., and of 1835 by J. B. Jarvis, Esq., either of which afford ample evidence of the inutility if not entire impracticability of adopting a more northern route; hence a mere personal recognisance of that suggested north of Snakehill fully confirmed the opinion derived from the surveys before mentioned, and led to the conclusion that a more minute invesigation would only add to the cost of the survey and more fully develope its difficulties.

A recognisance has likewise been made of a route leaving the one selected at Legrange, passing through the village of Goshen and along a range of Islands that extend themselves centrally through the Drowned Lands. This route is practicable, and in many respects favorable; but, inasmuch, as it would add to the aggregate rise and fall of the road more than 100 feet, without improving its directness or facilities for construction, the line following the immediate valley of the Wallkill is preferred.

Although the line selected, as a whole, may justly be considered favorable, there are nevertheless obstacles of no inconsiderable magnitude to be encountered between Newburgh and Salisbury, owing, as will be seen by reference to the profile, to the rapid rises, and consequent inadmission of ascents of sufficient ratio to attain the elevation required to pass the southern spur of Snakehill, without cutting and filling more than would be necessary under a fuller command of the grades. The topography too of this section of country is much varied and broken by small tributaries of Chamber's Creek and Otter Kill, which have their origin in the ranges of Snakehill, and have formed wide and deep valleys where the line comes in contact with them.

Of these obstacles the most prominent are at Chamber's Creek, the valley south of J. R. Caldwell's house, and the ridge and deep ravine where the line enters the valley of the Otter Kill. It is proposed, however, to build a long bridge at Chamber's Creek, and to substitute truss work for the embankment at the ravine near Mr. Caldwell's.—This will greatly reduce the first cost, and enable the company to replace it when it shall decay, with a more durable structure at an expense greatly below what would now have to be incurred, as they would then have the aid of their road to transport earth and other necessary materials.

At Salisbury the route enters a more extended and favorable field. The hills recede from the stream and present a broad and level valley for the site of the road, the ample capacity of which for affording a cheap and desirable location, is only interrupted by the windings of the stream, which renders it necessary to cross it so many times, and occasionally brings the line in contact with points of the high lands that bound it. This favorable range may be said to extend to the New-Jersey line, as the summit at Legrange dividing the waters of the Otter and Wallkills, is low and level, and may be considered a continuation of "that spacious and fertile valley formed principally on the one side by the Shawangunk mountains, and on the other by the continuation of the Highlands." Nevertheless the east shore of the Wallkill is occasionally abrupt and the stream continues to be closely bound by the high land until it reaches the proposed crossing place at Boges Island; thence the flats vary from a half to six and eight miles in width, and are so little elevated above the stream and so level that they are overflown by almost every rain, which has given rise to the appellation of Drowned Lands. But although the frequent crossings of the Otter Kill, the bridges at the Wallkill, the Rutgers and Mechanictown Creeks, together with those of many streams of minor importance, and the cuttings where the line comes in contact with the high land are items that will add no inconsiderable sum to the cost of the road; yet taken as a whole this part of the route in point of cheapness of construction, ease of grades, length of tangents, and lightness of curvature, will be surpassed by few, if any, works of equal length in the State.

The maximum grade upon the line is 45 feet to the mile, and may with little additional expense be reduced to 40, but since it occurs but in one instance, and that where the line is nearly straight, it is deemed economical and judicious to adopt it.

Grades descending to the west occasionally occur, and will swell the aggregate amount of rise and fall on the whole route, they cannot, however, be avoided without rendering the line much more circuitous than it now is, and either would be far more objectionable than the plan proposed, since these grades in no instance exceed 20 feet to the mile, and will still give a preponderance of power to the descending trade much beyond the actual difference that will exist between the quantities transported.

The length of the road from Liberty-street to the Jersey line will be	37 8-10	miles,
From the dock in front of the United States Hotel	38 2-10	do.
The actual rise from Liberty street to the N. J. line	278	feet.
The total amount ascended for the same is	318	do.
The total amount of rise and fall for the same is	460	do.
To which add 112 feet for the same from the River which gives the total rise and fall	572	do.

The estimated cost of the road per mile, including graduation, superstructure, land, depot, buildings, carriages and machinery, &c. is $10,714 30

Multiplied by 37 8-10 miles gives the total $105,000 00

With these general remarks we pass to a description of

First, The Plan of the Road.

Second, The Policy and Prospects of the Project.

And refer the company, for information relative to other minutiæ, to the accompanying map, profile, table of grades, and estimates in detail.

OF THE PLAN OF THE ROAD.

This part of our subject is of the utmost importance. The experience of the pioneers in Railroads has already cost a credulous and confiding public vast sums of money in speculative and extensive experiments. Experiments that from their attendant cost and varied results, have not only checked the progress, and rendered doubtful the completion of works of the first importance to the community, but that for a time cast a gloom over the whole system of railroads, and prevented the undertaking of enterprises of the kind, however favorable and necessary they might appear, until a more encouraging precedent had been presented, than was exhibited by the earliest roads.

But the public have now the gratification of seeing a system of constructing and applying power to railroads that renders them far superior to every other mode of internal communication in speed, safety, and capacity for accommodating their increasing wants; nor is it the least interesting fact of their progress in this country that out of the hundred different plans that have been tested, the simplest and cheapest of them all

is at this day taking precedence, and is most generally approved.

The plan recommended for the road of which we are treating will, I trust, be found consistent with the experience of the day. It will not materially differ from those adopted on the principal routes in this state, and will present a graded surface of 20 feet clear of ditches, with slopes of one to one in excavations, and of one and a half to one in embankments. This will give ample room for two tracks of 4 feet 9 inches in the clear, each.

The superstructure will have two continuous and parallel lines of sills composed of white pine 4 by 9 inches, and not less than 14 feet long each. These sills should be imbedded in trenches sunk in the graduation so that the upper side of them will correspond precisely with the grade of the road. Transversely to these, ties will be placed every three feet measuring from centre to centre. The ties should be seven and a half feet long, and 6 by 6 inches square, and of chestnut, white oak, or white cedar timber; also have notches of $2\frac{1}{2}$ inches deep to receive the wood rail and the spike for securing it to the sills, and guarding against lateral pressure. In the notches of the ties will be placed the wood rail, and be secured by red cedar, locust, or white oak wedges. The rail to be composed of Norway pine, and be in lengths of 18, 21, 24, 27 and 30 feet, and 6 by 6 inches square. The whole to be surmounted with an iron plate rail $2\frac{1}{2}$ by $\frac{5}{8}$ inches, which should be firmly spiked to the wood rail and underlayed at the joints by connecting plates. The horse path to be formed of materials from the side of the road, and slated or graveled as the material is most convenient.

It is confidently believed that a road upon the above described plan, with a single track and suitable turnouts, will, for the present, be capable of performing all the business that will accrue to it, and that an additional one will meet the demands when its facilities are known and appreciated, and its freight is drawn from all the vast resources that must ultimately contribute to it.

THE POLICY AND PROSPECTS OF THE PROJECT.

The Charter of the Hudson and Delaware Railroad grants to the company the privilege of connecting with the New-York and Erie Railroad, the one projected from the Jersey line through the valleys of the Wallkill and Pepo Coton creek and the Paulins kill to the Water Gap on the Delaware River, and through it, with that now actually executing from the Water Gap to the Susquehannah River, upon such terms as the contracting parties shall agree.

The New-York and Erie Railroad, it is well known, is rapidiy progressing. That through New-Jersey is now being surveyed under my directions, and will undoubtedly prove sufficiently inviting to capitalists to insure its completion at an early day, after it is known that the Hudson and Delaware Railroad is to be extended to meet it at the line.

Thus it will be seen that the Hudson and Delaware Railroad is ultimately to become the outlet for all the surplus productions of a country widely extended, and reaching far beyond its actual limits, that it is to receive and transmit to the Hudson the freight and passengers concentrated upon more than a hundred miles of railroads in New Jersey and Pennsylvania; roads that will penetrate the richest agricultural and mineral districts of the former and the vast coal the beds of latter, while its passing the track of the New-York and Erie road necessarily implies a connection with and participation in the business of transporting freight and passengers from the whole southern tier of counties to and from the great EMPORIUM of COMMERCE. That the Hudson and Delaware Railroad is secure in this latter means of affording a revenue to the company, needs no better evidence than the fact that the distance from the mouth of the Chechuck creek, (the most probable junction) by the way of Tappan landing to the city of New-York, is, (as given in the report of James Seymour, Esq., upon the New-York and Erie Railroad,) $82\frac{1}{8}$ miles, while by the way of Newburgh it will be only $25\frac{7}{8}$ miles by way of railroad, and 60 by the Hudson River navigation, making in all $85\frac{7}{8}$ miles. And the rise and fall upon the route proposed for the former is 1308 feet, and on the latter only 426 to Washington street, and 538 to the dock in front of the United States Hotel.

The route, therefore, via Newburgh is preferable to that via Tappan landing, and will afford the cheapest and most expeditious means of transit for freight, of every description. Cheapest, because the actual difference in distance between the two routes is but $3\frac{7}{8}$ miles, and because the route via Newburgh will not only have 770 feet less rise and fall to encounter (which alone will throw the balance on account of traction vastly in favor of Newburgh,) but because it will have with an increase in total distance of $3\frac{7}{8}$ miles, an excess of river navigation of 30 miles. And the river affords means of transporting both passengers and freight cheaper than it can ever be done by railroads. Most expeditious because the same power will give equal speed, and an equal quantity can be applied and give an excess of speed.

It is, however, urged that the termination of the New-York and Erie Railroad at Tappan landing will not be as likely to expose its business to interruption by ice during the winter season, as if it were to terminate at a more northern point. This is undoubtedly true, so far as it is consistent with the actual circumstances that will attend its termination at that point. But these circumstances give some plausibility to the suggestions of a more northern route, and as it is understood that the water in Tappan Bay is shallow for some distance into the stream, and that the entrance into the harbor *is* annually interrupted by ice, it is certainly questionable whether Tappan or Newburgh harbor is preferable for the winter season. It is true that the water at Newburgh is deepest, and it is equally true that water congeals most rapidly where it is shallow and spread over a large surface, hence it is believed that the harbor of the latter will be equal if not superior to the former in the winter season, and undoubtedly preferable for the remaining portions of the year.

This difference too will remain relatively the same if the New-York and Erie Company adopt any of the routes proposed for crossing the Wallkill and continuing to Tappan landing; and any of them can be approached upon ground favorable for a junction. Even should they ultimately adopt the Middletown route they may be joined at that place by passing the Wallkill at Stoney Ford and gradually ascending the high lands west of Philipsburgh, without exceeding the maximum grade between Newburgh and Salisbury, and over ground that will admit of a cheap construction of the work. Or the connection may be made with the same line in the valley of the Wallkill.

But notwithstanding the importance of a connection with the New-York and Erie Railroad, and the immense increase of revenue that the Hudson and Delaware Railroad Co. will derive therefrom, it is believed that still greater advantages are to be gained from its connection with the more southern interests. By this another and important part of Orange County is to be served. The extensive and durable water power of the Otter Wall, and Rutgers Kills, with the Mechanictown Creek, brought into full and active use, and a manufacturing interest created that will one day rival in importance, usefulness and value, that so long and justly celebrated for its agricultural productiveness.

The ultimate object of this route has, however, already been alluded to. But as the introduction of mineral coal to market through its channel is of primary importance, it may be well farther to remark that the distance from Newburgh to the Delaware River will be about 81 miles, thence "to the very centre of the coal mines" 53 miles, making the total distance from Newburgh to the coal beds 134 miles, and eleven miles more reaches the Susquehannah river, and the North Branch division of the Pennsylvania canals. And further, that it is stated by high authority that "we can upon completion of our road," meaning that from the Delaware to the Susquehannah, "deliver coal in quantities at the Water Gap at $1 50 per ton, and sell it at that price." Now if this can and will be done, the coal in vast quantities may be thrown into the New-York market at $4 per ton. But if it were to cost $5 50 per ton to deliver it, this channel would still successfully compete with any other engaged in the traffic.

Having thus alluded to the general resources that the road will have to augment its business, add to its importance and increase its revenue, I submit the following estimates with a view of showing that it will pay a large per centage on the cost, even under the most limited circumstances that can exist. They are based upon the supposition that the New-Jersey road is not built, and that the transportation on the whole and parts of the line will be equivalent to that of the items enumerated for the whole distance from Newburgh to the New-Jersey line.

ESTIMATED ANNUAL RECEIPTS.

40 Passengers daily each way, 80 for 300 days of the year, 24,000 yearly at	$1 50	$36,500
4,000 Cords of Wood,	1 75	7,000
Rails, Posts, Timber, Stone, &c.		2,000
1,000 Tons of Butter,	1 50	1,500
1,500 Tons of Pork and Live Stock,	1 50	2,250
150,000 Bushels of Grain and Vegetables,	4	6,000
5,000 Tons of Pressed Hay,	1 50	7,500
40,000 Bushels of Lime,	8	3,200
500 Tons of Iron,	1 50	750
RETURNING FREIGHT.		
2000 Tons of Gypsum,	1 75	3,500
1000 do. Salt,	1 75	1,750
4000 do. Merchandise of various kinds,	1 75	7,000
		$78,950

ESTIMATED ANNUAL EXPENSE.

Interest on first cost,	$28,350
5 per cent. on the perishable part of the superstructure,	6,000
10 per cent. on the Cars, Engines, Horses, &c.	3,000
Superintendance, repairs, fuel, &c. &c.	16,000
Total,	$53,350

$53,350 deducted from the estimated annual expense, leaves 25,600 dollars as the net income, over and above all interest, and deducting the three last items in the annual expense, and adding the remainder to the net income, gives 53,950 dollars, as the annual revenue, or THIRTEEN AND ONE-THIRD per cent. on the capital invested.

The above estimates, though stated in round numbers, are deductions from much minute data, and it is believed that those of the receipts will be found generally far below the actual tonnage that will pass upon the road, and in no one item exceeding it. In fact, with the exception of pressed hay and lime, equal quantities are now hauled into Newburgh over the turnpikes and common roads that will be within the influential range of the railroad. And the items in the annual expense *are known* to be liberal for even a greater tonnage than is stated.

The result, therefore, is that the Hudson and Delaware Railroad will amply sustain itself by its own local resources, and it is therefore unnecessary to enter into any detail to show that its receipts would be immensely beyond our calculations if united with the important works before mentioned The single article of coal would more than double the weight of transit and swell the receipts in like proportion.

All of which is very respectfully submitted,

JAS. B. SARGENT,
Civil Engineer.

EXTRACTS FROM THE

REPORT

OF WALTER GUINN, ESQ. ENGINEER,

To the President and Directors of the Wilmington and Raleigh Railroad Company.

(Concluded from our last.)

The estimate of the road-way formation falls far beneath the average cost of similar works; while it is believed that the profits will not be excelled by any improvement in the country. For your Railroad, in connexion with the Portsmouth and Roanoke, and the Petersburgh Railroad at Weldon; both of which are links in continuous lines of Railway and Steamboat communication to Boston, must become the great thoroughfare between the North and South; for between the Roanoke river and Charleston, or the Charleston, and Hamburgh Railroad, admitting, there were any other communication by Railway contemplated, its greater length and what is a matter of deeper consideration, its greater expense forbids the idea of rivalry; and places your road almost beyond the reach of competition. So that we may say, in fact, it forms an important if not indeed, the most important link in the great line of intercommunication between the North and the South. Under this view of the subject, it is difficult without the appearance of exaggeration, to estimate the probable revenue.

The travel between Charleston and the Northern cities by steam boats and stages, may be safely computed at sixty thousand. This amount might be greatly swelled by embracing the whole travel from New-Orleans; which we confidently believe will take the route of your Railroad.

But we will say 60,000 Travellers at $12,50 each,	$750,000 00
To this we may add for the transportation of the mail,	50,000 00
Way passengers and freight on produce and goods,	100.000 00
	$900,000 00
Deduct for the repairs and renewal of the road and steamboats,	$200,000 00
And it leaves a nett revenue of	$700,000 00

Now, although I believe this sum will fall short of the receipts of the first year, yet, lest we should appear too sanguine and to remove all possible objection, we will deduct from the foregoing, twenty-five per cent., which reduces the amount to $525,000 00, or a dividend of 35 per cent on the estimated cost of the work.

A Railroad which produces 6 per cent. nett in the first years of its operation, is considered good property; for the increase of business which must ensue, always increases the annual profits in a great ratio.

While our estimates exceed this per centage nearly six times, it will be perceived that we have confined ourselves entirely to the amount of the present travel; and this after being taken at a very low estimate, reduced 25 per cent. But in presenting a view of the prospects of the Road, we should anticipate the probable increase of travelling by reason of the increase of the business and population of Charleston; which must ensue from the great and gigantic scheme which she has in contemplation, and which she will no doubt carry into effect to Cincinnati. And in a few years the Railroad to Hamburg, which is now being extended to Athens, will be prolonged southwardly to Columbus; and thence in continuation with the Railroad to Pensacola, complete the line of Railway, and steamboats all the way to New-Orleans. But without any further specification of the various improvements which are in contemplation and begun at the South, suffice it to say, that your Southern termination at Charleston, towards which all these improvements converge, ensures your immediate, continually increasing and never failing sources of revenue; and completely sets all competition by other and similar improvements, at defiance. For all past experience has shown that the travel on routes connecting *commercial* cities, increases in a ratio, much beyond that of the business or population; and the great lines of travel in all countries led through the commercial towns.

Routes passing through the interior, with a view to divert the travel, must be regarded as experiments running counter to all experience, and of very doubtful success. And I lay it down as an incontrovertible fact, that those works which will prove most profitable, and most conducive to the great and varied interests of the country, may be classified under two heads. Those which connect the commercial cities, and those which lead from the commercial towns by the most direct routes to the interior and western portions of our country.

But your revenue will be greatly swelled from other sources, which we have not taken into the account. All the improvements which are contemplated from the sea-board to the Western part of your State, must cross the line of your Railway; and to whatever point destined, will find it to their interest, to some extent, to pursue it, in order to make selection of the most favorable location. Under this aspect, your Railroad presents itself to the State in a peculiarly interesting point of view. It traverses it nearly through its entire length from North to South, and forms the basis upon which the internal improvement scheme of the Raleigh Convention may be most economically carried out. For, as I have before intimated the cheapest route from any point on the sea-board to the West, from Beaufort, for instance to the narrows of the Yadkin, will be found on a very direct line *West*, until it falls into your Railroad; and thence, (in this case) along it to some point South of the Neuse river.

In a military point of view your Railroad, in connexion with the Portsmouth and Roanoke Railroad, and the contemplated Rail-road between Wilmington and Charleston, may be regarded as forming a complete line of defence to the whole seaboard from Norfolk to Charleston; for there is no Railroad in the country, upon which so large a force can be concentrated in a given time; and where, perhaps, there would be a greater probability of its being required. By the Charleston and Hamburg Railroad and its connexions; the Charleston and Cincinnati Railroad; the Roanoke, Danville, and Junction Railroad; the Portsmouth and Petersburg Railroads; and by means of the Railways to the West within your own State, levys for troops on South Carolina, Georgia, Alabama, Louisiana, Mississippi, Tennessee, Kentucky, Illinois, Indiana, Ohio, Virginia, North Carolina, Maryland, &c., may be met from the remote States in a few days, and in a few hours, from the more adjacent States, and any number of troops, may be thrown on the line of your Railway; whence, by lateral roads and Steamboats, (down the numerous navigable streams which the road crosses) in a few hours, or by a march of a day or two, they may occupy any position on this extended coast. And in the transportation of stores and munitions of war, which, under the military head, is a matter of primary importance, it affords a safe avenue; and in time of war, will prove a saving of millions to the Government.*

As a National work, therefore, yours cannot be considered as secondary to any in the country. But one of the most happy results of the Railway system in the Southern country, and which will be imparted by your Railroad to that portion of the State most concerned, is the effect it will have, by the speedy concentration of troops to put down, if not entirely suppress

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* *Extract from the Report of Mr. Cass, Secretary of War, on National defence.*

"The power of transporting troops and munitions of war, has already opened new views upon this subject; and such is the progress and probable extent of the new system of intercommunication, that the time will soon come, when almost any amount of physical force may be thrown, in a few hours, upon any point threatened by an army. Nashville may succor New-Orleans in sixty hours; Cincinnati may aid Charleston on about the same time; Pittsburg will require but twenty-four hours to relieve Baltimore; and troops from that city, and from Boston, may leave each place in the morning, and meet in New-York in the evening. This wonderful capacity for movement, increases in effect, some of the most important elements of national power. It neutralises one of the great advantages of an assailing force, choosing its point of attack, and possessing the necessary means of reaching it. Detachments liable, under former circumstances, to be cut off in detail, may now be concentrated without delay, and most of the garrisons upon the seaboard may be brought together, and after accomplishing the object of their concentration, be returned to their stations in time to repel any attack meditated against them."

and remove all apprehensions of servile disturbances and insurrections. The speedy transit of the mail, especially between commercial cities, is an object of solicitude with all Governments. Your improvement fully meets this object, and its importance under this head also, cannot fail to attract the attention of the General Government; and also the concentrated concurrent interests of the large cities at the North. And having the effect as we have asserted, your road will have to turn the whole stream of travel between the North and the South, through Charleston, and on the Charleston and Hamburg, and the Charleston and Cincinnati Railroads, she, as well as those interested in these two great improvements, are deeply interested in your success, and will no doubt contribute largely towards it; and the trade and travel it will throw on the Portsmouth and Petersburg Railways, will greatly enhance their profits, and advance the prosperity and wealth of Petersburg, Norfolk, and Portsmouth.

The counties along the line have manifested the interest with which they regard it, by the handsome subscriptions which they have made.

The benefits to Wilmington will be immediately felt in the great increase in the exchange of commodities, which the increased facilities of communicating with a rich back country will afford. And she may be justly proud of the rank to which she will elevate herself, in having projected and carried into effect, an improvement which may be characterised as a great National and State work.

All, which is respectfully
Submitted by,
Gentlemen,
Your obedient servant,
WALTER GWYNN,
Civil Engineer.
Wilmington, Aug. 15, 1836.

FIFTH ANNUAL REPORT OF THE STOCKHOLDERS OF THE WINCHESTER AND POTOMAC RAILROAD COMPANY.

(Concluded from our last.)

While upon this subject, it is due to the general meeting to state the reasons why this actual expenditure has exceeded what was supposed the first estimate so much—a result, which rather unfortunately has befallen most undertakings of the kind. It is admitted that the original estimate of the work was $300,000, exclusive of motive power. It is equally true that 27 miles of the distance, the subject of fair calculation at the time of its commencement, did not at least exceed its proportionate amount of this sum—say $5000 a mile for graduation and masonry. The remainder, extending from the approach of the road to the Shenandoah, to its termination on the Potomac, not at that time located, owing to the uncertainty of the route to be pursued, stands thus chargeable with the increased cost of graduation, being at the rate of more than $12,000 per mile. A good portion of this was prepared for a double set of tracks, in some parts more, most of it was very expensive, from its coming in frequent collision with the bed of the Shenandoah or the rocky bluffs along its margin, or compelled to follow a trace from Island to Island scattered in its channel, where embankment was obtained only from a considerable distance, and much bridging required across the numerous guts which connect the main stream of the river with the channel of the Navigation Company. To avoid covering the ground belonging to the general government with embankment, and to preserve access, between the different parts of property divided by the road as it passes through Harper's Ferry, it was found necessary to construct twelve hundred feet of double track on piles, the materials for which, as well as workmanship, were very expensive, and the solid embankment wide enough to receive four tracks near the abutment of the Baltimore viaduct, raised from materials hauled from the Maryland shore, drew far more more heavily upon our funds, than was anticipated by the Board. The price of timber for the superstructure, went generally beyond its first estimated cost, and the amount of land damages paid for the right of way, far exceeded the calculation of the warmest friend of the landed proprietor affected by its location. They are little short of $40,000, and if to one half of that sum, still leaving a reasonable allowance to meet the original demand expected from that source, there be added more than $30,000, arising from the unexpected difficulties above referred to, the reflecting stockholder will not be at a loss to account for the apparent miscalculation of the original friend of the improvement. In truth, however, there are but very few works of the kind in the United States, which have not cost much more than ours, constructed at the same time with equal permanency. 15,000 dollars per mile, including the motive power and depots erected will be deemed by the experienced eye, which has examined our railroad, as no extravagant average. And may it not in some degree be attributed to the laudable views of our inland economy, and the too generous confidence we reposed in our neighbors, as to one item of expense at least, if our community may have been surprised at the aggregate cost of the work. Should disappointment, however, have attended the construction of the railroad, and the time it has occupied, this may be said to have disappeared, so far as the success of its operations has been tested. In almost every instance, the trade over it has gone beyond our early calculations. The crop of last year was a short one, and a great portion of it was sent to market before our road was opened. Notwithstanding this, the quantity of flour we have transported up to the 1st of August, a period of little more than four months, is but little under 16,000 barrels. Grain of various kinds, and meal, heretofore almost excluded from market, as will be seen by the exhibit of our trade, have swelled our freight—and many articles, such as pig iron, iron blooms, and a quantity of lead from the borders of Tennessee, with now and then cotton and tobacco, have formed an unexpected addition to our transportation. The receipts from passengers who have passed over the road have also exceeded our first calculation. Although but little provision had been made for the accommodation by stages to the south and west of Winchester, where we think there is much room for competition, and the roads leading to the town have been during the greater part of the season, in a very discouraging state from the frequent rains—the number of passengers has averaged about forty a day since the opening of the road—twice the number calculated in the first report, submitted to our citizens on the subject of a railway from Harpers' Ferry.

From the failure of contractors to complete the Northwestern Turnpike, owing, in some measure, to the enhancement of the price of labor and provisions, that important avenue to the West, and destined tributary to our road, has yet yielded us a limited supply, consisting of passengers from the National Road, who embrace this delightful route through Romney, by a daily line of stages from Cumberland. Energetic steps have been taken to carry into effect the wise provisions of the Legislature to improve this interesting portion of the Commonwealth—and throughout its whole length, our mountain brethren will soon enjoy an outlet to market, which they have long and patiently expected, and travellers be furnished with the most expeditious communication between the Atlantic cities and the centre of the West. But without an improvement in the roads generally leading to the railroad, fertile as our country is, and variously adapted to productions which command the exchange of the seaports, it will only exist in comparative decay to districts naturally its inferior, where neighborhood communications have immediately been opened with enlarged channels of trade. In the upper counties a laudable energy has been displayed in improving the main access to the Winchester market, and below us several modifications of roads leading to our depots are in contemplation. A charter has been obtained to connect Smithfield with a railway lateral to ours; another branch is talked of, and the citizens of Staunton and other towns, forming a chain of enterprising communities through the centre of the Valley, despairing of a turnpike, which some of them preferred, whilst others have believed such an improvement unsuited to the great demands of our country and the spirit of the age, have instituted a survey for the continuation of the railroad from Winchester. This survey, we are informed, now almost completed, has encountered but few difficulties not easily surmounted, and presents no grades, it is believed, worse than those on the Winchester and Potomac Railroad. Recognised as kindred to ours at the first general meeting of the Stockholders in this Company, it ought not now to be considered an alien to our interests; it is bone of our bone, and flesh of our flesh. In this improving age, it will indeed soon become a grave question for the friends of our railroad, well calculated to excite their interest, how long can we retain the trade even of the upper Valley, should the termination of the railroad be fixed here? The citizens of old Virginia, roused to the life and enterprise of their early history, among numerous other efforts, are extending their hand to welcome the commerce of their brethren of the Valley by a railway, penetrating to the Eastern base of the Blue Ridge. Enlightened as this movement ought to be considered, and calculated to stimulate us to generous rivalship, destined though it be to a lucrative union with the line of railways which promise to connect the capitals of the seaboard, it will, when aided by other similar works parallel to it fail to satisfy the demands of the great Mediterranean route of trade and travel, stretching to the borders of Tennessee, and beyond them, the most remarkable country in the Union, whether viewed as to its extent, fertility, mineral resources, its healthy climate, and social and political advantages, indicating it as a prominent federal artery. We cannot allow ourselves to believe that the inhabitants of Winchester have much cause for alarm on account of the proposed extension of the railroad up the Valley. With the start of several years in trade, it would speak but little for the enterprise of our merchants if they could not arrest much of the overflowing commerce which such a channel would disgarge. Cities there have been, with no means of

supply inland to cheer the monotonous sterility of their situation on the border of the sea, whence alone they derive their support. whose names have been preserved only in the history of some fortunate neighbor; but there is no instance on record, of any town situated in the heart of a district like ours, blessed with all the elements of social wealth, and in the line of a flourishing trade, having failed to prosper, unless the apathy of its inhabitants tamely relinquish to others the advantages first enjoyed by them. A population such as ours cannot well be deprived of a large share of the commercial benefits arising from an extended improvement of the Valley, while it might well combine with these the prosecution of many branches of manufacturing industry.

Whether the liberal appropriation of the State of Maryland, on behalf of her great works of internal improvement will constrain the Baltimore and Ohio Company, ultimately to prosecute its gigantic undertaking from Harper's Ferry by a route north of the Potomac, we know not; but we hazard little in predicting, that the known forecast of the directors of that company will first ascertain if it be practicable to extend a railroad from Winchester to some point on the upper waters of that river, which might shorten the distance to the Ohio—the great object of their commercial desire. A route which would avoid all collision with their former rival, and would bring them into contact with several fertile valleys watered by branches of the Potomac, and in the vicinity of beds of Anthracite coal, might entitle it to an examination; for although the intermediate country is generally hilly, it is penetrated by remarkable passes, such as are not to be found on the basin of the Potomac on its north side. Independently of its locality, however, and adaptation to prospective extension, the Winchester Railroad holds out immediate and positive benefit to our country and early remuneration to the stockholders. The receipts of the company up to the 1st inst. a period of little more than four months, have amounted to $16,656,87; and had they been charged only with the expenses proper to transportation and incidental repairs together amounting to about $5000, a nett profit might have been divided among the stockholders of more than six per cent. per annum. The obligation resting upon the company previous to the opening of the road, and the heavy demands on account of a portion of it not yet entirely finished at the Ferry, compelled the Board to divert all the available proceeds, from what might appear to some of the stockholders their legitimate object, namely, distribution among them in the shape of a dividend.

Much of the stock has remained for a considerable time dormant, but to attempt to render it productive by a recourse to temporary bank facilities, appeared to the Directors, and it is thought the reflecting stockholders will agree with them, a policy of very questionable propriety. The payment of the debt is the appreciation of the stock of any company, and although that desirable object is best attained by making a dividend, it would appear to be a forced and injudicious mode of finance to do so, until the floating debts of the company were paid, or converted into a loan of some permanency. The latter arrangement it is thought can easily be made, when the character and prospects of the work are somewhat established, and its ability to meet its current demands and pay with promptitude interest upon its bonds, is beyond all doubt. This condition, it is confidently believed the company has now attained—few claims yet remain on account of actual construction of any part of the road, and the repairs incident to the first effect of transportation will soon be completed. The entire debt of the company including the convertible loan of $150,000 authorized by the Legislature amount to a little upwards of $171,000.—That portion of this sum consisting of temporary loans from Banks, if changed into a loan for a term of years, would, it is thought, give more animation to our stock, now a little under par, and would tend to equalize the claims upon the present stockholders, with those who may succeed them, and enable the company to make a dividend in February next, unless the failure of this year's crop should defeat their calculations. This course the stockholders will most likely sanction.

In the accompanying documents, relative to the receipts and disbursements of the company generally, are exhibited the aggregate amount of expenditures, since the first survey was instituted—stated at $586,926 48. In this sum is included the purchase money of some valuable improved property at Harper's Ferry, and the grounds adjacent to the depot at Winchester embracing about seven acres—the interest upon money borrowed to relieve the stockholders, and expedite the construction of the road, which with other items, not justly chargeable to its expense, would reduce the actual disbursements on account of the road and present appurtenances to less than $480,000. In the document which shews the particular items of expenditure, up to the same date, some causes of disbursement may appear high—their acknowledged importance, however, will we think satisfy the liberal investigation of the stockholders. Others there are, we feel assured, which will meet the views of a rigid economy, and in pronouncing upon their merits generally, it might be well to institute a comparison between the condition and cost of our road and other similar works elsewhere—the means for which are within the reach of almost every stockholder. Such is the state of the undertaking, which has drawn so largely upon our interests and exertions At first conceived far beyond the resources of our community, it has nevertheless been accomplished. Many difficulties have occurred in its prosecution, which its most calculating friends did not foresee, but they have been surmounted. Some of its early opponents have been agreeably disappointed by its results, while, with regret, we count many of its warmest supporters, whom Providence has not permitted to witness the consummation of their enlightened exertions. It has had its days of excitement, of gloom, and of triumph.—A variety of opposing interests have sometimes assailed it with threatening effect, but it now stands erect. Its promised benefits have appeared long in coming, but they will steadily advance, and be sure, for they will flow through a thousand channels yet unopened. And when the toil and disappointment, and party bickerings which attend the first stages of such a work are forgotten, it will grow in favor, and every part of Western Virginia feel its saving influence.

Mr. Sherrard, from the Committee on Finance, made the following Report:

The Committee of Finance respectfully ask leave to submit the following report, showing the receipts and disbursements of the Company for the fiscal year ending the 15th of July, 1836:

On the 15th day of July, 1835, there was in the hands of the Treasurer, to the credit of the Company—

In cash,	$3,577 44	
In bonds for stock and loans,	2,025 91	
Interest on these bonds,	239 73	
		$5,843 08

The receipts and disbursements of the Company between that time and the 15th of July, 1836, are shown by the following statements:

RECEIPTS.

From stockholders, (being the whole amount due from the subscriptions of individual stockholders,)		$33,106 33
From the Board of Public works, balance of State subscription,		20,000 00
From J. I. Cohen, Jr. and Brothers, of Baltimore, on loan,		20,000 00
From Thomas Biddle and Co. of Philadelphia, on loan,		49,971 67
From proceeds of discounts from the Banks in Winchester,		14,345 34
From the Baltimore and Ohio Railroad Company, to reimburse the amount advanced in constructing the southern abutment of the Potomac viaduct at Harper's Ferry,		10,161 02
For principal and interest on bonds for stock and money loaned,		2,525 06
For costs and interest,		76 28
For amount overpaid M. Scholfield on timber contract, and refunded by him,		1 35
For amount overpaid for discounts in Mechanics' Bank of Baltimore, refunded,		3 33
For amount paid to Treasurer by receiving and forwarding agents, on account of transportation of passengers and tonnage,	8,371 12	
For amount received by receiving and forwarding agents on same account, and disbursed by them for the use of the Company,	4,555 09	
Making the total amount of receipts by the Company, for transportation of passenger and tonnage, from the opening of the road, (14th March,) to first of July, 1836, that being the time to which the accounts are made up,		12,926 21
Total amount of receipts for the year ending July 15, 1836, with the exception of the amount received for transportation of passengers and tonnage between the 1st and 15th of July, an account of which has not yet been rendered by the agents,		163,116 59
To which add the amount of the balance of cash in the Treasurer's hands to the credit of the Company, on the 15th of July, 1835,		3,577 44
And it makes the whole amount received during the past fiscal year including the balance in the Treasurer's hands at the close of the preceding year,		$166,694 03

DISBURSEMENTS.

Amount disbursed by the Treasurer from the 15th July, 1835, to 15th July, 1836, inclusive,	$162,037 17
Amount disbursed by the receiving and forwarding agents from the opening of the road up to the 1st of July, 1836,	4,555 09
Making the total amount of disbursements,	$165,592 26
Which, being deducted from the receipts, leaves in the Treasurer's hands, on the 15th of July, 1836, a balance to the credit of the Company of	$101 77
To which add the balance of bonds in his hands at that time uncollected,	941 85
Interest on bonds to same time,	3 44
Leaves the total balance in the Treasurer's hands, on the 15th of July, 1836, to be carried to the credit of the Company for the ensuing year,	$1,047 06

The committee have carefully examined the warrants and vouchers, upon which the various items of disbursement, comprehended in the foregoing general statement have been made, and find them all in proper form, and duly authenticated, in the manner prescribed for that purpose.

Without a word of explanation from the committee in regard to the aggregate amount of receipts and expenditures as stated above, the stockholders would be misled as to the actual expenses of the company The sum of $7024 50 should be deducted from the accounts of receipts and disbursements respectively. That amount was borrowed from one of the Banks in Winchester, and was of course credited to the Company in the Treasurer's account of receipts ; and when the debt thus created was afterwards paid off, it was charged to the account of disbursements. This amount being deducted, the receipts of the year would be reduced to $159,569 53, and the disbursements to $159,567 76, without affecting the balance to the Company's credit in the hands of the Treasurer, at the close of the year, which would stand as above stated, at $1047 06.

The committee might here close their report, but as the work, with the management of which, they have been charged, in common with their colleagues of the Board of Directors, for the past year, is now rapidly drawing to a close, it will not be thought out of place, perhaps, to state, so that it may be seen at a single glance, the liabilities of the Company and its disbursements in the execution of the work, so far as the same have been ascertained.

Its ascertained liabilities are—	
To the stockholders, for capital stock	$300,000 00
To banks and individuals, for money loaned for the use of the Company,	171,500 00
To the stockholders, for balance in the Treasurer's hands,	1,047 06
To do. for receipts for passengers and tonnage,	12,926 21
	485,473 27
Its disbursements to 15th July, are,	486,926 48
Leaving an apparent excess of disbursements over receipts of	$1,453 21

This apparent anamoly of the disbursements of the company exceeding its receipts, will be explained at once, by recurring to the fact, that whilst the account of disbursements is brought down to the 15th of July, the account of the receipts of the receiving and forwarding agents is only rendered to the first of the same month, although the money received by them since that time has been in part placed to the credit of the company in Bank and appropriated to meet demands upon it.

The phrase "ascertained liabilties" employed by the committee in the foregoing statement, is designed to refer to its actual *existing liabilities*, as distinguished from such as are yet unascertained, or unprovided for, such as land damages in cases where the amount is not yet determined, outstanding demands upon the company which remain to be adjusted ; and, in short, all expenses which have been incurred, but for which the accounts have not been presented and paid.

The committee believing that it would not be unacceptable to the stockholders to be put in possession of the amount of the disbursements of the company, from the commencement of the survey made by Capt. Graham and his corps of engineers, up to the close of the last fiscal year, on the 15th July, 1836, have caused a statement to be prepared by the clerk of the board, which accompanies this report, showing as well the total amount of disbursements up to that period, as the several heads under which they were made. They will only add, that if any stockholder should think the information thus furnished not sufficiently minute, it will give the committee great pleasure to supply the deficiency by producing the books of the company and submitting them to his inspection.

J. H. SHERRARD,
J. SENSENEY.

August 5, 1836.

EXPENDITURES BY THE WINCHESTER AND POTOMAC RAILROAD COMPANY, FROM THE COMMENCEMENT OF ITS OPERATIONS TO THE 15TH OF JULY, 1836.

Expenses of surveying by Capt. Graham and his corps,		$1,123 33
Expenses of printing,		535 00
Expenses for books and stationary,		197 01
Expenses for Depot at Harper's Ferry,		1,087 37
Office expenses,		12 50
Postage account,		116 84
Expenses of location and engineering, viz :		
Salaries of engineer and assistants,	19,100 56	
*Other expenses,	7,339 77	
		26,440 33
Salaries of President and other officers,		3,900 00
Office rent,		210 00
Real estate at Winchester and Harper's Ferry,		4,411 00
Law expenses,		481 25
†Expenses of constructing bridges,		4,033 33
Land damages,		36,200 41
Expenses for Depot at Winchester,		7,185 35
* Do. for motive power,		3,097 91
† Do. for superstructure,		114,514 99
Interest on loans,		7,298 07
Expenses of graduation and masonry,		199,489 52
Do. of transportation,		2,061 82
Do. for timber,		72,913 78
Taxes,		1 42
Contingent expenses,		1,613 17
		$486,926 47

*In this item is included the expense of mathematical instruments, horses, chain carriers, office rent for engineers, fuel, stationary, board of hands, &c., &c.

†This item does not show the whole expense of constructing bridges—it shows only the cost of bridges under separate contracts. Where bridges were made by contractors for sections of the road where bridges are situated, the engineer made no distinction in his drafts, but included all in graduation and masonry. This item includes, indeed, only the wood work, generally, of bridges.

STATEMENT OF TRANSPORTATION AND TONNAGE UPON THE WINCHESTER AND POTOMAC RAILROAD, FROM THE 14TH OF MARCH TO THE 31ST JULY, INCLUSIVE.

TRANSPORTATION UPON THE ROAD.

DOWNWARDS.

15,771½ barrels of Flour.
11,456 bushels of Grain.
2,379 bushels of Meal.
97 T. 15C. 3qrs. 19lbs. of Iron.
60 T. 19C. 1qr. 5lbs. of Lead.
257 T. 10C. 1qr. 4lbs. of other Merchandise.

UPWARDS.

262 T. 3C. 1qr. 5lbs. of Plaster.
2,923½ barrels of Fish.
2,675 bushels of Salt.
1,340 T. 10C. 3qrs. 10lbs. of other Merchandise.

PASSENGERS.

		No.		*Amt. Fare.*
March,	Down,	212		
	Up,	224		
			436	$612 45
April,	Down,	489		
	Up,	570		
			1059	3,458 66
May,	Down,	573		
	Up,	634		
			1207	1,613 71
June,	Down,	501		
	Up,	586		
			1087	1,411 85
July,	Down,	736		
	Up,	812		
			1548	1,969 51
	Total,		5337	$7,996 18

AMOUNT RECEIVED FOR TONNAGE.

March,	At Winchester,	$430 85	
	At Harper's Ferry,	299 48	
			$730 33
April,	At Winchester,	1,900 44	
	At Harper's F.,	1 156 64	
			3,057 08
May,	At Winchester,	1,768 65	
	At Harper's F.,	1,188 93	
			2,957 58
June,	At Winchester,	606 88	
	At Harper's F.,	420 37	
	At Thompson's,	21 21	
			1,054 56

* This item only includes passenger and burthen cars. See next note.

† In this item is included 53,000 dollars, paid for bills of exchange remitted to England to purchase iron, locomotives wheels and mountings for cars, spikes, &c. Not having received the full statement of those purchases, the whole amount of that remittance stands charged to expenses of superstructure.

LEMUEL BENT, Clerk.
Win. and Pot. R. R. Office, Aug. 2, 1836

July,	At Winchester,	675 92	
	At Harper's F.,	1,085 23	
			1,761 15
			$9,560 70

RECAPITULTION.

Revenue from March 14 to July 31, 1836.

From 5337 passengers,	$7,095 18
Tonnage,	9,560 70
	$16,656 88

LEMUEL BENT, Clerk.

NOTE.—The above statements embrace the month of July, which is not included in the report of the Committee of Finance.

From the Utica Observer.

You have doubtless observed in the Albany Argus of the 30th ult. the proceedings of the Canal Board and of the Canal Commissioners, at their late sessions in Albany. It appears the work of enlarging and improving the Erie Canal is to be commenced in good earnest. It is with great pleasure we observe the determination of the Canal Board to improve the canal by adopting a new location at the Cohoes Falls, by which the great inconvenience o the shor levels in the present navigation will be materially remedied. It will be recollected the law authorising this improvement gives the Canal Board authority to change the present line in all cases where they may deem an alteration desirable to improve the present navigation, except through cities and villages, where they are not at liberty to abandon the present line. This confers a responsible and highly necessary power. It would be vain to deny that the present Erie Canal has material errors in location, and is defective in construction.—This has arose from the limited experience that was had at the infant age in our canal history, that existed in the commencement and prosecution of this great work—together with the effort to accomplish a great work with inadequate means; and we must not be supposed as casting the least reflection on the men who made the most of the circumstances that surrounded them, in the prosecution of an enterprise that was viewed by a large portion of our intelligent and influential citizens, as of doubtful utility if not a disastrous expenditure. We hope, therefore, and from what we see at the commencement of their operations, believe the Canal Board will view this matter in the broad and liberal light which the importance of the navigation demands; and apply the correction by amending locations that universally embarrass the navigation by its *abrupt curves*, and expose it to delay from floods, which are allowed to pour in, not only a redundancy of waters, but of mud and small gravel. A canal should not be affected by floods or drouths. This is indeed one of its most important points of superiority over river navigations; and in a navigation of such immense importance as the Erie Canal, no reasonable expense should certainly be spared to render it, with all its appurtenant works, least liable to the contingency of interruption.

It is not to be supposed that the eye of the observer, in travelling along the canal. will always be correct in its views of alteration that general appearances may suggest; but these may be determined by instrumental examination, which we trust will be applied with a skilful zeal. to do all that the great object so clearly demands.—It would indeed be mortifying to see a *perpetuation* of errors that experience and more full examination has rendered palpable, and which there is ample means to correct.

On the 22d of August next a portion of this great work, amounting to a million and a quarter of dollars, is to be put under contract. It will be the commencement of a canal 7 feet deep and 70 feet wide, extending 363 miles through the heart of the State; and who will undertake to portray its importance to the favored interior through which its advantages will be felt? That it will render our transportation to and from the Atlantic market 50 per cent. off the present cost, appears to be generally conceded by practical navigators. It will render trans-shipment between our cities and villages on its banks, and the Atlantic market no longer necessary. It will open a grand avenue to our neighbors of the upper lakes, and exhibit to the world an unparalleled artificial navigation.

While we are desirous of seeing this work well done, we have no wish to advise expenditure for mere display. The form most convenient for and the stability that will in the highest degree secure an uninterrupted navigation, will best accord with the great object to be accomplished.

Though not as remotely situated from market as our more western counties, still to our own county this improvement is of invaluable importance. Our heavy agricultural products will be greatly increased in value by the great reduction that will be effected in transportation. Our situation will be almost on the banks of the Hudson. Vessels carrying from 100 to 130 tons may start from the docks of our own cities and villages, and proceed without breaking bulk to the Atlantic market. Our merchants will put their goods on the same vessels lying at the New-York docks, and no breaking bulk will disturb them until their arrival at their destination. Our agricultural and manufacturing enterprise will receive a new impulse, giving freshness to the growth and importance of our central position. ONEIDA.

From the Repertory of Inventions.

PROGRESS OF SCIENCE APPLIED TO THE ARTS AND MANUFACTURES, TO COMMERCE, AND TO AGRICULTURE.

ON THE THEORY OF GRADIENTS ON RAILWAYS. BY W. S. B. WOOLHOUSE.—Mr. Woolhouse has addressed the following letter, dated February 20, 1836, to the Editors of the London and Edinburgh Philosophical Magazine, in reference to the papers of Dr. Lardner and Mr. Peter Barlow, which we transferred, from that work, to the "Progress of Science" in our number for March last.

As Dr. Lardner and Mr. Barlow hold out conflicting opinions on the theory of gradients on railways, and have left the subject in a state more calculated to create doubts in the minds of the less informed of your readers than to lead them towards the formation of settled conclusions, perhaps you will favor me with the insertion of a few words, by way of explanation, as far as the philosophy of the question presents itself to my mind. Mr. Barlow, without absolutely saying which of the two solutions is wrong, though probably quite conclusive in his own view of the matter, first states his objection to the arithmetical results of the formula employed by Dr. Lardner for the velocity, in certain cases, then gives an outline of his principle of investigation, and finally expresses himself "quite content to leave the decision to those whose minds have not already received a bias from preconceived notions of the forces." Whatever sentiments may prevail as to the competency of my opinions on such a subject, it will at least be acknowledged that I possess the qualification of being free from the bias here alluded to, and I am induced to hope that your readers will, on this very ground acquit me of any imaginable interference in this undertaking, voluntarily, the examination of a point that has already had the attention of such distinguished individuals. By close and continued application of particular opinions to particular subjects, it is indeed surprising how they fix themselves in the mind, and become ultimately, whether true or false, of almost a fundamental character. But I do not consider this observation to be applicable to the present case. It is my wish to simplify and expose the truth as far as I can perceive it. I do not, however, intrude the present remarks in elucidation of the subject without some degree of hesitation, although quite free from apprehension as to their theoretical soundness. To many of your readers, who must be far from satisfied with the present situation of the question, I nevertheless feel myself justified in submitting them.

According to Dr. Lardner, the subject is "totally distinct from the consideration of accelerating forces;" he considers it to be essential that the velocities be continued uniform, and therefore discards every thing in the shape of an accelerating force,—Now, in order that such a theory may be sustained, it is a well known elementary principle of forces, that the power employed must be always precisely equal to the resistance, or the amount of friction combined with the proper resolved effect of gravity along the railway, observing, however, that in the term friction, we must include the resistance to the motion experienced by the carriages, &c., in passing through the atmosphere. We shall not here discuss the practicability of preserving this exact balance between the forces at the various changes of inclination; nor shall we offer any serious objection to the principle that the friction is the same for all velocities, which has received the sanction of general practice, though doubtless inaccurate, as far as regards the effect of the atmosphere.

Continuing the notation of the preceding letters, we have t, for the moving power that will keep the load moving at a uniform speed, V, along the level plane; $t + \sin \delta$ for the moving power to keep the load moving at the same uniform speed up the inclined plane: and $t - \sin \delta$ for the moving power to sustain the same uniform speed down the inclined plane. To the truth of this there cannot be any doubt, if we assume, as Dr. Lardner has done, that the friction t is not altered by the slight inclination of the plane. By following Dr. Lardner's reasoning, we are hence fairly led to the result that the same amount of mechanical force will be expended in ascending and descending the inclined plane, as in draw-

ng the same load backwards and forwards along the level plane of the same length L.

Though Dr. Lardner is certainly justified in stating this conclusion to be a plain result of first principles, it should, at the same time, be remembered, that it rests solely on the hypothesis that the power in each case is to be precisely adapted to the amount of resistance, so as to preserve throughout the same uniform velocity V.—This hypothesis has not been admitted by Mr. Barlow, and it must necessarily fail in determining the effect produced by the deflection of a rail during the transitory passage of the carriages. In this way, it appears to me that the principle advocated by Dr. Lardner, carries with it a restriction that entirely unfits it for an objection to what has been advanced by Mr. Barlow, in his second Report, addressed to the Directors of the London and Birmingham Railway Company. On the other hand, "however, I can only come to Mr. Barlow's conclusion, that it is altogether erroneous, both in theory and practice," when the assumed maintenance of uniform motion is objectionable, as it most certainly is, in the case of the deflections of rails. Contenting myself at present then, with the opinion that the contending parties thus view the question of power expended, on different suppositions as to the way in which it is applied, I shall just take a very brief sketch of the question of velocity, when the motion is not assumed to continue the same through planes of different inclination.

Dr. Lardner supposes that in cases of uniform velocity, the resistance into the velocity is constant, and on this assumption deduces the equations stated by Mr. Barlow in (Repertory, March 1836) page 181, viz:

$$(t - \sin \varepsilon)\, v = t\,V \qquad v = \frac{t\,V}{t - \sin \varepsilon}$$

This assumed principle is, in my opinion, decidedly inaccurate, more especially, when it is contemplated that the carriages will pass along with the uniform velocity so expressed. For uniform motion can only be continued when the moving force continues equal to the resistance; and assuming with Dr. Lardner, that the amount of friction is independent of the velocity, the speed will in such a case be quite indeterminate, or, in other words, the power so applied will sustain uniformly, *any velocity* that may have been previously communicated. If the friction were *really* independent of the velocity, while a moving force which exactly balances the resistance would maintain uniformly *any previously imparted motion*, a moving force which exceeded the resistance would transmit the carriages with a velocity continually accelerated, in conformity with what has been said by Mr. Barlow: but as the portion of resistance arising from the atmosphere at least increases with the velocity, it is evident that the resistance will gradually augment till it balances the moving force, and so a uniform motion will eventually succeed. If the carriages be so acted upon as to retain a uniform velocity v along a level plane, and with such velocity and moving power they arrive at the upper end of, and proceed down, an inclined plane, the investigation given by Mr. Barlow (London and Edinb. Phil. Mag. vol. viii), pages 98—100, will be strictly accurate on two suppositions, viz., 1, That the friction is independent of the velocity and inclination of the plane. 2. That the action of the moving power is not diminished by the increase of velocity.—The former supposition is sanctioned by Dr. Lardner; the latter, as Mr. Barlow justly observes, if not true, will have the effect of giving the velocity and space passed over, rather in excess of the truth, and therefore the more favorable for a comparison with Dr. Lardner's velocities, which are so much in excess. There can be no doubt as to the inaccuracy of the preceding formula, from which the last mentioned velocities are calculated, as the principle from which it is derived is not founded in theory.

Production of Silk.—Raw silk is raised in and manufactured in four provinces of China; namely Kiang-nan, Fokien, Tche-kiang, and Quang-tung. It is to be observed of this commodity, and indeed of most others in the production of which skilful industry is required, that the supply from the provinces beyond the tropic is much superior in quality to what is obtained from those within it. The silks brought to the market of Canton are those of Kiang-nan or Nan-king, and of Quang-tung only; and the first is generally double the value of the last. There is no article which shows in a manner more remarkable than this the capacity of extended production possessed by China. In the fifteen years ending with 1823-24, the average exports of the East India Company (and they were the sole exporters) were barely 94,000 pounds weight, and in the last named year they were short of 80,000 pounds,—amounts which were supposed to express the whole disposable produce of the empire. In 1834, however, the trade having been above ten years in private hands, and the article brought to Europe through the medium of Singapore, the exports rose to 1,522,666 lbs. being an increase of between sixteen and seventeen fold. It is to be remarked, that this augmentation in the export has produced no sensible advance in the Chinese price of the article. The quantities here stated refer only to exports to England; but these form by far the most considerable part.—Edinburgh Cabinet Library, Historical and Descriptive account of China, Vol. 3.

Astronomy.—The Chinese annals give a singular example of the importance attached, in the year 31 B. C., to an eclipse which had not been predicted. It produced such terror, that the emperor secluded himself five days to examine into his conduct and that of his administration! Afterwards he published an edict to the following effect: "The appearance of the sun and moon has turned our attention to ourselves. It is necessary that we follow a better course, and thereby avert the evils with which the heavens threaten us. For myself, I can scarcely speak; I tremble at the sight of my errors; I wish that the dignitaries of my court would give me their advice in sealed writings, and I do not wish that any one should give me the title of *Ching*."—His courtiers complied with the command. Gaubil has given the answer of Thing-king, which was, that according to the rules of astronomy, eclipse ought never to appear but on the first day of the moon; though of late years, several have happened on the last day. The reason is, the moon has accelerated its motion, and by that the time of the eclipse is anticipated. *The sun is the image of the sovereign, the moon the image of the subjects. The imperfections of the latter have usually their source in those of the former.* This shows what a powerful instrument superstition is; though it has seldom been applied to so useful a purpose as the reformation of a government.—Edinburgh Cabinet Library, Historical and Descriptive Account of China, Vol. 3.

First Year of Free Trade with China.—There are residing at Canton upwards of a hundred European and India merchants; consisting of British, American, French, Dutch, Danish, Swedish, Spanish, and Portuguese, with Parsees, and Mahomedans, mostly from Bombay and Surat. The principal mercantile firms consist of eight British establishments, seven American, and one joint French and Dutch. The resident merchants, of course, are thoroughly acquainted with the trade, and are all men of business, activity, intelligence, and great integrity. With their assistance the first year of free traffic has passed over most favorably, and in such a manner as to contradict almost every assertion of the opponents of an open intercourse with the Chinese.—Upwards of 80.000 tons of shipping have cleared out for England, for the most part with European crews; yet there has been no example of any quarrel between the sailors and the natives. Instead of a scarcity and inferior quality of tea, as predicted, there have been exported for this country upwards of 43,000,000 of pounds, being 12,000,000 lbs., or nearly forty per cent. more than the average annual exports of the East India Company; and the article has been at least of equal quality, and much fresher than any tea ever furnished under the monopoly system. Under the rated duties at present exacted, an augmentation of the tea consumed has already taken place, to the amount, we believe, of about ten millions of pounds, raising the annual consumption of the kingdom from thirty to forty millions. The public revenue has gained in proportion; and, instead of an average of three millions five hundred thousand pounds per annum, we may henceforth calculate that the tea duties will not fall short of five millions; and indeed it may be expected that tea will yield the largest revenue of any one article of our consumption. To ensure this result, however, it will be indispensably necessary that the duty upon it should not exceed that on the corresponding articles of coffee and cocoa; reckoning the rate on both, not by quantity but by value, which would imply the necessity of a great reduction as applicable to tea.—Edinburgh Cabinet Library, Historical and Descriptive Account of China, Vol. 3.

More Railroads.—A delegate convention recently assembled at Northampton, (Mass.,) and adopted a resolution recommending an immediate survey of a railroad from Hartford to the North line of Vermont, through the valleys of the Connecticut and Assumsit Rivers.

AGRICULTURE, &c.

From the Farmer's Register.

ON THE NATURE, FORMATION, PROPERTIES AND PUODUCTIONS OF ARGILLACEOUS SOIL.

BY M. PUVIS.

Translated for the Farmer's Register, from the Annales de l'Agriculture Francaise.

EDITORIAL REMARKS.

It is but little more than twelve months since we first met with one of M. Puvis' publications—which one (the Essay on Lime) was the latest which he had then sent to the press. Since, we have devoted many pages of the Farmer's Register to translations from that and other of his pieces, some of which were of much earlier date, but which did not come under our view, and probably had never reached this country, until brought by our special order, and in consequence of the high opinion formed of the author's later writings, which had been seen in the last numbers of the *Annales*. In presenting these several pieces, it is hoped and believed that we have both gratified and informed thousands of readers, (through various re-publications that have been made,) and have done much to diffuse the knowledge of the value of lime as manure, and to encourage and promote its extensive application. While we have heretofore frankly stated some strong objections both to the matter and the manner of M. Puvis' different essays, we think that all of them are interesting to investigators of the nature of soils, and the action of calcareous manures, and highly valuable to those who are but little informed on those subjects, and are seeking all the instruction that they need to direct their practice. As to the main and most important opinions of M. Puvis, we could not do otherwise than approve them—for it is remarkable how closely they agree with our own, first advanced and maintained (so far as was then known,) in the Essay on Calcareous Manures. The two writers separated by the ocean, and ignorant of each other's labors, and even existence, were during the same course of time engaged in investigating the same class of subjects, and arrived (though often by different proofs, or trains of reasoning,) to the same results. The entire deficiency of calcareous earth in natural poor soils—the certainty of improving such soils by its application—and the impossibility of enriching them profitably without—the *acidity* of such soils—the effect of liming or marling a country to lessen or remove *malaria*, and its consequence, autumnal diseases—all these views are maintained by both writers—and each maintained what he then thought was as novel and unsupported by other testimony, as it was important to be made known.

The following piece of M. Puvis, though the latest to reach us, in fact preceded most of what we have heretofore had translated; and this piece, it seems, is but an abstract or new form of an earlier publication, which has not yet been seen. But though our reading and publishing of the several articles has thus been in nearly a reversed order to that of their original appearance, the injury thereby sustained has not been considerable owing to a peculiarity in the manner or form of all these several publications, which is in general a great fault, but which in this case, (and very often in other agricultural writings,) is of much use to readers, however offensive to the critic's eye. It is the repeating, in different kindred articles, the same descriptions or opinions whenever the same subjects come under view. Thus the peculiar qualities of the "argilo-silicious" soils, which are the subject of the following article, have been described in the Essay on Lime, and elsewhere, with sufficient distinctness to enable us to know them. Our inferences in regard to them were stated in a note to the Essay on Lime, (page 363, vol. III., Far Reg.,) and this entire article shows that those inferences were correct.—In fact, if M. Puvis had been investigating the nature, and treating of the improvement, of the "ridge" lands of lower Virginia, he could not have more correctly described them, than he has done in describing soils in France. The dividing ridge or level between every two rivers, or tributary streams, in lower Virginia, is precisely like the "argilo-silicieux plateaux" of M. Puvis: remarkable for the same general features of sterility—deficiency of calcareous earth—peculiar fitness for calcareous manures—*for being more or less subject to sickliness* in autumn. As examples exhibited are more impressive than general description, it may be observed, that the stiffest kind of M. Puvis' "argilo-silicious" soil, (precisely the soil of "*triste Sologne*"—) is presented in the body of land in Prince George county, which lies between Powell's Creek and Ward's Creek, both flowing into James River: that most of the neighboring level ridge lands between other streams, (and through which the mail road passes) are examples of the medium texture: and that below, in Surry, the ridges are more sandy, indeed very light, yet still exhibiting the same general qualities.—Every county in lower Virginia (if not elsewhere) will furnish abundant specimens of all these varieties of texture.—Though varying greatly as to the predominance of sand or clay, there is, throughout, the same general character. We were, long ago, forcibly struck with this very uniform character of a great extent of our country, (as described concisely in Essay on Cal. Man. p. 40, 2d Ed.) and thence supposed that there has been a similarity of geological formation, different from that of the lower and more fertile lands interesecting this sterile region, and different from that of any other region ever heard of, until we recently met with the writings of M. Puvis, and his description of precisely similar lands in France. We are rejoiced to be enabled to call his support to the aid of improvement in Virginia and other Atlantic States: for all that he says, in this article, is as applicable to our country as to France. Whether his geological views are plausible or not, we are not qualified to decide: but at any rate, they, and the facts by which they are supported, are curious and interseting.

The classification of soils by writers on agriculture seem to have been hitherto of little utility. Till now they have aimed to class them by means of their texture, or different degrees of consistency; and this method has brought together soils different in nature, properties and composition.—Hence it has resulted that the classification, instead of simplifying matters has only rendered them more complicated; and in this instance, as in some others, science, by a classification at variance with nature, has retarded, rather than advanced practice, and has introduced a vexatious confusion into agricultural works and theories. This serious inconvenience would not have occurred if lessons had been taken from practice in this question. Every where experience has taught the husbandman to divide the soil into two classes, distinct in their nature, their composition, their properties and productions: it is this unscientific (*empirique*) classification which should have been followed; and then we should not have been lost among the English "*loams*" of which we cannot ascertain the exact quality, now the "free lands," (*terres franches*,) nor "fat clays;" (*luts gras*,) of our French writers, which also occasion misinterpretations in each country.

The great author of all things, in his supreme wisdom has fortunately varied the comparison of soils but little. Among the vast multitude of simple substance of which the globe is composed, he has scarcely admitted more than three to form its surface—that part destined to support its inhabitants: these substances are silex, alumine, and lime. A greater number of component parts, by diversifying the nature of the soil, would have made agriculture much more complicated—and it is already, in the actual state of things, so difficult an art! If it had been necessary to practice husbandry upon a soil composed of numerous elements, it would have been almost entirely above human intelligence.

Among these three earths, the two first, silex and alumine, form almost the whole mass of the upper stratum, and exclusively compose more than half of it. The silex is found in the form of sand, and the alumine is scarcely ever met with alone, but it exists in the soil under the name of argil [pure clay] clay, always mixed or rather combined with particles of silex very minutely reduced.

When lime, or rather the carbonate of lime, is found mixed in a greater or less proportion with the two first earths, it modifies their nature in whatever quantity it may be found mixed with them: the compound then takes the name of calcareous soil, and its properties are changed in a remarkable manner.

Sometimes the lime is mixed with a little magnesia, which then changes all the characters of the calcareous soil and most frequently renders it barren.

With these three principal constituents there is found mixed more or less of vegetable mould, (*humus*,) the decompesed remnants of preceding vegetation, or additions made by man to increase fertility; and, finally, a small portion of oxide of iron is very often met with, which does not seem to act an important part of vegetation.

Practical agriculture has learned in each country to divide the soil into *silicious*, and

calcareous lands.* In Ain, Saone-et-Loire, and Jura, and in a great part of France, the argilo-silicious land, (*terre argilo-silicieuse*) bears the name of *terre blanche* and the calcareous lands receive names which distinguish them from it completely; in the south the argilo-siliceous lands are called *boulbeuses*, and the calcareous lands *terres fortes*, in Yonne they are distinguished as *terre de puisage* and *fortes terres*, in Aveyron the one has the name of *segallas*, and the other that of *causses*; in Berry and the Gatinais the first is called *terres de Sologne*, in Belgium and the north it is called *terres a bois, terres elytres*. In fine, practice has every where given a distinguishing name to this nature of soils, which every where offers the same composition, the same properties, the same productions and the same difficulties in its cultivation.

It is this classification, this distinction of practice that I propose to examine particularly. So long ago as 1811, struck with these two great natural and practical divisions, I published a memoir on this subject. Since then I have felt more and more the great necessity of it, and my present work, which is the study of the first class of soil, of the soils composed of silex and argil will be, in some sort, a developement of facts in support of my work of 1811. Hereafter we shall be able to return to the study of calcareous soils.

Our subject will lead us to some details of agricultural geology, a science yet in its birth, for which as we proceed, we shall collect some materials.

I. The soil of which we are going to speak is not to be confounded with the granite or schistous soils which cover the most elevated parts of the globe. These last soils offer indeed an analogy of composition and productions with the former; they are also composed of alumine and silex—but they abound in granitic or schistous fragments of various magnitudes, which are not met with in like manner in the argilo-silicious *plateaux*; they produce, as these last, the heath and broom, but the fern does not grow abundantly on them.—Their formation is not the same, the exterior characteristics and the sub-soils are different; the granitic or schistous soils seem to have been owing to decompositions of granite or schist on the same spots by meteoric influence; at other times they have been produced by the movement of partial waters in the interior basins.

The argilo-silicious soil, on the contrary, belongs, as we shall see hereafter, to a great deposite which seems to have been general; but which, however, did not rise to great heights. It covers, in France and elsewhere, vast extents, and it composes at least three fourths of our forest lands in the plains; the great forests in the neighborhood of Paris and those of Normandy are almost entirely composed of it. It is the only great shade of soil which is produced every where with striking analogie in its soil, its sub-soil, its properties, its advantages and its defects; while other natures of soil offer great disparities among themselves in the different positions in which they occur.

Its composition, in the first place, as we have previously announced, is completely identical, but it varies much in consistence, and in the faculty of retaining water, according to the greater or less quantity of clay which it contains, and as the silicious sand found in it is in a state of more or less minute division; for the experiments of Thaer, Schubler, and Cadet Gaussicourt, have proved that the stiffness of a soil and its *impermeability* (impenetrability to water) depend on the minuteness of division of the silex, as well as on the proprotion of clay that it contains. Silex in the form of coarse sand takes only one fourth of its weight of water, while reduced to an impalpable powder, such as is obtained from clay, it retains nearly three timesits weight; which explains, on the one hand, the great humidity of argillaceous soils and on the other the great contraction that clay suffers either by drought in agriculture, or by heat in the arts.

II. The color of the surface of this soil, when it has been long exposed to the air, is white, which has given use to its name of white land, (*terre blanche, terrain blanc.*)

What characterises this soil particularly is that when it is dry, it is easily enough penetrated by water, but when once saturated. it admits no more; the water which then falls upon its surface remains there without being able to penetrate it; this property has caused it to be called *impermeable* soil, because in fact it does not permit the water to pass through to the lower strata.

One of the worst results of this *impermeability* of the soil is the unhealthiness which is experienced in a greater or less degree wherever this soil occurs: the intermittent fevers which are observed more or less on the borders of stignant waters are very frequently endemic on the argilo-silicious plains, although they may present neither marshes nor ponds.

This unhealthiness, it appears, may be explained in a plausible manner.

The water with which the soil is inundated, not being able to escape in any direction, remains there in a state of stagnation, the general principle of the corruption of water. It forms then in the soil a kind of interior marsh; the sun and the dryness of the air exhale a part. These waters, motionless, diminished, heated by the sun in the warmth of the long summer's days, ferment, become altered, and are sometimes so much corrupted as to become black; they are then an unwholesome drink for men; and at the same time the exhalations of a soil impregnated with corrupted water become unhealthy, as those of the borders of marshes, of ponds, and of all lands temporarily inundated, and which the summer's sun strikes upon, after the waters are drawn off. Then among the inhabitants of a district, in the midst of an atmosphere mixed with deleterious exhalations, numerous intermittent fevers occur, without any necessity for the appearance of marshes or ponds in the country.

III. Almost always under the white [or light colored] upper soil, a sub-soil is found of clayey sand (*sable argileaux*) reddish and shaded with gray, or more rarely with red veins.

Its color may enable us to form a judgment of its degree of *impermeability*, and consequently of the degree of humidity of its surface: when the whole mass, soil and sub-soil, is gray, it is more impermeable, and its upper stratum is more wet; when the inferior stratum is reddish or veined, the soil allows the surface water to penetrate a little more, and the upper layer is better drained; it is then remarkable that the gray veins which it contains are more moist than the rest of the mass. The gray color, doubtless arises from the greater abundance of clay, and the red announces a greater proportion of sand, colored by the oxide of iron.

Nevertheless in all its varieties, this stratum retains the water on its surface in a greater or less degree, allows scarcely any to penetrate into the interior of the soil.

IV. The argilo-silicious formation covers vast extents of the two grand divisions of which France is composed, the basin of the Mediterranean, and that of the ocean. In these two positions, so different, although near, we are unable to assign to the deposites of this stratum shades of difference which may very sensibly distinguish them. That which covers a part of the basin of the Rhone, the only basin of France which declines towards the Mediterranean, presents, then the same characteristics as in the other parts of this country which decline towards the ocean. Nevertheless, in the basin of the Rhone, the alluvion may be more clayey, a property which it shares with all the different strata of the surface of the soil in this basin.

The cause of this may be attributed to the numerous formations of gray clay, which we shall call granite clay, that are found in this basin; and besides, to this circumstance, that the river which occupies the bottom of this basin having a much greater descent than those which flow to the ocean, (since Geneva is 300 toises above the level of the sea, consequently in a course of 120 leagues the river falls 300 toises,) the soil there has been more profoundly agitated, the plastic clay has been dissolved in greater masses, and has given more stiffness to all these strata of the basin, and first to the argilo-silicious formation.

V. This formation, generally, covers the *plateaux*, [ridges or table lands] which separate the basins of great rivers, whenever they are not divided by elevated mountains; and when mountains divide them, this formation often rises on their slopes to very considerable heights. Thus it is found on the first steps, or ascent, of the mountains of Autumnois; it is found covering the granites of a part of Haut-Charolais, of the mountains of Forez, and rising to almost equal heights on the two slopes of those mountains which decline, on the one side to the Loire, and on the other

*Here and elsewhere the author uses the term "silicious soils" in contra-distinction from "calcareous"—or to designate soils which are not at all calcareous We have elsewhere used the term "acid soils" for the general class.—Ed. Far. Reg.

to the Rhone—that is to say, to the ocean and to the Medeiterranean. But then the difference of stiffness is sensible between the formation on the one side of the ocean, and that on the side of the Mediterranean.

It is found at an almost equal height in the environs of Lausanne in Switzerland, of Thonon in Savoy where it rises above the alluvions of the borders of the Lake of Geneva. The great argilo-silicious table land of the basin of the Rhone, which from the gates of Lyons, covering a part of the departments of Ain and of Saone-et-Loire, reaches to the middle of that of Jura, rests on elevated *chauss'ees* of the granites of ——————* near Lyons: and what is very remarkable, is that, as we have said elsewhere, the general declivity of this *plateau* lies in a direction contrary to the course of the rivers which border it; that it goes on increasing in this direction for the 20 leagues of its length, so that the *plateau* towards the heights of —————— ends by rising nearly 100 toises above the course of the rivers which bound it on the two sides.

VI. The fragments of rocks which this formation contains, are always pieces more or less rounded by the movement of waters, and the largest are generally found at the greatest depth. The strata are always horizontal, the sand is almost always coarser in the inferior strata, and its grains are successively finer up to the surface, where they are very minute. All these circumstances evidently indicate successive precipitations from a liquid, in the bosom of which the suspended earthy particles have been at liberty to obey the law of their gravities. It is then an aqueous deposite which has extended itself over vast surfaces. Nevertheless, it is not to be believed that this deposite has been for a length of time carried along by the waters before its precipitation, for it frequently contains fragments whose angles still remain and which have not been rolled long enough to become round. In the basin of the Seine the flints of chalk beds, which are there met with still preserve, in part, their native forms; and the fragments of mill-stone (*silex carie*) which are found in Sologne are not yet rounded, although they have been rolled; and finally the rolled flint stones which are found in the argilo-siliceous deposite of the Rhone belong to the ancient alluvions of the basin, and have not received their form in the various movements of the deposite in which they now occur.

VII. Every where this stratum covers the great formations and is no where covered by them; it is then evidently the last of the great revolution which has agitated the surface of the globe.

VIII. It does not appear possible to attribute it to fresh waters, to the formations, always partial, of river waters, which take a distinct character in each basin, and generally occupy its bottom. We do not find in it the fresh water remains so numerous in marls, as well the stony, as the earthy kinds; and, besides, when the basins of rivers not separated by mountains, this formation, occupies the whole extent of the intermediate ridges or table lands. Finally, the alluvion placed in the basin of the ocean rises on the slopes of the mountains to the same relative height as that placed in the basin of the Mediterranean; and where these mountains are depressed, the strata of this alluvion unite, and are confounded.

This stratum of identical composition which covers such vast extents in countries distant from each other, which has risen above the basin of rivers, which unites the basins of seas, can, it seems only be owing to the last phasis of the movement of great waters, of the movement of seas themselves confounded together.

It is true that few marine remains are met with in this stratum: the few petrified sea-urchins, which are found in Sologne may there be contemporary with the beds of mill-stones which crop out through the argilo-silicious stratum, and the formation of which rises beyond that of the deposite by which it is covered.

IX. This stratum must then have been deposited by the water over the whole surface; and it would not be difficult to explain how, while continuing to cover the ridges and table lands, it may have disappeared from the bottoms of the basins which it covered. When, by a course of which we are ignorant, the level of the inferior waters was lowered, currents were formed in the interior of the basins of the rivers which in the great reservoirs; the waters quitted the high lands, to collect together in the basins, their natural bed; the waters of the elevated parts of the table lands, to reach their respective basins acquired but little rapidity in their courses of short extent, and only carried off more or less of the last deposite, which was not altered in its composition. But it was not the same in the bottom of the basins; there, rapid currents of great length were established; and impelled by the waters above, they swept off the last deposite and mingled its elements with the deposites of the inferior strata.

When the waters became less rapid, the fragments which they carried along, were successively deposited, commencing with the heaviest; and as they approached a state of repose, the minute particles which the waters retained in suspension were precipitated, and formed the upper stratum, which has become the vegetable stratum, [or mould] of the lower part of the basins, and which is composed of fragments of all the formations carried off by the waters, the latest as well as the most ancient.

X. This is the place to remark that the argilo-silicious deposites which cover the *plateaux*, generally increase in stiffness as they approach the sea; thus, in the basin of the Loire, the sands of the Sologne are lighter than the same kind of table lands of La Sarthe; so also, in the basin of the Seine, the table lands of the Gatinais, and of the forest of Fontainebleau, are less stiff than the analogous ones of Bernay, and of the forest of Larche in Normandy.

The causes which have brought about this state of things may be conceived: the sandy particles must have been first deposited, and have formed the alluvions of the more elevated parts of the basins; the waters on retiring have left them successively exposed, and the fine and clayey particles, remaining last in suspension, have been progressively more numerous in the deposites as they approached the sea, and consequently have rendered the alluvions more stiff, more clayey. Thus the soil of the borders of the Seine which often shows little stiffness at Paris, acquires more as it approaches the sea: and in like manner the *littoral* soil of the three rivers, the Rhone, the Saone, and the Aisne, is lighter before their confluence, than that of the Rhone in Comtat, and that of Comtat is less clayey than that of the great plain in Arles: these facts are explained in the same manner as the preceding.

XI. Finding myself involved in the great questions of the formation of soils, I shall not hesitate, at the risk of digressing from my subject to collect here many important facts in agricultural geology.

The argilo-silicious deposite has been very evidently the last of the great deposites which have covered vast surfaces: it is, in some sort, the last phasis, or general movement of waters, on the surface of the earth; but since then, partial revolutions seem to have taken place in the basins of large and small rivers; there are even some to which we seem able to assign an era, and which do not go beyond the historical ages. Thus many positive and very remarkable facts may induce an opinion that in the basin of the Rhone a great movement of waters must have taken place since the establishment of the Roman dominion in this country. When wells are dug at Marseilles, water is found under a stratum of gravel about 20 feet thick, as its junction with another formation on which we meet with traces of habitation, roads, Roman, Phœnician and Gallic medals. This level of the soil has then been inhabitated, two thousand years or more ago, and consequently the stratum of gravel more than 20 feet thick which covers these parts of the basin has been brought into them since, by a movement of waters which no historical recollection recals.

But if we remark further that in ascending the basin of the Rhone to Arles, to Orange and Valence, to Nimes, to Lyons, the traces of Roman inhabitation are every where covered with a stratum of gravel many feet thick—that at Bourg, situated in the same basin, are found medals, instruments of a contemporary date and of the same sort as those met with at Marseilles, and every thing which characterises an ancient level of habitation between two strata of gravel analogous to those which cover them elsewhere—we shall have good reason to believe that the stratum above the medals which have been found, must be owing to the one same revolution, which consequently must have changed the whole face of the lower part of the basin of the Rhone.

This stratum at Marseilles, and in the the greater part of the places where it oc-

*These blanks occur in the French publication and probably were made necessary by the illegibility of the manuscript. In the several pieces by M. Puvis, as published, there are numerous indications of mistakes of the author's words; and sometimes others of his meaning—so manifest, that the translator has ventured to alter them.—Ed.

curs, cannot be owing to the ruins of habitation, to the rubbish of destruction, which raises the inhabited surface in populous cities; for the traces of habitation, the medals, the roads, mould (humus) bricks and pottery, in angular pieces, would be found throughout the whole thicknes of the stratum, whereas this is composed without mixture of rolled pebbles of silicious gravel of the same kind, covering calcareous gravels disposed in horizontal strata, identical in thickness and in composition, which could be owing only to a natural formation deposited from the bosom of the waters.

But still farther traces of this inundation are found. At the junction of the basins of the Ain and the Rhone, there exists a great plain which bears the name of Valbonne, (*Vallis Bona;*) a name evidently given by the Romans, and of which the soil is now composed of an arid stratum of silicious gravel like that which is found all along the basin of the Rhone; but we should consider as certain, that this stratum did not cover the valley when it received the name of *Vallis Bona;* it may then be believed, that the alluvion of good quality which covered this valley, was carried off by the great flood which has thrown over a great part of the surface of this large basin, all those increments of gravel which have covered and devastated the inhabitated surface. In support of this conjecture, we find in Bas-Bugey at Meximieux, and in Dauphiny, at Saint Priest, opposite the plain in question, a stratum of calcareous soil of good quality, which often rises many feet above the alluvion of gravel, this stratum, which at several points bears traces of having been torn away, rose, it may be believed, above the borders of the Ain and the Rhone; it covered consequently, the plain between Meximieux and Montluel, and gave occasion to its name of *Vallis Bona*, which was preserved to it after the waters had deprived it of its qualities. An aqueous revolution then has taken place in the basin of the Rhone; this revolution must have been subsequent to the establishment of the Roman power, and to this revolution the stratum of silicious gravel succeeded, which from the borders of the lake of Geneva, to those of the sea, covers such vast extents.

We shall not continue farther the discussion of this important question of agricultural geology, for fear of exceeding the proper limits of this journal.

XII. In all movements of great waters which have taken place, each basin of a river has formed a new upper stratum which has become the vegetable stratum, (or surface soil;) and this is distinguished by shades of formation which are peculiar to itself, and which it has received from the fragments of the mountains which border upon it, from those brought by the water of its confluents, mixed with the great general deposites. Thus are explained those analogies of soil and of formations which are found throughout the whole extent of any one basin, and in the secondary basins themselves.

We have designedly gone back to the origin of these analogies of soil, that we might recur to an important idea in agriculture. It is this: that the formations in any one basin being composed of the same fragments, and owing to the same revolutions, the soil of these basins presents throughout their whole extent a great analogy, and consequently, the practices of agriculture which have succeded in one point, may be applied, the difference of climates excepted, to the analogous formations; agrtculture perfected on some points of a basin, may give lessons almost certain for its whole extent.* Thus the study of agriculture, to become more profitable, instead of being made according to a political association, by Departments for example, ought to be made by the basins of rivers; it would give rise to many fewer mistakes, and consequently, to much more success. The rules and successful practices of a basin, should be studied anew, if we wish to make an application of them to another basin in which the composition of the soil is owing to different circumstances.

XIII. This caution, this fear of mistakes, ought to have its full effect when agriculture is practiced on the great argilo-silicious deposite which covers such vast extents, and presents every where the greatest analogy. The practice of agriculture on this deposite, might then have general rules which it would be very important to collect; but it must first be well characterized, in order that it may be every where known.—We shall therefore resume the course of our observations.

The soil and the sub-soil of this stratum, although of different shades, appear to be of identical composition, as experience daily proves in a striking manner. When by any circumstance the whitish stratum of the surface is removed, so as to leave only the reddish stratum of the sub-soil, some years of cultivation and manuring, or even of spontaneous vegetation without culture, are sufficient to give to this reddish subsoil the gray color of the rest; and, in the same manner, when this reddish earth is carried out on a cultivated soil, the shade which it gives quickly disappears by mixture with the rest, and by the effect of cultivation.

The proof of this identity is still more complete, if we remark that in digging into the lower parts filled up by the falling of more elevated portions of the soil, we find the red soil shaded with gray, or the gray shaded with red veins in the middle of the rubbish; which prove the new increment, with all the characteristics which it has elsewhree, its stiffness and its *impermeability*.

The sub-soil and the stratum of the surface, are then nearly identical, its formation throughout the whole thickness is therefore the production of the same aqueous revolution; only the oxide of iron which colors the sub-soil, loses its color by cultivation.

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* It may not be useless to all readers to say, that by the "basin" of a river, the author does not mean merely the valley or lower lands through which it flows, but the whole area, high and low, which lies within, or is intersected by, all the tributary streams of the river. Thus the basin of the Mississippi takes in the immense area from the summits of the Rocky Mountains to those of the Alleghany.—Ed.

XIV. The effect of frost upon this soil characterizes it in a peculiar manner; the water at the surface when it is in no great quantity, often freezes in vertical threads which sometimes rise six inches, and resemble a vegetable growth. But what is still more remarkable, is, that the soil rises up by freezing much more than the greater part of calcareous or alluvial soils. New vegetables, planted, or even sown, are torn out of it in a manner truly astonishing; plantations of wood of that year, or even of the year preceding, were torn out at two different times by the freezing without snow, in February, 1831; and sowings of seapines, (*maritimes*) made the year before, were thrown out of the soil. It is therefore prudent to wait till the end of winter to make plantations in such soils, and not to dig the holes beforehand, that water may not get into them and remain; and as the effect of frost is less sensible on the parts covered with turf, the little holes, after planting, should be re-covered with turf, to prevent as much possible as new losses.

The rising of this soil from freezing, occasions besides the great inconvenience of much deeper roads than on calcareous soil.

These effects are explained in a plausible manner from the nature of the soil itself. This soil contains much silex in a state of very minute division, either free or combined with the clay; this silex as we have seen, takes a greater quantity of water than other descriptions of soil; the water which penetrated this soil expands, as we know, by freezing; it expands then at the same time the soil which it penetrates; the expanded soil rises up, aud raises with itself the plants and their roots when they do not reach to great depths.

The surface of the soil in thawing first, and losing a part of its water by evaporation, is contracted and sinks upon the rest of the soil, and leaves exposed a part of the roots which cannot descend again with it because their extremities are fixed in a soil still frozen: the next day this effect is renewed, and the plant is soon partly or entirely out of the ground, according to the length of its roots.

The rising of the soil is greater in proportion as it is more clayey, because then it contains more silex in the state of impalpable powder, or it absorbs more water; it it is greater than in the ordinary calcareous soil, because carbonate of lime receives only 85 per cent of water to 100 of impalpable powder, while silex takes 280 per cent. There are, however, some calcareous soils which also greatly expose the roots of vegetables; these are the marly (*marneux*) calcareous soils; thus, in the freezings without snow in February last, our calcareous soils of the plateaux, whether *terres-mares*, or our marled lands, had more plants thrown out than our common white lands, (*terres blanches.*) We attribute this to the fact that our *terres mares* are nothing more than a mixture of the argilo-silicious soil of the plateaux with the inferior marly stratum; but our marl which contains commonly 40 per cent. of carbonate of lime, has 60 per cent. of clay or very fine silex, while our white lands contain a great deal

of silex in the state of sand. Our *terres mares* and our marled lands, contain then, relatively, more fine silex than our ordinary ridge or table lands, and for this reason may expose the roots of plants still more.

XV. But with the same sub-soil, almost always clayey, the surface varies much in stiffness and tenacity; it passes from a state the most tenacious, and the most difficult to work, to the lightest sand, which is carried off by the wind; and yet under all these diversities of soil, there is found almost every where the *impermeable* red sub-soil.

When the upper soil is clayey, it is then *accidente* formed of a collection of small basins or ponds, which serve to drain it; the waters have not levelled the surface, or rather after having levelled it, they attacked it in places, and formed in it basins or hollows which receive the water of the surface, and without which it would be impossible to cultivate it.

In this case, it may be conceived that the soil and the sub-soil are in their nature clayey, of an *impermeability* almost absolute; this soil is also very wet, since it contains a great deal of fine silex, which absorbs 280 per cent. of water, and to derive advantage from it, the cultivator is obliged to add to its natural declivity by artificial beds or ridges by the plough. Wheat, rye, and most agricultural productions, succeed more or less upon it when the drawing off of the superabundant water has been effected.

The dog's-tooth grass, (*chiondent*,) agrostis stolonifera, *herbe trainasse*, the little motherwort (*matricaire*) prey upon this land and impose on it, as an absolute condition of production, the necessity of a very careful cultivation; such is, mostly, the great *plateau*, which extends from the gates of Lyons into three departments, the Ain, Saone-et-Loire, and Jura; such are nearly, also, Puysaie in Yonne, a part of the plain of Forez in Haute Loire, and the part of Sologne in the Cher and Loire, where fish ponds are found.

But if this soil, to yield produce by cultivation, requires to be carefully drained, the necessity for this is almost as great to produce woods with advantage, especially in the most clayey variety; without this, on its surface covered with little pools, without mellowness and without strength, the greater number of large vegetables languish; the oak, particularly, is frozen on it almost every year. Then it becomes necessary that ditches, judiciously placed, may collect and carry off the superabundant waters of the surface: with this care, the aspect of the soil changes, large vegetables grow with natural vigor, and are no longer subjected to any other than the great general accidents depending on temperature and climate.

XVI. The elevated parts of each *plateau*, when the waters have had less effect, are generally of a level and sandy soil on the borders, the lower parts are the most *accidente'es* and of stiffer soil. Thus in the great *plateau* or basin of which we speak, Bresse is more moist, more clayey, more *accidente'e* than Dombes, which is at once more elevated and more sandy than it; and it is the same case elsewhere in the same soils.

But this great *plateau* which belongs to the basin of the Rhone, appears to be the most wet of all those of the same nature which are met with on the French soil; nowhere is it necessary, as with us, in order to derive a profit from the soil, to cut it by perpendicular ditches into small pieces ridged in the middle, to increase thus the natural declivity by artificial slopes, and finally, to add to all these labors, cultivation by bedding or water-furrows. But what increases still more in our country the difficulties of cultivation, are the rains, amounting to 45 inches annually, which keep the surface of a soil, that does not allow the water to penetrate to the interior in a state of inundation, unless the flowing off of the moisture is hastened by artificial means. And what is very remarkable, is, as we have just said, that the soil is more clayey in the low parts of the *plateau*, where the waters appear to have carried off a greater thickness of the strata. Thus, the soil of Bresse is more clayey and more troublesome, and difficult to cultivate than that of Dombes; in Dombes artificial ridging is less necessary; ploughing in raised beds is generally sufficient to drain off the water; and sheep succeed there, while they perish almost every year in Bresse.

Fish ponds succeed well only in this clayey variety of soil; the greater part of those which were in a calcareous soil, are now dried, and yield a produce in grain and forage much superior to what they did in fish.

XVII. Two conditions are absolutely necessary for this manner of employing land (for fish ponds,) and these are found united only in the clayey variety of this soil. The first condition is a very great slope, and the second, an *impermeable subsoil*. For a good pond of some extent, there should be 8 or 10 feet of water near the dam, and consequently, at least 8 feet of slope in the surface, from the commencement of the pond to the dam; a slope certainly very great, and which is hardly to be found except in the beds of torrents.

To keep the pond full during the summer, when there is little rain, which is absolutelp necessary for the preservation of the fish, it is in a manner indispensable, that the inferior soil should retain the water, and should, consequently, be *impermeable*.

XVIII. Most frequently, when the soil is light, the surface is level, it is hardly ever inclined: there is only a slight slope on the nearest water courses; consequently, in such places, there are no fish ponds; the soil, indeed, still rests, almost always, on the *impermeable stratum*; but it is often at so great a depth, that the surface which suffers from wetness in rainy weather, suffers also from drought in dry, warm seasons.

These two varieties of land, the clayey and the light, although of the same nature and of the same formation, may be distinguished from each other, the first by the name of *argilo-silicious*; and the second, by that of *silicioargillaceous* soil.

Fish ponds in the plains of the light or *silicio-argillaceous* lands, are evidently impossible, unless they could be established on the water courses which traverse them; which would destroy all the resources of the country in forage, by covering all the meadow lands.

It is of this variety of soil that is formed, in part, the *plateau* which separates the basin of the Seine from that of the Loire, which contains such vast extents of wood, and some cultivated parts; on this *plateau*, are found the forest of Fontainebleau, and that of Montargis.

Such is also the part of Sologne, in the basin of the Loire, from Gien almost to Bourges, and which separates the Cher from the Loire: it forms a great *plateau*, which rises on one side above the vale of the Loire, and on the other, above the basin of the Cher; such are all the *landes* [sandy plains or deserts] of Bourdeaux, and a great part of those of Bretagne and of Maine. In this kind of soil, rye, buckwheat, and some fields of potatoes, are almost the only productions of the cultivated lands.

Sheep, which succeeded ill, or not at all, on the argilo-silicious lands, are often in the silicio-argillaceous lands, the only means employed to derive a profit from the soil. On these, the oak often succeeds well, and suffers less than on the other variety of soil, but the chesnut is the preferable tree.

UTICA AND SYRACUSE RAILROAD.—There was subscribed on this road, $250,-000 in Albany, $100,000 at Syracuse, and over $600,000 at Utica. Books were opened at other places also, the capital is $800,000.

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Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeng river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine — Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300	dozens	Ames' superior back-strap Shovels		
150	do	do	do	plain do
150	do	do	do	caststeel Shovels & Spades
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron. 4—ytf

JUST PUBLISHED,

THE COMPLETE PRACTICAL FARMER,

BEING a plain and familiar treatise on the Culture of the Soil, the Orchard and the Garden; the rearing, breeding, and management of every description of Live Stock, the diseases to which they are subject, and the remedies; directions for the management of the Dairy; a description of the most useful implements of Husbandry; and every information necessary to the practical agriculturist. Also, an index, by which any subject can be instantly referred to. In three parts; Part 3, on Live Stock, under the immediate supervision of R. H. Budd, Veterinary Surgeon, New-York.

Published by COLLINS, KEESE & CO.,
36—3w1aw* 230 Pearl-street.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

18 ROGERS, KETCHUM & GROSVENOR.

OFFICE OF THE WETUMPKA AND COOSA R. R. Co.
WETUMPKA, ALA., 29th July, 1836.

THE Directors of the above Company are desirous of securing the services of a competent resident Engineer, to survey and locate the route of the Wetumpka and Coosa Railroad, commencing at this place. The route of the road will pass through a country that is considered as healthy as any in this latitude. Persons desirous of embarking in such an undertaking will please address the undersigned at this place.

W. H. HOUGHTON,
Sec. W. and C. R. R. Co.

The Evening Star and Courier and Enquirer, New-York; the Commercial Herald, Philadelphia; Baltimore Gazette; National Intelligencer, Washington; Richmond Enquirer and Whig, Richmond, Va.; and Charleston Mercury, will please give the above eight weekly insertions, and send a copy containing the advertisement, together with their bills, to the undersigned. (31—5t) W. H. HOUGHTON.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

HUDSON AND DELAWARE RAILROAD.

NOTICE TO CONTRACTORS.

SEALED PROPOSALS will be received at the Office of the Hudson and Delaware Railroad Company, in the village of Newburgh, until the 10th day of October next, at 2 o'clock, P. M., for the Grading, Masonry, Bridging, &c., of their road from the west side of Chamber's Creek to Washingtonville, a distance of ten miles.

Plans, Profiles, Specifications, &c., will be in preparation, and exhibited ten days previous to the letting. JAS. B. SARGENT, Engineer.

Newburgh, Aug 24, 1836. to10—35

NOTICE TO CONTRACTORS.

PROPOSALS for excavating and embanking the Georgia Railroad from the upper end of the work, now under contract, to Greensboro', a distance of 34 miles, will be received at the Engineer's Office, at Crawfordville, on the 21st and 22d days of October next.

—ALSO—

At the same time, for the Branch to Warrenton, 4 miles. And if prepared in season, the Branch to Athens, length 37 miles.

J. EDGAR THOMSON,
33—t22o Civil Engineer.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersunk heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350	tons	$2\frac{1}{2}$	by	$\frac{1}{2}$,	15 ft in length,	weighing	$4\frac{68}{100}$	per ft.
280	"	2	"	$\frac{1}{2}$,	" "	"	$3\frac{50}{100}$	"
70	"	$1\frac{1}{2}$	"	$\frac{1}{2}$,	" "	"	$2\frac{1}{2}$	"
80	"	$1\frac{1}{4}$	"	$\frac{1}{4}$,	" "	"	$1\frac{25}{100}$	"
90	"	1	"	$\frac{1}{4}$,	" "	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

A. & G. RALSTON.
28—tf Philadelphia, No. 4, South Front st.

OFFICE PONTCHARTRAIN, RAILROAD Co.
New Orleans, 19th May, 1836.

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,
JNO. B. LEEFE, Secretary.

28—3m.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron. RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co.,
July 25th, 1836.

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cut stone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers' office, New Lisbon.

Persons unkown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.
E. H. GILL, Chief Engineer. 30—to10

NEW ARRANGEMENT.

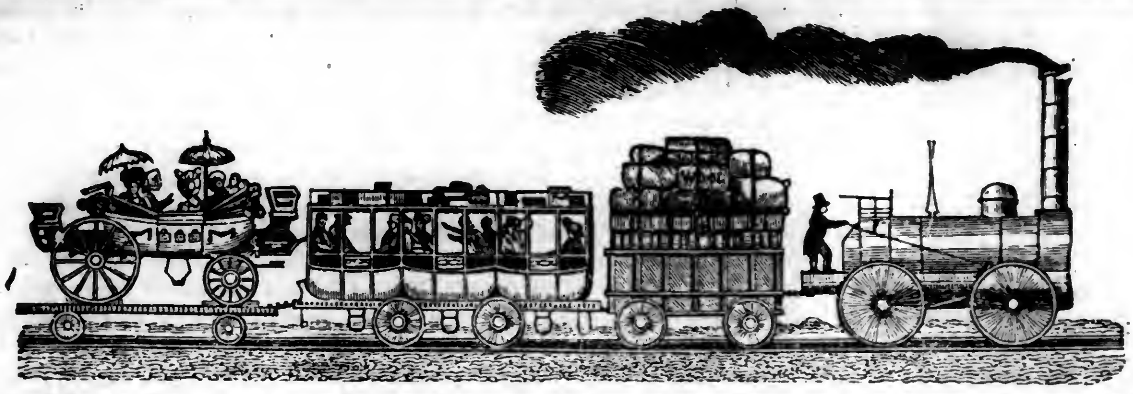
ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND,	GEORGE COLEMAN,
ROBT. C. FOLGER,	SYDNEY S. DURFEE

33—tf.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, SEPTEMBER 24, 1836. [VOLUME V.—No. 38.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, SEPTEMBER 24, 1836.

NEWBURGH AGAIN.—We referred, a short time since to the brilliant prospects of this village—and to its advantages in relation to the termination of the Great *New-York and Erie Railroad*—and in our last we published entire the very interesting and important Roport of Mr. Sargent, the Engineer of the road, which will be found fully to sustain us in our remarks. This Report should be read by every business man in the community; especially those who are interested—and who is not?—in the New-York and Erie Railroad.

It may not be generally known, yet it should be, that this branch of the road, or the Newburgh road, which is to terminate at Newburgh is to pass the whole length of the village—along the margin of the river—and it follows of course that the day is not far distant when it will be lined with a row of storehouses to receive produce and merchandize.

When it is known that the *ascent* to be overcome from the point where the roads diverge, to *Newburgh* is only 148 feet and the *descent* 390 feet, it will be readily understood that very little expense will occur for traction in the direction of the heaviest trade—and it will follow of course that the *business* will follow the most *natural* channel when there is a choice, therefore NEWBURGH *must* become the *principal* outlet for the five hundred—yes, in a few years, *five thousand* miles of railroad to the very heart and extreme points of the most fertile region of country on the Globe.

What then may not be anticipated in the way of improvements at this delightful place? Indeed so well are business men of this city satisfied of the important advantages of Newburgh for manufacturing, as well as commercial, purposes, that large purchases have been made within a few weeks, of real estate on which substantial improvements are to be made immediately—one company alone are about to commence buildings in which will be employed, in the course of six months, over one hundred hands in its different departments—a steam saw mill will also be erected this winter—and probably a *Carriage and Railroad Axle* manufactory, employing forty or fifty men, will go into operation in the spring. Flattering, very flattering indeed, are the prospects of Newburgh, and such are the present indications of business that houses and workshops are in great demand, every house in the place being occupied. Indeed, *fifty* to *one hundred* dwellings will be required there next year, and no better investment can be made than in good *dwelling* houses at Newburgh; they will pay fifteen per cent. interest on their cost, on a lease for three to five years. Yes, we know of a man who will contract to take *ten* good dwellings, of two stories each, built to a plan furnished, to accommodate *two* families, on a lease of three to five years, at fifteen per cent. on the cost of the lot and building. And to any one disposed to put up such buildings at Newburgh, and have them ready to occupy this fall, or early in the spring, say by the 1st of March, all necessary information will be given at this office.

As a place of business, there is no other on the Hudson, between this city and Albany, which surpasses it.

There are no less than *four* steamboats owned here, and employed in the New-York trade—two of which. the HIGHLANDER, owned by T. Powell & Co., and the WASHINGTON, owned by D. Crawford & Co., do credit to their enterprising proprietors—the others, the SUPERIOR owned by Davis and Oakley, and the WM. YOUNG by P. Carpenter & Co., are good business boats and afford comfortable accommodations for passengers.

Another new boat is now, we understand, nearly completed, which is owned by, and to run from the dock of, B. Carpenter & Co., which will probably be equal, in speed and comfort, to the *Highlander*, a boat not surpassed—when comfort, safety

and speed, &c. are taken i to view—by any other on the river. The business of Newburgh may be in some measure judged of, by the boats it employs; and as to passengers, a greater number probably arrive and depart, than at any other landing below Albany—to accommodate which a daily *morning* line of boats will probably leave Newburgh on the opening of the next season—an engagement rendered necessary by the increase of business—and the period is not far distant, we predict, when there will be *hree daily* ines of boats between Newburgh and New York, viz: *morning, twelve. and five o'clock lines.*

The beauty and health of Newburgh will undoubtedly make it a desirable residence for families to educate their children, and we may with confidence say that the citizens of Newburgh will take proper measures to have other schools, in addition to those they now have, of the first order, as as they may be required.

We cannot permit this opportunity to pass without calling attention to one for Young Ladies, already established there, and very liberally patronised. We refer to that established and under the control of the Rev. Mr. Prime. It is pleasantly situated a little to the north of the village, and has about 75 pupils, which are all that can be accommodated.

There are other schools of reputation, as we are informed, but of which we can only speak from report.

There are also six or seven places of public worship, which are generally well attended; and, judging from observation, it may be truly said of Newburgh, that it has a population not surpassed by any other, of equal numbers, for *industry, sobriety,* and *thriftiness.* They have generally earned what they possess, and therefore know how to take care of it. It has been well said of the *business* men of Newburgh—"*there are none more worthy of confidence.*"

BOSTON AND TROY (VERMONT) IRON COMPANY.

We have before us the charter granted by the Legislature of Vermont, at its last session for a Company with a view of bringing into use the rich ores of the "mountain State." This is a liberal charter. The Company is permitted to hold real estate to the amount of $300,000. At a meeting of the petitioners and their associates at Montpelier, this act of Incorporation was accepted, and a Company formed under it. The capital stock of said company has been divided into *Twelve Thousand Shares* at *Twenty Five* dollars per share. More than half of these shares have already been subscribed for, by persons in Vermont and in Boston, and about *one fourth* in *this* City; leaving a small amount yet to be taken. The property of this Company consists of about 1400 acres of land, in the town of Troy, Vermont. It embraces an exceedingly rich, and an inexhaustible mine of Iron ore, and a water power of almost unlimited extent for manufacturing purposes.

We have a specimen of the ore now before us which is very rich, and according to Dr. Chas. T. Jackson's analysis of the same contains $62\frac{1}{2}$ per cent. of pure Cast Iron, and is consequently as rich as any yet discovered in this country. From careful investigation, it has been ascertained that Pig Iron can be manufactured on the premises for from 14 to 15 dollars per ton; that all the Iron which can be made for a long time to come, may be sold at the furnace, to supply the present demands for it in the State—and at the rate of from 45 to 50 dollars the ton; and should more of the Iron ever be manufactured by the Company than could be sold at the furnace, it can be transported to Albany, N. Y., for the sum of $8 50 per ton, where it will sell readily for 45 to 50 dollars the ton.

We are induced to believe that this Company will possess great advantages for manufacturing Iron; and that they can supply a superior article; and we trust they will in some measure dispel the opinion so prevalent in this country that we must go to Europe for the immense amount of Iron, and especially of *Railroad Iron* used, and to be used here.

It is, indeed, mortifying that, with such an abundance of the richest ore, and an inexhaustible supply of *fuel*, we must send our millions abroad, instead of paying them to our own enterprising and deserving citizens. A different course of things must soon, we feel confident, exist, when we shall not only produce, but also manufacture for all our own purposes, our own *Iron* and *Steel* in the greatest perfection.—To such an end, we with great confidence look; and therefore hail with enthusiasm, the appearance of every new establishment which shall tend to produce such a result.

The accompanying letter from James Anderson, Esq., of Boston, who was selected to examine and report in relation to the property and operetions of the Company, will be highly satisfactory to those who take an interest in the matter.

Information in relation to future operations of the Company may be obtained by applying to J. E. Benners, Esq., 67 Wall street, New-York—or to the office of this Journal.

☞ It should be borne in mind that the contemplated Railroad from Hartford, Conn., up through the *Connecticut* Valley, will probably pass through the town of Troy, where these works are to be located.

Extract of a letter to a Gentleman of this city, dated

Boston, August 21st, 1836.

MY DEAR SIR,—I intended to have returned to Boston by the way of New-York, for the purpose of reporting to you verbally what I now propose to write you, respecting the property in the Town of Troy, State of Vermont; but in consequence o the sickness of Mr. ——, I was obliged to return directly home. I regret that I was obliged to take this route, because I could have given you better and more satisfactory answers to your questions, in verbal conversation, than I can possibly do in writing. Although the attentions of my friends occupied considerable of my time, while I remained in Troy, yet I was enabled to make many enquiries respecting the property which you have the privilege of purchasing, and shall be able to answer most of your questions. These I shall answer, not in the order in which you put them —but in that which is most convenient to me.

First, then—The town of Troy lies in the north part of Vermont, Orleans Co., and is about forty miles from Lake Champlain. It contains about 1000 inhabitants, a number of saw and grist mills, and I think two small woolen factories; and it is represented to be extremely rich in Iron Ore; Marble and Lime Stone. The Iron mine which you have purchased is situated near the middle of the town.

Second. The Iron mine is peculiarly, and as it appears to my eye, most advantageously, situated. The ore lies imbeded in a ridge of land which rises more than fifty feet above the plain, and is to all appearances inexhaustible. I walked over and around this ridge and examined the veins of ore which every where show themselves from the summit to the base of the mountain, and many large masses of the ore weighing from one to two tons, are scattered along the sides of the ridge, which have been detached by some convulsion, or by their own weight. The mountain, in the language of a resident, is truly "a mountain of *Iron Ore.*" From the results of Dr. Jackson's analysis of this ore, it contains from 64 to 65 per cent. of pure Iron, and is therefore as rich as any ore yet discovered, and is vastly richer than that found in Pennsylvania, from which so much Iron is made. It seems also from Dr. Jackson's analysis and certificate, that this ore contains a highly magnetic quality which renders it peculiarly appropriate for smelting into soft and ductile, yet tenacious iron.

Third. If I remember rightly the amount of land, which your bond gives you the tittle to, is not far from 1400 acres within this space, I learn that most of the iron ore of the town, and in fact, of this part of Vermont, is located. The principal river of the town (the Missisqui river) also runs through it, and very near the base of the mountain which contains the ore. There are also two good farms on this land—one of which lies on the banks of the river where mills will be erected, and upwards of 25 acres of it is cleared land, and on this portion of the farm is a good house and barn. The other farm is still more valuable, and as I was in-

formed will yield this present season 100 tons of hay—which is worth on the spot six dollars per ton. A large portion of this 1400 acres is heavily timbered with hard wood, and the soil is generally rich and good for farming purposes. The people of Troy tell me that the land would command on average from 5 to 10 dollars per acre after the wood shall have been cut off.

Fourth. As it respects the water power of Missisqui river, which you were so anxious to have me examine, I will remark that there is, I am sure as much *fall* and *power* as was represented to you. The Missisque river, as I have observed, runs through your lands, and is a deep and rapid stream. The fall in it is so considerable that a number of dams can be thrown across it within the boundaries of your purchase, on which many mills might be erected. The dam on which the iron mills, and near which the furnaces should be built is but a short distance from the mine which contains the ore. The river at this place is 150 feet wide and was from four to five feet deep when I was there. By building a dam ten feet high a fall of water of from 14 to 15 feet can be secured. This spot seems to be formed by nature for a mill power, for the bed of the stream here is formed of a solid rock, and the river forms a kind of curve, and is bordered by high banks so as to enable you to form a large pond above. About two miles below this is another place where a still larger water power can be had at small expense. This is the mill privilege which Mr. Young has bonded to you. The former privilege, and on which your works should be erected, is about one and a half miles from the mine—and the land from the mine to this water privilege has a gradual descent—so that it would be easy to transport the ore to the furnace over it upon a cheap railroad, by gravity, the descending load taking up the empty cars.

Fifth. In answer to your question whether "materials for building dams, mills and furnace—and also for smelting iron ore can be obtained in abundance"—I will state that lumber can be obtained from your own premises, and that bricks can be purchased near by for three dollars per thousand.—Charcoal, which is an important and necessary article in the manufacture of iron, may be obtained in any quantities in the immediate vicinity and at the very low price of *three dollars* for the *hundred* bushels—a number of persons were anxious to contract to furnish coal at this price.

Sixth. To the question "what would it cost to build a dam, erect a furnace—a saw mill—and a power bellows"—I ascertained that a dam might be thrown across the stream at the place above named for 500 dollars—and that a saw mill might be built upon it for the like sum—a Mr. Willis Williams, a mill-wright, offered to contract to build both for the sum named—what a power bellows would cost I was unable to learn—a furnace which would be capable of running out 1200 tons of pig iron in a year; would cost about 1500 dollars.

Seventh. To the question—"what would it cost to make a ton of pig iron, after the furnace and mill shall have been erected"—the following facts furnished me by those who have been conversant with the business, will give the proper answer.

For raising the ore and transporting to the furnace, two tons of it, or a quantity sufficient to make a ton of pig iron	$1 50
For 200 bushels of charcoal at $3 per 100	6 00
For preparing the ore for the furnace, say	1 50
For the labor of five men	5 00
	$14 00

The sum of 75 cents for raising a ton of ore and transporting it to the furnace is indeed small, but there are many persons now in Troy who are ready to contract to do it for that small compensation. This fact shows how advantageously the ore is situated for mining. At Franconia, and also on the west side of Lake Champlain, I understand that it costs 7 and 8 dollars a ton to mine the ore, so deep in the earth is it inbedded.

Eighth. You ask "what would it cost to transport a ton of pig iron from the furnace to Albany or New-York." The distance to Keyes' wharf at Highgate on Lake Champlain is 38 miles by a very good road—and a ton of pig iron can be transported from the furnace to said wharf at $5 per ton.—From said wharf down the Lake and through the canal to Troy or Albany, N. Y., it would cost 3½ per ton—so that a ton of pig iron made and transported to Troy or Albany would cost (14 and 8½) 22½ dollars. A ton of pig iron would sell at present at either of these places for from 40 to $50 per ton—and should it equal in quality that imported, it would command $60 per ton.

Ninth.—There is, however, already, a large quantity of pig iron used in Vermont, and I have no doubt but that every pound that could be made at the contemplated works, would be sold at the furnace for forty-five or fifty dollars the ton. For now there are many furnaces in the vicinity of the lake, and in the north part of the State which work vast quantities of pig iron, and many more furnaces would be erected provided the iron should be made in Troy. The proprietors of the furnaces now in operation, go to Montreal and other distant places for their pig iron, and pay sixty dollars a ton for it, and also a high price for carting it from those places to their furnaces.

I will observe here, that while I was in Troy, a committee of gentlemen from St Albans visited Troy, to ascertain if the iron works were to go into operation; and in case they were to, they were authorised to make an arrangement by which all the pig iron that should be made, might be carried to St. Albans; and so anxious were the people of St. Albans to effect this object, that they had already raised by subscription about $1600, to build a good road, or improve the one which now leads to that town from Troy. The distance from Troy to St. Albans is about forty miles. I have now replied to most of the questions which you noted for me to answer, and shall be gratified should they be satisfactory, or of value to you. It may be, however, that I have given you no information in addition to what you are already in possession of.—In relation to the subject generally, I will observe, that from the inquiries which I have made respecting the quality, quantity, and the location of the ore, and the facilities for converting it into pig iron, I am decided in the belief that you will make a profitable investment by purchasing the premises and working the mines as you have proposed. And before closing this long, and perhaps tedious letter, I will suggest that should iron works be erected on the river near the mine of ore, this spot would doubtless become the centre of business of the town. At present there are two villages in Troy, situated at opposite extremities of the town. As is natural, there exists quite a rivalship between these two places in regard to business. Should the contemplated iron works ever be erected, it is the opinion of the people of Troy, that a new village would spring up near them, which would become the principal village of the town, and would monopolise most of the business which is now transacted in the two present existing villages. But I will draw to a close, for I find I am becoming so much interested in the subject that I may lead you astray, by suggesting what may possibly take place provided you should go on in your proposed undertaking, and yet I cannot close without expressing the hope that you will persevere. I hope so, too, more for the public than any private benefit which would result from such an undertaking. Millions of dollars are now sent out of the country to purchase iron, which ought and might be retained in the country, and paid to our own citizens for converting into iron the rich ore which now lays dormant and useless in our own soil. I hope the time will soon come when we shall make all the bar and railroad iron that may be demanded in our country. It is truly mortifying that we should be dependent upon foreign countries for that which our own country can produce in abundance, and at a much less price, even, than it can be manufactured for in those countries. Excuse me from this digression, and believe me that I shall be happy if the contents of this letter shall be acceptable to you.

Your friend and ob't. serv't.

JAMES ANDERSON.

P. S. Since the above was written Pig Iron has greatly advanced.

POUGHKEEPSIE AND ITS IMPROVEMENTS.

The following extract from the Boston Traveller gives but an imperfect idea of the present and prospective manufacturing operations of Poughkeepsie.

A recent visit to that delightful and flourishing village, has given us a high opinion of the enterprise and public spirit of many of its inhabitants. They have laid out new streets and public squares, and erected many new and elegant buildings, both for private and public purposes, which do them much credit. The schools and seminaries are of a high order, and their numbers are rapidly increasing, which will insure a large accession to the population of the place for purposes of education.

The shrewd forecaste of the intelligent and wealthy citizens of Poughkeepsie is evinced, as well in matters of business as in beautifying and adorning their village.—They hold out liberal inducements to manufacturers to locate there, and extend to them every facility the place affords, and Poughkeepsie, therefore, must become a place of great business—especially when the Railroad to Stockbridge, and a line of steamboats to New-York, shall be in operation. Its society is equal to that of any other town or city in the State, and its mechanics, or at least some of them, have few equals and no superiors.

The following extract from the Boston Traveller refers to one who would do credit to any age, or country. We shall refer again, and more particularly to Gen. Harvey's operations, as soon as we can find leisure to examine his machines now in operation and in course of construction.

Poughkeepsie, June, 1836.

"The extensive silk factory, owned by a company with a capital of $200,000, is completed, and nearly ready to commence operations. Gen. Harvey, a skilful machinist, and the inventor of some half score of "Yankee contrivances," has got up a screw company, with a capital of $200,000, which promises not a little toward the future prospects of the place. The screws are made by the machinery of Gen. H.'s invention, and with astonishing facility—the whole being accomplished by three rapid applications of the machinery. The first cuts the screw from the wire, and forms the head; the second forms the groove and finishes the head; and the third makes the screw, and turns out a highly polished and beautiful article—far superior to the English screws made by hand. It is expected that this establishment will manufacture not less than twenty thousand gross per week, and give steady employment to 300 hands. I saw in the same establishment a machine for coining money, made for the government mint; the model of a saw for felling trees, invented for the express benefit of a "down east" company of speculators; a machine for turning out horse-shoes, perfect, with only one speedy operation; and a large number of machines for weaving stock frames, were in the "full tide of successful operation," all productions of Gen. Harvey's fertile genius."

AN ACCOUNT OF THE PORTAGE RAILROAD, OVER THE ALLEGHENY MOUNTAIN, IN PENNSYLVANIA.—BY S. W. ROBERTS, PRINCIPAL ASSISTANT ENGINEER.

The commencement of the construction of the Allegheny Portage Railroad, was authorised by an act of the Legislature of Pennsylvania, passed the 21st of March, 1831. Previous to that time, surveys of the Allegheny Mountain had been made by several eminent engineers; and these surveys had thrown much light on the topography of the country through which the Railroad was to pass.

Sylvester Welch, Esq. was appointed principal engineer of the work, by the board of Canal Commissioners; and he organised his locating party, and had the tents pitched near Lilley's Mill, at the head of the mountain branch of the Conemaugh, on the 12th day of April, 1831.

The locating party at the beginning, consisted of—Sylvester Welch, principal engineer; Solomon W. Roberts, principal assistant engineer; Patrick Griffin, surveyor, and twelve assistants and axe-men, and a cook.

The line was commenced at the head of the Little Conemaugh, and continued down the valley of that stream to Johnstown, a distance of 21 miles, where it connects with the western division of the Pennsylvania Canal. The western end of the Railroad was located on the 14th of May. In the month of May, Mr. W. Milnor Roberts joined the corps as principal assistant engineer, and traced the line from the turnpike crossing, near the summit of the mountain, to Lilley's Mill, a distance of five miles.

The grading and masonry of the twenty-six miles thus located, were contracted for at Ebensburg, on the 25th of May, and the work was commenced by clearing a track, 120 feet wide, through the forest,—most of which consisted of heavy spruce or hemlock timber. The location of the line from the turnpike crossing, near the summit, at Blair's Gap, eastward to Hallidaysburg, a distance of ten miles and two-thirds, was immediately proceeded with. This part of the work was let to contractors on the 29th of July, 1831; and thus the grading and masonry of the whole Railroad, being thirty-six and two-thirds miles in length, were put under contract. The laying of the first track, and the necessary turn-outs of edge rails, and of a double track of plate railway on the inclined planes, was contracted for on the 11th of April, 1832. The work upon the Railroad was prosecuted vigorously, at one time a force equal to two thousand men being employed upon it; and on the 26th of November, 1833, the first track was so far advanced as to permit the passage of the first car over its whole length.

On the 18th of March, 1834, the road was opened as a public highway; the State furnishing power on the inclined planes only and it continued in use until the 31st of December, when the navigation of the canals of Pennsylvania, which this road connects, was closed for the season. The Railway was again opened on the 20th of March, 1835; shortly after which, the second track of edge rails was completed. On the 11th of May, the State began to furnish the whole motive power, locomotive engines being used on the "long level;" and this continued until about the middle of December, when the canals were closed by ice.

The Portage Railroad consists of eleven "levels" or grade lines, and ten inclined planes. The ascent from Johnstown to the summit is $1171\frac{58}{100}$ feet in a distance of $26\frac{59}{100}$ miles; and the descent from the summit to Hallidaysburg is $1398\frac{71}{100}$ feet in a distance of $10\frac{10}{100}$ miles. There are five inclined planes on each side of the mountain, varying in inclination from 4° 9' to 5° 51', or from $7\frac{25}{100}$ feet to $10\frac{25}{100}$ feet elevation, to 100 feet base; they are numbered eastwardly, the one nearest Johnstown being No. 1, that nearest Hallidaysburg, No. 10. The following table shows the length, and rise or fall of each "level" or grade line, and of each inclined plane.

		Length.	Rise.
Level No. 1.	from Johnstown to plane No. 1.	4.13 miles	101.46 feet
Plane " 1		1607.74 feet	150.00
Level " 2	ascending,	13.06 miles	189.58
Plane " 2		1760.43 feet	132.40
Level " 3	"Long level,"	1.49 miles	14.50
Plane " 3		1480.25 feet	130.50
Level " 4		1.90 miles	18.80
Plane " 4		2195.94 feet	187.86
Level " 5		2.56 miles	25.80
Plane " 5		2628.60 feet	201.64
Level " 6	Summit level at Blair's Gap,	1.62 miles	19.01—1171.58
			Fall
Plane " 6	descending,	2713.85 feet	266.50
Level " 7	"	.15 miles	0.00
Plane " 7	"	2655.01 feet	260.50
Level " 8	"	.66 miles	5.90
Plane " 8	"	3116.92 feet	307.60
Level " 9	"	1.25 miles	12.00
Plane " 9	"	2720.80 feet	18 .50
Level " 10	"	1.76 miles	20.58
Plane " 10	"	2295.61 feet	180.52
Level " 11	to Hallidaysburg,	3.72 miles	146.71—1393.71

A part of the railway, generally 300 feet long, at the head and foot of each plane, is made exactly level. The planes are all straight in plan and also in profile, excepting that the angles of elevation at the lower ends are rounded off by curves. There are some minor variations in the grades on the "levels," made to suit the ground, which are omitted in the preceding table. From the lengths and heights given above, the average grade of each "level" may be obtained correctly.

The embankments were made 25 feet wide on the top, and the bed of the road in excavations is 25 feet wide, with large side ditches. Where the lines follows the bed of the Conemaugh, it is protected by substantial slope wall. As the railroad is generally constructed along the steep slopes of hills, often of a clayey soil, and as it crosses many small streams, great care in drainage was necessary. Sixty-eight culverts of masonry laid in mortar, the sum of the spans of which is 494 feet, pass under the railroad, besides 85 drains of dry masonry, of from 2 to 3 feet span. There are four viaducts of hammer-dressed sand-stone, to carry the line over streams. The first and largest is over the Conemaugh at the "horse shoe bend," about eight miles from Johnstown. This magnificent viaduct has a single semicircular arch of 80 feet span, and the top of the masonry is 70 feet above the surface of the water. The whole cost of this work was $54,562 24 cts., and by building it, a lateral bend of about 2 miles was avoided. There are two viaducts over branches of the Conemaugh, each of 40 feet span, and one over a branch of the Juniata at Hallidaysburg, having two arches of 33 feet span, which vary 35 degrees from a right angle with their abutments. There is a tunnel through a spur of the Allegheny

at the head of inclined plane No. 1, about four miles from Johnstown, near which the Conemaugh makes a bend of two miles and a half. This tunnel is 901 feet long, and 20 feet wide by 19 feet high within the arch. It is arched for 150 feet in length at each end, and the entrances are finished off with ornamental facades of cut stone. The whole cost of the tunnel, including arching, was $37,498 85 cts. The edge rails used on the Allegheny Portage, are "parallel" rails of rolled iron, weighing about 40 pounds per lineal yard. They are supported by cast iron chairs, which weigh on an average about 13 pounds each. The rail is secured in every chair by one iron wedge.—The stone blocks which support the chairs, contain three and a half cubic feet each, and they are imbedded in broken stone, at a distance of three feet from centre to centre. On a part of the railway, the chairs are laid upon a timber foundation, and on the inclined planes and along the canal basins, at the two terminations of the road, flat rails upon timber are used. At the head of each inclined plane, there are two stationary steam-engines of about 35 horse power each, which give motion to the endless rope to which the cars are attached.—Only one engine is used at a time, but two are provided to prevent delay from accidents. Four cars, each loaded with 7000 lbs. can be drawn up, and four may be let down at the same time; and from six to ten such trips can be made in an hour. The machinery is very simple and effective.—Its construction was superintended by Mr. Edw. Miller, as principal assistant engineer. A safety car attends the cars, both ascending and descending, and stops them in case of accident to the rope, which adds greatly to the security. The credit of this contrivance is due to the principal engineer. The grubbing and clearing of the Portage Railroad cost $30,524. This work was equal to cutting a road through a dense forest, 120 feet wide and about 30 miles long. The grading of the railroad, including the grubbing and clearing, and all works done under the contracts for grading cost $472,162 59¼ cts. This work includes, 337,220 cub. yds. of common excavation.

212,034	"	"	slate or detached rock.
566,932	"	"	hard-pan or indurated clay.
210,724	"	"	solid rock.
14,857	"	"	do. do. in tunnel at $1 47.
967,060	"	"	embankments carried over 100 feet.
67,327	perches		slope-wall of 25 c. feet.
13,342	"		vert. do. and wall in drains.

The viaducts and culverts, and the skew-bridge for carrying the turnpike over inclined plane No. 6, contain 28,368 perches masonry, and their total cost was $116,402 64¼ cts. For the first track and the necessary turn-outs, including a double track upon the inclined planes, there were delivered 509,11 stone blocks, each containing 3½ cubic feet, cost $27,072 15 cts.; and 508,901 feet lineal of 6 by 8 inch timber; 239,397 feet of 10 by 10 inch, and 2842 feet of 12 by 12 inch timber, of white oak and pine, which cost $47,184 50 cts. The work done under the contracts for "laying" railway on the first track, including furnishing broken stone, amounted to $135,776 26 cts. All of the iron rails were imported from Great Britain, by Messrs. A. & G. Ralston, Philadelphia, and also a part of the chairs, spikes, and wedges for the first track. The total cost of British iron at Philadelphia imported for the first track, was $118,883 36. The *aggregate cost* of all works done and materials furnished under contracts for the *first track* of railway was $430,716 59½ cts. For the second track there were imported 16,976 bars of edge rails, each 18 feet long, which weighed 1803 tons, 14 cwt. gross, and cost at Philadelphia $87,494 80 cts., or $48 5 cts. per ton. The *aggregate cost* of all work done, and materials furnished under contracts for the *second* track of railway was $362,987 05½ cts. Aggregate cost of work done and materials furnished under contracts for building ten stationary engines and machinery at the inclined planes, houses, sheds, dwelling-houses for enginemen, wells, water-pipes and ropes, first set, was $151,923 30¼ cts.

GENERAL STATEMENT OF THE COST OF THE PORTAGE RAILROAD.

Cost of Grading,	$472,162 59¼
Masonry,	116,402 64¼
First track of Railway,	430,716 59½
Second track do	362,987 05½
Buildings, Machinery, &c., at planes, *first set*,	151,923 30¼
Ten stationary engines, *second set*,	37,779 25
Buildings, &c., for second set of engines,	21,049 59
Depots, machine shops, water stations, weighing machines, and various works,	41,336 66½
	$1,634,357 69¼

The above sum is the cost of constructing the Portage Railroad at the contract prices; but it does not include office expenses, or engineering, or the extra allowances made to contractors, in a few instances, by the Legislature after the work was completed, and beyond the contract prices.

Four locomotive engines have been used upon the "long level" but the expenses of them belong to another account.

About fifty thousand tons of freight, and twenty thousand passengers passed over this road during the season of 1835. This is but a beginning of the vast trade destined to take *this route*, which was nearly an untrodden wilderness five years ago. The State of Pennsylvania has reason to be proud of her public improvements, and the Allegheny Portage Railroad is one of the most important links in that great chain which connects Philadelphia with Pittsburg.

The above statements were derived from official documents in the Railroad office at Johnstown, and consequently may be depended upon.

Johnstown, January 1, 1836.

PRINTING FOR THE BLIND.—We are happy to inform our readers that the British Society for embossing and circulating the authorised version of the Bible for the use of the blind have received the munificent grant of 100*l.* from the British and Foreign Bible Society "towards printing the Scriptures for the use of the blind, by means of an embossed stenography, after the invention of Mr. Lucas." In order, therefore, that the blind may be regularly supplied with the sacred Scriptures, the type is already commenced in this city, and the Society expect to commence printing some time next month. They are, therefore, desirous that the blind should receive the instruction offered them by the Society at their school, 57 Castle-street.—[Bristol Journal.]

APPLICATIONS OF CHEMISTRY TO THE USEFUL ARTS, BEING THE SUBSTANCE OF A COURSE OF LECTURES DELIVERED IN COLUMBIA COLLEGE, NEW-YORK, BY JAMES RENWICK, PROFESSOR OF NATURAL EXPERIMENTAL PHILOSOPHY AND CHEMISTRY.

V.

CARBON, HYDROGEN AND THEIR COMPOUNDS.

(Continued from August No.)

4. MANUFACTURE OF COKE.

AUTHORITIES.—KARSTEN. Metallurgie de Fer.
DUMAS Chimie appliquee aux Arts.
BEAUMONT and DUFRENOY. Voyage Metallurgique.

Rationale.—Coke bears the same relation to bituminous coal, which charcoal does to wood, and is, like it, obtained by distillation at a red heat. Bituminous coal is a compound of carbon, hydrogen, and oxygen, in very various proportions. In the variety called cannel coal, the proportion of hydrogen amounts to 5½ per cent. in the Liverpool coal it is about 3¼ per cent., and in the slaty varieties does not exceed one per cent. The quantity of carbon varies from 75 per cent. in cannel coal, to 90 per cent. in that of Newcastle. The proportion of oxygen in cannel coal is about twice as great as would suffice to convert the hydrogen into water; in the Newcastle coal about four times as great; and in the slaty varieties, it but little exceeds the proper relation.

Coals may be divided into three varieties:

1. Those which contain at least three per cent. of hydrogen, and, at most, as much oxygen as will convert half the hydrogen into water.

2. Coals which contain oxygen in such quantity as to convert two-thirds of the hydrogen into water.

3. Coals which contain oxygen enough to convert the whole of the hydrogen into water.

The first of these varieties fuses when heated, and the excess of hydrogen uniting with a part of the carbon, escapes in the gaseous form; by the formation and escape of gas, the coke is rendered light and porous. The second variety fuses also, but the quantity of gas formed is not sufficient to render the coke porous, it is therefore compact and massive.

The third variety does not fuse, and the escape of the vapor of water reduces the mass to the form of powder.

Coal of the first class increases in volume when it is coked; the other two varieties yield coke in less volume than the coal employed. In their uses in the arts, the first furnishes the most valuable coke; the last that of least value.

Coke may be prepared in iron cylinders or retorts, but this is only done when the volatile products are to be collected; this method will therefore be described when we treat of the preparation of gas for illumination. Treated in this way, cannel coal yields about 50 per cent. of coke, and that of Newcastle as much as 80 per cent.

When the distillation is performed at a low temperature, the weight of coke is increased, but its volume and porosity are

diminished. It is therefore advantageous, when the volatile matters are not the principal object, to effect the decomposition of the coal by a sudden and high heat.

Preparation.—When coal is rich in hydrogen, it may be readily coked in heaps resembling the *pits* used in preparing charcoal. The coal must be in pieces having not less than three or four inches in each dimension. The heaps are conical, having a base 15 feet in diameter, and a height of about 30 inches. The heap may be best covered with straw, on which is laid a layer of moist earth, the straw being so applied that the earth cannot enter into the spaces between the pieces of coal. But as the use of straw is expensive, it is more usual to cover the large coal for about the height of a foot from the ground with smaller pieces, and the outside with coal-dust; the top of the heap is covered with the refuse coke which is left in the form of powder, in handling that obtained in previous operations. The heap being finished, a few lighted coals are dropped into an opening of six or eight inches in depth left in the top; the space is then filled up with fragments of coal, and when the combustion has fairly commenced, the whole is covered with earth or refuse coke. The rest of the process is much the same as that of preparing charcoal, but is easier, as coal when in mass will not continue to burn after the gaseous matter has escaped, unless new surfaces be exposed to air.

In heaps of greater diameter and height than we have described, the combustion would be too slow at first to form a porous coke, and so rapid at the end as to render it difficult to extinguish. Yet so large is the quantity of coke which is required in some instances, and particularly in the manufacture of iron, that heaps of so small a size would be attended with inconvenience. The shape of the heap is therefore changed in such cases from a cone to a long prism. The breadth of this must not exceed 15 feet, nor its height 3 feet, but its length may be unlimited. This prism must be set on fire in the mode we have mentioned at several points on its upper edge. In this way not only may a greater quantity of coke be prepared at a single operation, but the time is shortened, the conical heaps requiring three or four days for their conversion into coke, while the prisms are finished in 24 hours.

The product is usually about 40 per cent., but some coals, that of Virginia for instance, yield 50 per cent. If a coal, in consequence of its containing but little hydrogen, does not burn freely, it cannot be converted into coke in this way. Such a coal was found in Yorkshire, (England,) in association with minerals which would render the manufacture of iron profitable. In order to apply it to this purpose, an intelligent manufacturer (Wilkinson) imagined the application of a chimney, for the purpose of obtaining a more powerful draught. This chimney is conical in form, about a yard in height, and as much diameter at bottom; the diameter at top is two feet; it is built of brick, the lower courses of which are laid in such manner as to leave openings. Around this chimney the coal is piled in a heap, whose radius is about 6 feet greater than the outer radius of the chimney. This heap is composed of alternate layers of large and small coal, the lowermost layer being of pieces of the largest size. The surface of the heap is covered with ashes or refuse coke, and fire is applied by throwing burning fuel into the chimney. Wet ashes are kept on hand to close any cracks which may occur in the cover of the heap. Dense smoke flows from the chimney, and is followed by a blue flame; as soon as this appears, the top of the chimney must be closed by a plate of cast iron and the combustion will speedily cease.

The coal of Pittsburgh, Pa., as far as we can learn, must resemble in quality the coal employed by Wilkinson, for although far removed in character from anthracite, it has not hitherto been converted into coke by the use of the mode first described. We cannot but express our belief that the method of Wilkinson would be found sufficient for the purpose and that by its aid the manufacture of iron from the ores might be introduced into that city, which at present receives almost all the pig iron used in its extensive foundries and forges, from the opposite side of the Alleghany range of mountains.

This method has also been introduced, with some modifications in Staffordshire, where the coal is of better quality. Here the coarser coal is placed in contact with the chimney, and the finer at the outside of the heap, the whole being covered with ashes or refuse coke, leaving a few openings for the admission of air. As soon as the coke is finished, water is poured on the heap to extinguish the combustion. In this way the product of coke is raised from 40 to 50 per cent.

All the methods of which we have spoken require that the coal should be principally of that size which is of most value for other purposes, namely in coarse fragments. Much however of all good coal is reduced to dust in its extraction from the mines, and in the handling it must undergo. This, in most parts of England, is totally lost, and it has even been necessary to burn it in heaps in order to get rid of it.—In France, where coal is more scarce, and consequently of more value, it has become an important object, that none but such refuse coal should be converted into coke, and the coarser pieces left to be employed for other purposes. This object has been successfully accomplished in the neighborhood of St. Etienne.

The heap in which the coal is burnt may have the form either of a truncated cone or oblong truncated pyramid. The latter form is the most easily constructed, and described. A case of plank is formed, having the desired figure, say a base of 50 or 60 feet in length by 4 feet in breadth, a height of 3½ feet; and the planks are so inclined as to make the dimensions of the upper surface two feet less in each direction than that of the base.

The planks which form the ends of the case are each pierced with four holes: one at the base, one directly over it and near the top, the other two at half the height of the plank, and in the vertical plane of the upper edge of the sides. Each side is also pierced with three ranges of holes, having the same arrangement in quincunx as those of the ends, and at the same distances.

These holes serve for the introduction of tapering spars. The spars of the lowermost layer are passed through the holes in the sides and ends, at right angles to the respective direction of these surfaces, and at the angles where the spars meet each other, vertical spars are set up. The second range of spars is inclined to the sides in such manner as to meet the vertical spars; and the third layer has the same direction as the first.

The fine coal is prepared by mixing it into a paste with water, by means of a hoe. It is then thrown into the case, and well rammed upon the lower range of spars, until a bed has been formed to receive the second range of spars. This latter range being placed, more coal is thrown in and rammed, until the height of the third range of spars has been reached, and this being introduced, the rest of the case is filled in the same manner.

In order to lessen the expense of the wood employed, the heap may be built in successive portions, each ten or twelve feet in length, and when one portion has been finished, the planks and spars are removed to enclose and form passages in a second portion. The spars form conical passages in the mass, by which air may be admitted during the combustion. When the heap has thus been completed and covered with ashes and refuse coke, all the wood is removed, and the heap is set on fire by igniting small heaps of coarse coal upon each of the openings left in the upper surface by withdrawing the vertical spars. It has been found that in pyramidal heaps, about $\frac{1}{25}$ part of the coal to be coked is required for this purpose; but in small conical heaps, where a single vertical spar will suffice no more than $\frac{1}{35}$ will be used.

The attention of the workmen must be directed not only to close the cracks which may appear in the cover, but to keep the passages left by the spars open by means of iron rods. The completion of the process is known by the cessation of the flame. Water is then introduced into the lower passages, whose steam in passing through the incandescent heap is decomposed, and furnishes hydrogen which escapes in flame. The heap is then covered closely with earth, and left until it cools.

In this way coal which would otherwise be lost, yields 50 per cent. of coke of excellent quality.

When coal of the first variety (with the exception of cannel coal) is distilled in close vessels it yields from 70 to 80 per cent. of coke, by the combustion of about ten per cent. of coal. As the best of the methods we have yet described yields no more than 50 per cent., and the most common of them no more than 40, there is obviously a very great waste. In the neighborhood of coal mines this is more than compensated by the simplicity

usd facility of this process. But at a distance from mines a more economic process is necessary, unless coke can be transported from this vicinity, which is by no means easy, in consequence of its friable character, and its being liable to injury by being wet. The best apparatus for this purpose is called the coking oven. This is formed of a cylindrical wall about 2 feet in height surmounted by a dome, from the summit of which rises a chimney about 18 inches in height. In the circular wall is a door about 18 inches by 12 inches, having an iron shutter. The coal is introduced through the chimney, and spread by a rake over the floor, to an uniform depth of about 4 inches. Burning coals are then dropped through the chimney, and as soon as the ignition is fairly commenced the door is closed. When a blue flame begins to appear at the chimney, the top of it is closed by a plate of iron. In this method about one half more coke is obtained than by the ordinary heaps.

Large spheroidal kilns, and reverberatory furnaces have also been used, but their principal object was the preparation of the coal tar. As this article has not proved to be of any great value, and is besides produced at gas-works in quantities greater than can be consumed, it is unnecessary to describe these kilns and furnaces.

It may be here mentioned that turf or peat may be carbonised as well as coal or wood. The fuel thus produced is of very excellent quality, and may be applied to the same purposes as that obtained from wood or bituminous coal.—Pits as used in preparing charcoal have not been found well adapted to the preparation of the charcoal of turf. The little that has been made of good quality was prepared in iron cylinders, but as this is too expensive for manufacturing purposes, it appears probable that if it should ever be necessary to carbonise turf on a large scale it will be done in kilns like those described under the head of charcoal.

5. LAMP-BLACK.

AUTHORITY.—Encyclopedie Methodique—Arts at Metiers.

Lamp-black derives its name from its having been originally obtained by collecting the soot of lamps. This method is still used in some cases. Linen wicks are immersed in linseed oil and lighted; the smoke is received in a copper vessel on which the soot is deposited. What is called ivory black was made at first by receiving the smoke of similar wicks upon plates of ivory.

At present lamp-black is manufactured on a large scale, by burning refuse resinous substances, or even from the soot of coal. When resinous matters are employed, they are placed in a kettle over a furnace, and free access of air is admitted over the mouth of the kettle. The resinous matter being heated fuses at first and finally takes fire, giving out a dense smoke. This smoke instead of being carried off by a chimney, enters a lofty circular chamber; the roof of which is conical with a single opening in the centre. From this roof a cone of sheet iron is suspended by a pulley, and nearly fills up the area of the chamber; this cone has also an opening in the centre. The interior of the chamber, and the lower surface of this cone are covered with coarse woollen coth or with sheep skins. Upon these the soot settles, and may, when the combustion is over, be separated by drawing the sheet iron cone up and down by means of the pulley.

Lamp-black is extensively used as a paint, and there are other forms of vegetable charcoal which are applied to the same purpose. Even common charcoal reduced to powder is sometimes so employed.

Blue black is formed by burning the kernels of the peach in crucibles, to which the covers are carefully luted, with but one opening for the escape of the gas.

A very fine black is made by treating the twigs and tendrils of the vine in the same manner. The article called black chalk, and used in the manufacture of crayons, or for drawing, without preparation is the charcoal of a shrub (*fusain*) which grows in France.

The black used in Europe by engravers is made from a mixture of wine-lees, peach-pits, ivory and bone, calcined and ground to powder. It is prepared for use by making it into a paste with linseed oil.

6. ANIMAL CHARCOAL.

AUTHORITIY.—DUMAS, Chimie appliquee aux Arts.

History.—In the preceding section we have mentioned the original mode in which ivory-black was prepared. For that method, the calcination of fragments of ivory in close vessels was substituted, and it was speedily found that an article little inferior was to be obtained from bones. Still, so long as the sole use to which either was applicable was in the art of painting, this observation was of little value. At the end of the last century, however, it was discovered that carbon, in any form, had the property of discharging the colors, taste and smell of liquid vegetable substances. Common charcoal was at first used for this purpose, but in 1811 it was discovered by a chemist in the south of France, that animal charcoal was much more powerful in its effects, and was capable of separating rapidly and certainly, vegetable coloring matter from any liquids whtasoever. Since that time the manufacture of animal charcoal has risen to great importance, and we shall hereafter have occasion to cite several important applications that have been made of it in the arts.

Preparation.—Animal charcoal is usually prepared from bones, and at the same time ammonia is obtained. We have had occasion to refer to this process under the head of that alkali. Some farther details are, however, necessary. The carbonisation of bones is performed in cast iron cylinders, similar to those used in the manufacture of nitric and muriatic acids. The tube which conveys off the volatile matter must be three inches in diameter, and connected with a series of three necked bottles.—The opposite end of the cylinder to that where the tube issues is closed by a dish, which has no opening in it. The bones are broken to pieces and freed from the fat by boiling. They are placed in the cylinders and kept at a red heat for thirty-six hours; at the end of this time they are taken out, and shut up in olose vessels to prevent combustion, until the charcoal is cold. The charcoal is then stamped into coarse powder, and finally ground between millstones into fine meal.

If it is to be used as a paint, it is again ground with water, and then dried in earthen moulds. Another form of animal charcoal which was formerly lost, is that left in the preparation of Prussian blue. In this manufacture blood is calcined with potash, and the charcoal is obtained by washing off the alkali.

APPLICATION OF ANIMAL CHARCOAL TO THE DISCHARGE OF VEGETABLE COLORS.

The action of charcoal in discharging colors seems to be owing to the same cause as its power of condensing gasses; of one of which it takes up 90 times its own bulk. The action in this case is due to a mechanical attraction, and to this we may ascribe its powers of retaining the coloring matter of liquids filtered through it. Animal charcoal, upon this theory, owes its superior effect to its greater degree of division; this minute separation of its parts is evident from the fact, that the actual carbonaceous matter in calcined bones does not exceed ten per cent. and is yet sufficient to give its intense black color to the remaining mass of phosphate and carbonate of lime. In that obtained in the manufacture of Prussian blue the division is still more minute, as it is in fact a chemical precipitate from the blood employed, it has for this reason a still more powerful effect. In consequence of this divisibility a larger surface is provided by which the attraction may be exerted.

The liquids which best evince the powers of charcoal in discharging colors, are the solution of indigo in sulphuric acid and molasses. The relative powers of different forms of charcoal on these solutions are exhibited in the following table, the power of that obtained from bones, without further preparation being taken as the unit.

	Indigo.	Molasses.
1. Calcined bones,	1.00	1.00
2. Soot of vegetable oil fused with artificial phosphate of lime,	2.00	1.90
3. Calcined bones from which the phosphate of lime has been washed by muriatic acid,	1.87	1.60
4. Calcined bones again calcined with potash,	45.00	20.00
5. Albumen or Gelatine calcined with potash,	35.00	15.50
6. Blood calcined with potash,	50.00	20.00

In order to render the above table useful it is to be stated that a given quantity of calcined bones will discolor the solution of one thousandth part of its weight of indigo,

or nine times its weight of molasses. After producing this effect it will not act again until the coloring matter absorbed has been separated by calcining the charcoal a second time.

As an instance of the use of these substances in the arts, we may cite an article well known in our markets. The made wine, called Marseilles Madeira, is prepared from the common red wines of the south of France. Their deep color is discharged by filtering them through animal charcoal, and they are made up to the American palate by the addition of brandy. The peculiar smell and taste of the original wine is discharged at the same, and it is thus ready to receive such as may be given it artificially.

Animal has similar advantages over common charcoal in the rectification of spirituous liquors. By its use, all the peculiar and often offensive taste and smell of these liquors may be separated. We shall have occasion to treat of these uses of charcoal under their proper heads.

A carbonaceous substance, having powers in these respects about equal to calcined bones, has been prepared from a species of shale charged with bitumen, which is found in some geological formations, and particularly in the strata of coal fields. In the separation of the volatile matter the shale becomes extremely porous. It is therefore well adapted to the construction of filters, which may be made of slabs of the carbonised rock.

7. GAS-LIGHT.

Rationale.—Bodies which burn with flame must be either volatile, or capable of furnishing a gas when heated. Thus, phospherous and sulphur burst into flame, when their vapor escapes freely, and the vapor of alcohol is readily ignited. Any aeriform body whatsoever, if intensely heated, assumes the appearance of flame. In oleaginous, resinous, and bituminous substances, a red heat causes a decomposition, and new combination of their elements; these new combinations are both gaseous and volatile, are readily ignited, and in burning form flame. Thus in a common fire of bituminous coal, bitumen is first formed; this is again decomposed by the heat, yielding tar and gaseous carbeurts of hydrogen; the former yields vapor, which in mixture with the gas burns with flame. In a common lamp or candle, the wick composed of inflammable matter readily takes fire; the heat thus produced melts the tallow, when that is used; the liquid tallow, or oil, is drawn up by capillary attraction into the pores of the wick, and coming in contact with its ignited part, is decomposed and yields carburetted hydrogen; this is set on fire by the ignited wick, and flame is formed.

Gases do not become luminous, nor assume the appearance of flame, except at very high temperatures, far higher, indeed, than those at which solid bodies become luminous. If then, a gas, when heated in the act of combining with oxygen, so far as to become luminous, should deposite a solid body, or if the product of the combustion should have the solid form, the flame will be brilliant; but if the product of the combustion remain in the state of gas or vapor, the flame will give but little light.

Thus, when phosphorus is burnt, the whole product is solid, and the flame has the greatest brilliancy of any that is known; when heavy carburetted hydrogen, (olefiant gas) burns, a part of its carbon is deposited, which, disseminated through the flame in a solid form, gives it the lustre due to an intensely heated solid; but when hydrogen or alcohol are burnt, even by the aid of a stream of oxygen, which causes the greatest heat of any known combustion, the flame will have so little brilliancy as to be hardly visible in the bright light of day, because the products are aqueous vapor and carbonic acid gas.

Combustible bodies may not only be decomposed directly in a fire, or by the aid of wicks, but they may be heated in close vessels, and the gases which are evolved may be kept in proper reservoirs until needed for the purpose of illumination.—From these vessels they may be carried in pipes to the place where the light is needed, and inflamed by an ignited substance as they issue from beaks of some convenient form.

When combustible bodies, whose principal constituents are carbon and hydrogen, are decomposed by heat, these elements may be either wholly separated or may enter into new combinding. The products are therefore carbon in the solid form which remains in the apparatus where the decomposition is performed; hydrogen uncombined; light carburetted hydrogen, olefiant gas or heavy carburetted hydrogen; liquid carburets of hydrogen; and tar. In the present case the resdiuum of carbon need not be spoken of, nor would we have any thing to add to what has been stated under the heads of Coke, and the several varieties of charcoal. Hydrogen has the smallest density of all known bodies, and in burning produces the most intense heat; but as the product of its combustion is aqueous vapor, and that extremely rare in consequence of being generated at a very elevated temperature, the flame has so little brilliancy as to be hardly visible in the light of the sun. Light carburetted hydrogen is a compound of one equivalent of carbon to two of hydrogen. The density of the compound is increased to eight times that of hydrogen, or the numbers which respectively represent these specific gravities are 1 and 8. In a close vessel it is not affected by a heat below one approaching to whiteness; but at a white heat or a little below, it is decomposed, and deposites its carbon. When burning freely, sufficient heat is generated to produce this decomposition, and the carbon deposited in the flame having the solid form, and therefore becoming more luminous than the hydrogen or the aqueous vapour which that gas forms, gives brilliancy to the flame. Light carburetted hydrogen is not absorbed by water to any appreciable extent.

Olefiant gas contains twice as much carbon as light carburetted hydrogen, and may be considered as a combination of one equivalent of each of its constituents; the volume of the hydrogen is reduced one half, and the density of the compound is fourteen. Even at a low red heat, olefiant gas begins to decompose, depositing half its carbon, and being thus converted into light carburetted hydrogen whose density is lessened in the relation of 8 to 14. At a full red heat it is completely decomposed. In burning therefore it deposites twice as much carbon from an equal weight of gas, furnishes a flame of equal size to that of twice its bulk of hydrogen, and which is far more brilliant, in consequence of the quantity of carbon deposited in the flame being twice as great.—Olefiant gas is therefore the most valuable of those generated by the decomposition of combustible bodies, and in the manufacture of them every exertion should be made to obtain it in the greatest quantities, which the nature of the material will admit, and to preserve it from waste after it is formed. The most obvious cause of waste is its having a greater degree of solubility in water, than the light carburetted hydrogen or pure hydrogen; water taking up one eighth of its own bulk.

Two liquid carburets of hydrogen were discovered by Faraday to exist in gas. These are very volatile, one of them boiling at 60 Fahr. and the other as low as the freezing point. Both of these may therefore exist in vapor at mean temperatures, and the latter under almost all circumstances. They both contain more carbon than olefiant gas, and therefore furnish a flame of greater brilliancy, but it may happen that all the carbon they deposite is not consumed, and thus, too great a proportion of them may take the form of smoke.

The vapors of these carburets agree with olefiant gas in one property, viz., they are decomposed by chlorine, rapidly and without the aid of light, while hydrogen, and light carburetted hydrogen, are condensed by it more slowly. As these vapors and olefiant gas are more valuable for illumination, the measure of the quantity of a given mixture which is condensed on the first application of chlorine is the best of all tests for the value of gas intended for illumination.

Another liquid carburet, analogous to Naptha is likewise produced in the decomposition of coal. As this does not boil below 180°, but little of its vapor can be present at ordinary temperatures; but if present it produces a dense smoke, except in burners of the best form.

The tar need only be mentioned here in consequence of its being capable of decomposition by being returned to the apparatus, and thus of yielding the gaseous and volatile compounds just spoken of. In the laboratory, or under circumstances where the heat may be carefully regulated, the character of the products may be varied to a very great extent. From bituminous substances little else but tar may be obtained, and oleaginous substances will yield little but their own vapor, if the apparatus be not permitted to become red hot. If allowed to rise to a low red heat, olefiant gas, and the two volatile carburets will become the principal products; at a

higher heat light carburetted hydrogen; and at a white heat uncombined hydrogen. In the successive stages of the process, the several substances will come over mixed in various proportions, and each in its turn will cease to appear.

In manufactories on the large scale, such nicety is impracticable, nor is it ever necessary. It is then sufficient to divide the matters which are used into two classes, each of which requires a peculiar management.

The first class comprizes those substances which do not decompose rapidly until the light carburetted hydrogen is formed. These must be subjected to a full red heat; for an attempt to obtain the more valuable compounds would be attended both with delay and a waste of the material. Still as some olefiant gas will be formed, no more water should be used in purifying them than is absolutely necessary to remove offensive matter.—Coal is a body of this class.

The second class comprizes those which may be decomposed with sufficient rapidity, at a temperature consistent with the existence of olefiant gas. These ought to be treated at the lowest temperature which will ensure the decomposition of their own vapor; one which merely gives a red glow to the surface of the iron vessel used in the process is sufficient for the purpose. To this class belong oils, and the solution of rosin in spirits of turpentine.

History.—The adaptation of a wick to oil or tallow, in order to obtain light by the decomposition of these substances, and the ignition of the gases and vapors they yield is among the oldest of human inventions. On the old continent neither tradition, written history, nor even mythological fable reach the epoch of its discovery.—Yet it must have been introduced prior to the separation of the races which peopled the two continents; for while in the ancient world there is no tribe so rude and savage as not to be acquainted with the use of the lamp, even the polished nations which occupied Mexico and Peru were ignorant of it. The only inhabitants of the Western hemisphere who used wicks were the Esquimaux, and if they be an ancient American race, they may have derived this information from Greenland, which was peopled at a remote era by a Norwegian colony.

The idea of separating the two processes which take place in the wick, effecting the decomposition at one time, and storing up the gases for use did not appear to have occurred to any one until the year 1785, when it was proposed by a French engineer of the name of Lebon. This was applied to the distillation of wood, and he endeavored to collect at the same time the pyrolignous acid which was evolved. It does not appear that this use of his invention was attended with any valuable result. In this country, however, about 30 years ago, the apparatus of Lebon was manufactured in Baltimore, and occasionally used for the distillation of bituminous coal. The retort employed was of the shape of a flower pot and made of iron; to this a cover was fitted by grinding, whence a pipe proceeded; and the pipe was usually divided into two branches each of which terminated in a burner. The retort being filled with coal was set in a common fire, and the gas ignited when it began to escape from the burner. In order to prevent the offensive smell of the gas from being apparent, the lights were kept beneath the chimney.

Previous to the year 1806 the factories of Watt and Bolton at Birmingham, and of Philips and Lea at Manchester were lighted by gas obtained from coal; and in the ten years succeeding, it was generally introduced into all the large manufactories of Great Britain. It was also occasionally used in smaller establishments, and in particular at Ackerman's in London, whose example had a powerful influence in bringing it into public notice. When first applied, no attempt was made to purify the gas, its use was therefore extremely offensive, and by no means wholesome. During the ten years of which we have spoken the character of the gases evolved in the decomposition of coal were chemically examined, and by the aid of science, the mode of separating every offensive substance, and most of those injurious to combustion discovered.

In 1815, some streets in London were lighted by coal gas distributed in pipes, and in 1816 the method became general in that city.

In 1817, Taylor and Martineau began the decomposition of oil, which, when properly treated, yields a gas of far greater illuminating power than is given by coal. Previous to this time Mr. David Gordon, a gentleman for many years a resident of the United States, had proposed to render gas portable by condensing a number of atmospheres in strong metallic vessels. So long as no gas but that from coal could be obtained the method promised but little success. On the introduction of oil gas however, the plan was resumed and carried into successful operation. By this method, ships, steamboats, railroad and other carriages may be furnished with the beautiful and safe light given by oil gas; and if it was compelled to give way before the immense capital vested in coal gas manufactures in the British capital, there is little doubt that it might be applied to advantage in a new and open field; particularly in countries where coal bears as high a price as it does in most of our Atlantic cities.

The manufacture of gas from rosin as now usually conducted, was the invention of Professor Daniell of King's College, London. It has, however, been conducted on a large scale no where except in the city of New-York. Mr. Rembrant Peale was however, probably the first who prepared gas from this material, although he treated it in a different manner. The Museum in Philadelphia was lighted under his direction by gas prepared from rosin as long ago as 1814.

a. Coal Gas.

(Concluded in our next.)

AGRICULTURE, &c.

From the Farmer's Register.

ON THE NATURE, FORMATION, PROPERTIES AND PRODUCTIONS OF ARGILLACEOUS SOILS.

BY M. PUVIS.

Translated for the Farmer's Register, from the Annals de l' Agriculture Francais.

EDITORIAL REMARKS.

(Continued from our last.)

XIX. On all the varieties of this soil, provided it is drained, resinous trees seem to become naturalized, and often grow even more rapidly than in the mountainous countries where nature seems to have placed them exclusively. In this soil, where the richest harvests are refused to the cares and labor of man, all the families of resinous trees often prosper better than in our gardens. The larch and the forest pine (*sylvestre*) the sea-pine and the laricio grow vigorously over the whole extent of this soil, when it is laid dry, and the pine *du lord* seems of all to be that which best withstands the wetness. These make an excellent alternation with the deciduous (*feuillus*) trees. A single generation of these large trees, after having enriched man with its productions, often suffices to accumulate upon the soil many inches of productive mould.

I shall not repeat here the observations which I have already made elsewhere upon this soil, the nature and properties of which, appear to have been hitherto so little attended to; however, it is necessary to repeat that in consequence of the impermeability of the soil, the *plateaux* which are formed of it, contain but few springs; because, in the first place, the rain water cannot penetrate into the interior to form and maintain reservoirs to supply them; but especially, moreover, because the interior waters cannot, but with great difficulty, escape through the impermeable stratum, to arrive at the surface. It is probable that in this soil which confines the water, Artesian wells, to give it a passage, would have a better chance of success than elsewhere.

These table lands, having in general some declivity, enough of rain water rests on the surface to injure vegetation, but not enough to form marshes. Marshes proceeding from interior water—from waters below the impermeable stratum, are then also very rare, and can only be met with in this soil, when the impermeable stratum in the bottom of the basins happened to be mixed in places with gravel, which renders it permeable.

The small number of marshes which are found in this soil, are placed in the basins of water courses where the impermeable stratum has been diluted or modified in its nature; they are of small extent, and could be easily drained, because the *plateaux* themselves have, generally, a very sensible slope.

These water courses, destined to receive the water from rains, and especially from the springs of a district, are then also very rare in these lands without springs; and those which are met with, are rapid, and have hollowed out deep valleys; because the bottom of these valleys tends to come

upon the level of the great rivers which flow at the foot of the *plateau*, and because the plateaux most frequently rise several hundred feet above the level of the rivers, the argilo-siliceous alluvion of these basins has been often entirely carried off.*

XX. When the argilo-siliceous alluvion is left to itself, the herbage, which elsewhere covers the soil with a close and lasting carpet, comes up upon it weak and thin; and when the surface is badly drained, its wetness is favorable to *carex* and other species generally of little substance, and even these grow badly and slowly; they are often found accompanied by a variety of moss, which covers the surface, and still more the subsoil when naked and exposed, with its whitish foliage. When the soil is better drained, heath, broom, (*genet*) sheep sorrel, spurry, (*spergule*) fern, the peculiar and exclusive vegetables of this soil, take possession of the surface at the expense of other growths. Sheep are here supported better than on the poor herbage of wetter soils; other cattle also feed and live upon it nearly throughout the summer. The soil derives remarkable advantages from these vegetables which it nourishes: man believes that he has a right to complain of them because they present obstacles to its cultivation; but these species, larger than the feeble grasses of turf, leave more dead remains or litter on the soil, and by a happy foresight of nature, these remains are decomposed with difficulty in this inert soil, assume the character of acid mould, (*humus acide*,) and form future resources for this unfruitful land.†—The plants, of the production of which we complain, are then of great benefit to this soil, or rather to us: they have changed the nature of the soil, they have furnished to it the mould (*humus*) which alone distinguishes its arid sub-soil, and have rendered it at last capable of producing the larger vegetables—the trees which cover it in a great many places. But in a few generations, when the previous growth of heath, or of other plants natural to this soil, has not accumulated great resources, this succeeding growth of trees is soon exhausted. It happens, then, often in this soil, which receives few of the principles of vegetation from the atmosphere, that the whole growth of woods languishes and disappears quickly from the surface; then reappears the alternate cover, or shift (*assolement*) of small plants, the producers of acid mould—and the soil, by these means, stores up new powers for new productions. In this great rotation of Nature's crops, the ages of man count but as years.

Among these soils there are some, however, more happily endowed. The natural rotation then takes a different character: the larger plants continue to live upon them; different characters of these plants only, are replaced by others, and the different families succeed each other. Thus on good mountain soils we see the beech and the resinous trees succeed each other in turn, as on good soils in plains we see the birch replace the oak, which soon reappears itself after one generation of the birch.

XXI. With this great analogy in all the principal points which distinguish these soils, with their identity of composition and of production, we still, on each particular body of table land, or ridge, (*plateau*) meet with circumstances which appear peculiar to each district, and which it is perhaps important to remark. Thus on the great argilo-silicious plateau of the basin of the Rhone, as it rises towards the south and approaches Lyons, it loses the name of Bresse to receive that of Dombes; its soil becomes more sandy, lighter, and less wet, on a great extent of soil. In the most sandy and least wet parts, one of the grasses, the *anthoxanthum odoratam* takes possession every year among the rye, and covers the earth like a carpet. After harvest it blooms, and its numerous heads exhale a cadaverous odor which infects the atmosphere. Some persons are inclined to regard this odor as the principle of the endemic fever of the country; but the fevers prevail where the soil is not covered with the *anthoxanthum*.

Is this *anthoxanthum* the same variety as that of the botanists? The heads, the flowers and the leaves have a great resemblance, the odor of the two plants when bruised, is little different, the smell of the flowers even has some similarity: yet there would be, apparently, good reason to doubt their identity. The plant so called by botanists, is one of the earliest blooming grasses in the spring, and that of Dombes blooms at the end of the summer: that of the botanists has an odor which is in request to give a perfume to hay; its stalks and leaves often rise above a foot; that of Dombes only covers the soil, its flowers rise scarcely six inches, and give out a smell almost intolerable to those not habituated to it. Finally, that of the botanists appears to be long-lived, while that of Dombes can hardly be biennial, for it cannot establish itself in the soil in the course of the year preceding the rye during the fallow-ploughings; it must spring up, at the earliest, in October, with the rye itself, and last three months longer than it, for at the end of October its plants are almost all dry.

If there are two different varieties, it would be still uncertain whether the smell of that of Dombes were natural to it, or arose from the climate and soil which produced it. Could this soil, in which the interior waters are corrupted at the time of the flower's blooming, injure also the odor of the plant? If the two plants belong to the same variety, the question would be decided; the alteration of odor would be owing to the state of the soil at the end of summer.

XXII. What particularly distinguishes the argilo-silicious soil from alluvial soils, and others of good quality, is, that the subsoil, which, as we have seen, does not differ from the upper stratum, is entirely without vegetable matter, while we see in alluvial soils, and even in calcareous soils, mould occurring below the soil, or vegetable surface stratum. Here, there is only a barren clayey sand. Also, while in other soils, vegetables sink their roots to seek nutritive juice below—in this soil the roots run without sinking, because there is nothing to be found below the stratum exposed to the atmospheric influences. This circumstance explains, in a plausible manner, the quick exhaustion of the surface in trees on white land, (*terrain blanc*) and consequently their disappearance after a longer or shorter period of vegetation. It is for this reason, that, while in good soils trees often do little injury to crops, and sometimes even afford them advantageous shelter; in the soil of which we speak, they consume the resources of the surface, starve the surrounding vegetables to some distance, and wither them up, especially during the heats of summer. It is thought sufficient to account for this, to say, that "the shade *burns*." Yet, this ought to have quite a contrary effect, since it evidently shelters from the heat of the sun. But if we remark that this effect takes place in all exposures, that it is more sensible on the south side of trees where the shade does not fall, than on the north, which is often shaded, and that this effect does not occur in deep soils into which the roots descend, while it exercises all its ravages on shallow soils, where the roots run far to draw from the surface; if, lastly, we remark that the evil is much greater during droughts, that it shows itself much sooner on these points than elsewhere, that the evil is seen in the withered leaves of the vegetables, and with all the symptoms produced by drought, we should necessarily conclude that this effect is owing to the absorption of the humidity of the soil and of some vegetable principles, by the spreading roots of the tree at the expense of the crop covering the soil.

But a very conclusive fact confirms this explanation, already so plausible. A row of poplars planted on the edge of a field damaged the crops very much. I caused

* And with it, the beds immediately beneath, which have not offered resistance to the flood—such as the marly beds. The surface soil, or mould, of the bottom of the valley, rests then upon plastic clay—a bed more firm, which is not washed up by, and its particles suspended in water, and which has therefore better resisted its force, than the beds of other earth that were super-imposed —ED.

† Instead of the plants above named, (which, except sorrel, are not indigenous, and perhaps not known here) let the reader suppose to be substituted the names of our broom grass, the poverty (or hen's nest) grass, pine leaves, and whortleberry shrubs, and the description and the general remarks will suit well for our poor ridge lands, either in woods, or cleared for tillage and again "turned out." These poorest of our natural soils alone, of all in this region, present an accumulation of vegetable matter, so great as to be even injurious to cultivated crops—and which, in that respect exhibit many points of resemblance to the peat soils of Britain, which are unknown in our warmer clime. But it is not merely because the vegetable products above named are slow in decomposing, that they are thus accumulated on our author's "argilo-silicious" lands, or on what we have elsewhere termed "acid soils." The acid ingredient, or property, of such soils, is itself anti-septic, and therefore tending to preserve from decomposition all vegetable matter in contact. Soils made calcareous, of course lose all acid quality, and the decomposition of these, or any other vegetable remains, proceeds rapidly. Possibly, this action of calcareous earth is not merely negative—that the effect is not caused merely by its neutralizing and destroying of the antiseptic acid—but that calcarious earth may also possess a positive septic action, which serves to aid and hasten the decomposition of vegetable matter. Many persons, who have not been guided by reasoning, chemical knowledge or research, have formed this opinion, from observing the rapid and entire disappearance of the fallen leaves on the rich limestone forests, compared to the great and permanent accumulation on the poor woodlands of Virginia. See Essay on Calcareous Manures, 2d ed. p. 31, and ch. 8 throughout.—ED.

a ditch to be dug so as to cut the roots of the poplars; the following year the crop of wheat on one part, and of clover on the other, was finer in that portion of the field which the trees generally starved, than on all the rest of the field. It must, therefore, have been the roots, and not the shade, which injured the crops, and the roots, therefore, absorbed the humidity much sooner than they consumed the vegetable joices of the soil. Yet, I would not admit that the nutritive juices could have accumulated in the soil which had to nourish, at the same time, the trees and the crop; but I think that the decaying remains of the roots, having become a vegetable nutriment, gave the advantage to those portions of the field which they formerly injured.

XXIII. This kind of soil, it cannot be dissembled, requires great intelligence and constant labor to render productive. It is for this soil that the proverb was made, "*tant vaut l'homme, tant vaut la terre,*" (as man is, so is the earth;) but with great care, much labor, and abundant manures, (*engrais*) it may be raised to a production which compensates the trouble and the outlay.

What particularly distinguishes the argilo-siliceous soil from calcareous soils is, that in these last, crops without (alimentary) manure (*fumier*) grow, feebly it is true, but without appearing to exhaust the soil in a sensible degree; in the other, without manure they will scarcely grow at all. To make this soil productive, there is absolute need of a stimulant to develope its vegetable powers, and the effect of the (alimentary) manure consists as much in stimulating the soil and the vegetable organs, as in supplying them with the nutritive juices. When an equal quantity of manure is given to these two soils, so different in their natures, that its effect on the calcareous soil is perhaps twice as great as on the siliceo-argilaceous soil; whence we should naturally conclude that the faculty of imbibing the principles of vegetation from the atmosphere, is much more powerful in the calcareous soils, and the vegetables it produces, than in the argilo-siliceous soil, and it is that which constitutes their gaeatest difference.

XXIV. But this important faculty, which nature seems to have refused to this soil in its formation, man, by a happy compensation, may give to it, with all the properties and all the advantages which distinguish calcareous soils. If he covers the soil with marl, if he applies to its surface a certain quantity of lime, or sprinkles it with ashes, or even confines himself to burinng its surface, then the nature of the soil is changed; an unusual fertility appears—(alimentary) manures act upon it with more effect, and the soil receives that happy impulse which, when it is extended over the whole surface of the country, changes its entire aspect, and produces in it agricultural wealth, the assured source of prosperity, strength and population. Lime, and the substances which contain it, would then be a very powerful means of vegetation on a soil which does not contain them; spread so as to form scarcely a two-hundredth part of the cultivated stratum, it increases with the ordinary quantity of manure all the productions more than 50 per cent., during a period of more than twelve years. The calcareous particles which it furnishes to the vegetable texture, are not a millionth part of the product itself, since lime does not form a moiety of the weight of the vegetables reduced to ashes. This surplus of production which is not furnished at the expense of the soil, (since at the end of twelve years it will still be richer than before the application of the alimentary manure,) and which does not come from the very small portions of the substance of the lime, (which does not form a millionth of the production,) comes then from the atmosphere. The soil and the vegetables which it supports, have then received from the lime, and from its mixture with the vegetable stratum, the faculty of imbibing from the great reservoir of vegetable elements, carbon, azote, oxygen and hydrogen.

We shall not now expatiate farther on the subject of improvements by calcareous substances: they demand a longer and more particular explanation which will find another occasion.*

XXV. Let us return to our principal subject. As we have said elsewhere, by a fortunate and beneficent harmony, the formation on which the argilo-siliceous soil rests is calcareous, and contains marl in great abundance; there is not within our knowledge an argilo-silicious *plateau* in which marl has not been found at a greater or less depth; generally, it is found where the ridge or table land ends on reaching the alluvions of the basins, and in the inflexions of the soil where the waters have carried off a considerable part of the deposite.†

On a great portion of the surface of the *terres a bois, terres elytres* of Belgium, and of the Department of the North, marl has been found. In Picardy, it is brought up from some depth; on the table lands of the three departments of ancient Normandy, it is sought at a depth of 100 feet, even of 200 feet from the surface; Puisaye obtains it on the surface (in out-croppings) and Dauphiny at a slight depth.

Our great *plateau*, which extends into three Departments, shows it on the borders and in the basins of the streams which water them. On most of the great *plateaux* which border on the Loire, and which form a great part of the soil of a dozen Departments, marl is frequently met with, and is in many cases successfully employed. The *boulbins* of Toulouse have it also, and make use of it with great advantage.

Finally the plateau which forms the Gatinais and Sologne, which declines partly to the Seine and partly to the Loire, rests every where upon calcareous deposites. Marl is found either on the edge of the plateau, or at a little depth in its first portions, or finally in basins of the streams which water them. We may then regard it as certain, that generally, there prevail under the argilo-siliceous deposite a calcareous formation and deposites of marl, which when brought out upon the surface may give it a fertility almost equal to that of the most favored soils.

Nevertheless, sufficiently numerous observations have often shown me a stratum, not calcareous, but resembling, in its exterior characters, the earthy marl, on the nature of which chemical tests alone have been able to undeceive me. This stratum, which is nothing else than what we have distinguished by the name of plastic clay, is met with from time to time on the table lands, and in the spots where we may expect to find marl; but it is still more frequently found at the bottom of brooks, where it serves as a sub-soil to poor meadows. I have found it sometimes in cysts (*sacs*) with marl, and by its side. I have met with it upon the marl, but often below it: the plastic clay should then be subordinate to the calcareous stratum, as this last is to the argilo-silicious statum, and we should hence conclude that where the plastic clay is met with, the calcareous stratum is wanting—has been carried off—and consequently marl will not be found.

If this law of super-position exists, as is probable, it may be of great use in searching for marls; but observe, that the clay does not exclude the marl, except upon the spots where it is found; and that it is no proof of exclusion on the neighboring portions. The earthy strata of the surface have been greatly warped (*tourmente'es*) and displaced; they are, therefore, even in the same district, far from occupying the same level, and from being regularly met with at the same depths; nevertheless, in this disorder, great as it doubtless is, the law of super-position which we have noticed does not cease to exist.

XXVI. Marl and lime are powerful agents of fertility in this kind of soil; but for both, and particularly for lime, it is necessary that the soil should be drained, or they must be applied to it in quantities resembling those of the English. With this condition of the soils being invigorated [by draining,] these two agents have already changed the face of extensive districts, which have been doubled by their means in wealth and population. An age ago, Norfolk, now a county of classic agriculture, was covered with heath; it is marl which has rendered it capable of bearing that succession of crops which makes it rival the most favored soils in fertility. One-third perhaps of the cultivated soil of England and Scotland has received, and still continues to receive, from lime, an impulse of fertility which raises the mean product of their fields to, at least, a half more than the same soil produces in France. Marl and lime, in Germany, have changed the aspect of

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* And which has been already presented to the readers of the Farmers' Register in Vol. III. in M. Puvis' essays on lime and marl —Ed.

† Even in this important respect, the resemblance holds between the argilo-silicious lands of the author, and the "acid" ridge lands of lower Virginia, and probably of Maryland and North Carolina. Though not the marl described by M. Puvis, a calcareous statum of fossil shells underlies, at various depths, nearly the whole of this vast region: and though it has as yet been reached for use only where its out-croppings show at the surface, in future times, when the value of this improvement will be properly understood, this bed will be found and obtained by deep pits, almost in every neighborhood, and for the use of large spaces which are now considered destitute of, and entirely opbarred from this manure.—Ed

whole provinces. Italy, by lime, has improved the culture of large wet *plateaux*.—America renews by lime the exhausted fertility of vast plains, from which cultivation had demanded too much without returning to them a sufficiency of manure.

In France, La Puisaye in Yonne, has been trebled in value by marl: half the territory of the Department of the North owes its classic cultivation to marl and lime; many cantons of Normandy, the *Arrondissement* of Bernay, the environs of Lisieux, seek for marl at the depth of 200 feet; and finally in Sologne the use of marl has already improved great extents, but unfortunately it is more rarely found there than in other places.

Lime in the three Departments of Normandy has produced effects more numerous, more extended, but yet more recent than marl; a mine of coal (*houille*) of middling quality, worked during the last few years, there furnishes fuel for a great number of lime-kilns, three-fourths of the product of which are employed in agriculture. La Sarthe, Maine-et-Loire, which have employed lime for less than forty years, see their agriculture enriched in proportion as its use is extended.

The Department of Landes, with its barren sands, is covered with harvests by the the application of lime to its soil: there is not perhaps an argilo-silicious plateau, in France, on which trials of marl and lime have not been made with success. We are far, it is true, from a commencement of experiments in their use on a large scale, but it is already a great point to have begun.

Nevertheless, as it appears, scarcely a fourth part of the argil-silicious soil can have been improved by either of the means; if they were extended to the other three-fourths, it is not believed that there is any exaggeration in saying that there might result an increase of an eighth in the whole production of the French territory; an immense result, doubtless, and which would not be the only one; for a multitude of observations and arguments, as well as the actual healthiness of the lands where lime and marl have been largely used, should induce a belief that on this soil, improved by the calcareous principle, the salubrity which it wants would reappear with the fertility.

XXVII. When marl and lime are wanting, or at too great a distance, or too dear, their place may be supplied, and, on this soil which requires to be stimulated, an impulse of fertility may be given analogous to that produced by the calcareous agents.—Paring and burning is a resource always certain for these soils; there is then a production of lime in the calcined vegetable particles. The vegetable powers produce potash and lime even in soils which appear to contain none; paring and burning brings into play these active principles of vegetation, which although in small proportions exercise all their influence on the soil; and moreover the clay undergoes a modification which seems to produce upon the soil an effect similar to that of lime, and, like it, to develope, in a high degree, the faculty of imbibing from the atmosphere the elements of the growing plants.

From the Farmer's Register.

ANALYSES AND QUALITIES OF MAGNESIAN SOILS.

BY M. PUVIS.

Translated for the Farmers' Register, from the Annales de l'Agriculture Francaise.

[The following extract is taken from the *Excursion Agnonomique en Gatinais*, of M. Puvis, his publication which next succeeded the foregoing article, and part of which is suited to follow in connexion.—We shall present such parts as may throw light on the other communications of this writer, or otherwise, may seem likely to furnish agricultural instruction.

This part is selected as presenting specimens of a new class of soils, those containing magnesia—and to which ingredient, the author attributes their stability. The facts presented are novel, (at least to us,) and also interesting: but the author's deductions from these facts, we dissent from altogether. Our views, in contradiction to our author's will be postponed until his opinions have been presented.]

Plateu of Gatinais.

At some distance from Paris, when we leave the valley of the Seine, after having ascended a hill of considerable elevation, we find on the summit the silicio-argillaceous plateau; a great part of the forest of Fontainebleau is situated upon it, as is that of Montargis; this plateau separates the basin of the Yonne from that of the Seine. Silex prevails there in the state of sand; these sands serve as materials for the brown free-stones (*aux gres a cement calcaire et a cement siliceux*,) which are met with in only one part of the plateau; but when the free-stone is wanting, there is always found a great number of flints, which by their form and covering greatly resemble those belonging to chalk, which are found so abundantly in the basin of the Seine as far as the coasts of the sea. Chalk is found on the surface in many places below Paris; but above, it is most frequently covered with many other strata which keep it from the surface; and nevertheless, flints are very numerous in the soil of the plateau. In the same manner, in those of Dombes and Bresse we find the rolled peboles of the Rhone, so numerous in all the formations of the basin; so the argilo-silicious plateaux almost always contain fragments peculiar to the formation of the basins which they overlook.

The fragments of the lower parts of the basin which are found in the argilo-siliceous alluvion of the plateau, would prove, if that had not already been established, that this formation is the most recent, that it was general, and that it took its elements even from the bottoms of the basin, and that it covered these bottoms as well as the high plains, or ridge land.

The Estate of Barres.

At some leagues from Montargis, beyond Nogent, we reach Barres, the property of M. Vilmorin.

This property, which he purchased thirteen years ago, contains 600 *hectares* (1,200 arpents.) His agricultural experiments, his desire to undertake great improvements, were too much confined in the neighborhood of Paris. To be successful on a soil of good quality, was not enough for his activity and his desire to be useful; he therefore made a purchase here on a soil of little fertility, and in his hands, this property has become quite an experimental form. It could not have been better chosen for this purpose, because the land is composed of the two kinds of soil which form the district.

The property is divided into two parts by a small valley, containing 50 arpents of pasture, meadow and marsh, which are divided between the two domains; the eastern part belongs to the calcareous plain which unites with the calcareous plains of Yonne, without, however, being of the same nature as they: it composes two thirds of the property, that is, 800 arpents. The western part, which is more elevated than the eastern, belongs to the argilo-silicious plateau of the Gatinais; of the 350* arpents which compose it, 150 are sloping, and form the passage from the plateau to the valley. These 150 arpents partake of the two natures of the soil; they are of good quality. The remainder, 200 arpents, belong entirely to the plateau, and are composed of sandy sub-soil mixed with angular flints of chalk.

This property offers greater resources in forage than most of the neighboring estates: besides the meadows of the valley, just spoken of, it has some of considerable extent on the Vernisson, a brook which waters the country.

I. The calcareous soil of the plain rests sometimes on a white, granulated marl, which is easily crumbled, and sometimes on a hard rock, which resists the atmospheric influences; it seems to make an exception among those of its class and appearance; its exterior characters would cause it to be esteemed fertile in a great part of its extent; it shows a sufficient stiffness, a dark color which announces a sufficiently strong proportion of mould, and often even the chestnut color, the ordinary indication of a good soil.

It is especially in spring crops that this soil shows its inferiority; oats, barley, and spring vetches come up well enough after sowing, but they are without strength at the time of heading. Clover, lucerne, and sainfoin, take well when sown in the spring; at harvest, the cereal plants cover them; they are vigorous enough, and preserve a good appearance even during autumn and winter; but when the time for shooting arrives, they put up only a small number of stalks.

When the soil remains uncultivated, it is badly covered with turf, produces thistles, euphorbia, and other plants of no use or advantage to the cattle that run upon it. It suffers from wetness. Sheep upon it take the rot; but it suffers still more from drought, which seems to render the stalks of plants stationary upon the soil.

II. The calcareous plateau of which we speak here is very extensive: it reaches from Montargis to beyond Barres, more than 10 leagues in length,

* In the original, this is misprinted as 250.—Tr.

This kind of soil appears to be peculiar to this part of the basin of the Seine; the neighboring calcareous soils which appertain to the basin of the Yonne, present entirely different characteristics; they are dry, it is true, but with a vegetable stratum, they become covered with wild leguminous plants, easily produce clovers, sainfoin, lucerne, and in wet springs, spring crops succeed upon them.

These soils have then something peculiar in their nature which makes them a troublesome exception in the class to which by their composition they naturally belong: they present an agricultural question of great importance to study, and almost new, and they are applicable to sufficiently great extents of soil, since they occupy more than ten leagues in length.

The analyses made of them by M. Henry, at the request of M. Vilmorin, are very interesting, and are as follows:

No. 1. A coarse gray land, the earth of the surface composing at least three-fourths of the ploughed soil of the plain.

10 *grammes* of this earth gave:

Silex,	2.45
Alumine,	0.35
Carbonate of lime,	3.85
Sub-carbonate of magnesia,	0.23
Per oxide of iron,	0.41
Humus { Soluble, 0.12; Insoluble, 1.70 }	1.82
Water,	0.58
Loss,	0.31
	10.00

The 18 per cent. of *humus*, soluble and insoluble, which this analyses gave, may cause a suspicion that the sample furnished contained more of it than an average of the soil. The proportion of *humus* would be quite extraordinary, since lands the most fertile contain scarcely 10 per cent: and there are hardly any except marsh or alluvial lands which contain it in that proportion: it is nevertheless established by this analyses that this soil contains a great proportion of *humus*, especially of insoluble *humus*.

No. 2. Represents nearly a fourth part of the extent—the portions where the vegetable stratum is very thin, where it is not ploughed on account of its deficiency in fertility, and is used as a sheep pasture.

10 *grammes* gave:

Silex,	1.80
Alumina	0.20
Carbonate of lime	6.90
Sub-carbonate of magnesia	0.47
Oxide of iron	0.27
*Oxide de Magnesie** [manganese?] a trace	0.00
Water	0.20
Humus, soluble	0.05
Loss, and charcoal of insoluble humus	0.11
	10.00

This earth, the least fertile of all those analyzed, contains twice as much carbonate of lime and of magnesia as the former, the color also is whiter. It appears to receive its change of color from the *detritus* (or broken down fragments) of the friable rock on which it is based; its composition is almost identical with that of the sub-soil No. 4, of which we shall give the analyses below.

No. 3. Sandy earth of the calcareous plain belonging to those portions of the plain, which, in the revolution that carried off the silicio-argilaceous stratum, preserved a part of it now mixed with the soil of the plain.

10 grammes of this earth contain:

Silex	7.90
Alumine	0.67
Sub-carbonate of lime (represented by *chlorure*, 0.18)	0.16
Sub-carbonate of magnesia	0.02
Oxide of iron	0.47
*Oxide de magnesie** [manganese?]	0.03
Humus, soluble	0.15
Water	0.35
Loss and charcoal of insoluble Humus	0.25
	10.00

This earth presents a great difference in composition from the preceding, since it contains 80 per cent. of silex and scarcely 16 thousandths of carbonate of lime, and 2 thousandths of carbonate of magnesia.—Yet its properties, its productions and its defects, are nearly the same as those of the preceding numbers. On the other hand, it would seem by its composition to be almost confounded with the sandy sub-soils of the plateau lying on the other side of the valley; but it produces neither heath, broom, nor sheep sorrel, &c.; plants characterizing these sands—and it agrees, as to cultivation; with Nos. 1, and 2, and like them, spontaneously produces euphorblia, thistles and other plants useless to cattle.—It possesses then those common properties of an active agent which must be common to both, which makes them a distinct class; and this agent can be nothing else than the mixture, or perhaps combination of the carbonates of lime and magnesia.

These two principles, therefore, have a very great effect upon vegetation, since 16 thousandths of carbonate of lime joined to 2 thousandths of carbanate of magnesia are sufficient to change entirely the nature and products of the soil. But let us pursue our analyses before making a deduction of all their consequences.

No. 4. Sub-soil of the plain. Its color is reddish, as is that of many calcareous soils of good quality; but having been neither affected nor modified by the waters of the last revolution, in consequence of the shelter given it by the upper stratum; and not having been exposed to the atmospheric influences, it may be regarded as the type of the deposite which forms the soil of the plain, the deposite anterior to the silicio-argilaceous formation.

10 grammes of the sub-soil of the plain gave:

Silex	0.39
Alumine	1.27
Carbonate of lime (represented by *chlorure*, 8.20)	7.41
Carbonate of magnesia	0.41
Oxide of iron	0.31
Oxide of magnesia	0.00
Water	0.06
Humus, soluble	0.05
Loss	0.10
	10.00

This soil is a species of marl which contains 74 per cent. of carbonate of lime, 4 of magnesia and 12 per cent. of alumine: its composition is quite similar to that of the analysed soils of the plain.

III. These analyses may afford us important inferences.

These soils evidently make, as we have seen, a distinct class of the silicious soils. Their properties seem to differ at least as much from those of calcareous soils, properly so called, which produced spontaneously the small species of clover, on which leguminous plants of different species succeed easily, and manures almost always secure good crops. It is not then to the carbonate of lime that they owe their inferiority: its action, on the contrary, seems to be nullified, since the characteristic properties of calcareous soils appear no longer to exist in these. Nor is it more to the silex, the alumine, nor the oxide of iron, which are found in abundance in all good soils, that this difference can be attributed. Then, of all their constituents, there remains only the magnesia to which can be owing the characters which distinguish them from their analogous soils.

It has been already fully admitted in principle that magnesia is unfavorable to vegetation. The English chemist, Tennant, formed this conclusion from the analysis of a lime which struck with sterility all the soils to which it was applied. In America the use of a magnesian lime quickly wore out (*fatigue*) the soil; and Davy has admitted it as a truth. Some trials on a small scale have shown me that while in a calcareous soil, beans, when sown, sprouted soon, and came up vigorously, in the same soil modified by an addition of magnesia, germination was retarded, and the stalks especially had only a feeble and tardy growth: yet Thaer calls into question the soil being made sterile by magnesia; and opposes to the conclusions of Tennant, that Einhoff has analyzed a very fertilizing marl which contained 20 per cent of magnesia: and farther, it results from a careful analyses, that the mud of the Nile, which we know to be so fertile, contains a large proportion of magnesia. From these last facts it may be concluded that the magnesian mixture in the soil may indeed, under certain conditions yet unknown, not be injurious to fertility: but there still remain multiplied facts, and the results of observations, of which our whole plain presents us with a new and great example, that many magnesian soils are unproductive.

But how does magnesia occasion barrenness in a soil? This problem is doubtless of difficult solution, but very important, since it seems probable that if we knew the causes which render magnesia unproductive, it would perhaps be possible to remedy them; we shall attempt to point out

* So in the original.—Ed

some *data* which perhaps may indicate the course.

And first we will remark that the magnesian mixture takes from the soil all its characterestics of calcareous soil, deprives it of all the advantages which always accompany the unadulterated mixture of the calcareous principle, and gives it a character peculiar to itself, which distinguishes it whether by its mode of acting on vegetation, or by the vegetables which it spontaneonsly produces, to the exclusion of those produced by the calcareous soil.

Still farther, it would seem, that magnesia takes from the carbonate of lime the property which eminently distinguishes lime and all its compounds; that of rendering *humus* soluble, and that it tends on the contrary to render *humus* insoluble, in proportion as it is accumulated in the soil by cultivation. In fact, the great proportion of insoluble *humus*, which the analyses have found in the soil which composes three-fourths of the cultivated plain, although a part might have been owing to an accident, could not proceed from spontaneous vegetation in this soil which is almost always under the plough, and which produces few plants. It proceeds then from cultivation: but cultivation does not furnish insoluble *humus;* the *humus* of the manures then have passed into this state in the soil.—Now, it is not the lime, the action of which consists in rendering *humus* soluble, that can have produced a contrary effect; neither is it the silex nor allumine to which it is attributable; it must therefore be charged to the magnesia alone, and to this circumstance we may ascribe the unproductiveness of magnesian soils, in which manures, instead of benefitting the plants cultivated on the soil, pass into the state of insoluble *humus*.

The carbonate of magnesia has, besides, the property of retaining more water than all the other earthy combinations. According to the experiments of Schubler of Hoffwyl, it receives and retains four and a half times its weight. It may be possible that it communicates to the soil in which it is found, the property of retaining a quantity of water, which at first would be injurious to vegetation. This would explain the cause of the rot among sheep on this soil; but this water, after having injured vegetation, would not continue in the soil, for it suffers much from drought in the spring.

In this state of affairs, and in a question so important, on which doubts are accumulated, and facts and opinions are arrayed in opposition, it is a great and noble agricultural problem, that the proprietor has proposed for himself to subdue this rebellious soil and force it to yield good crops; we shall see hereafter that this object has been, in a great measure, obtained.

IV. After this long discussion on the magnesian soil of the plain, we come to the soil of the *plateau:* this kind of soil composes a great part of the *arrondissement* of Montargis, especially in the south and south-east portion; it covers besides almost the whole extent of the *arrondissement* of Gien on this side and beyond the Loire. This soil has received the name of *terre de Sologne*; the only differences which characterize the parts sloping towards the Seine and those which slope to the Loire, are the chalk flints in the basin of the Seine and the fragments of different varieties of silicious rocks in the portion of the *plateau* which slopes to the Loire.

The soil of the *plateau* of Barres offers every where a pure clayey sand, which contains in great quantity the chalk flints of the basin of the Seine, and varies little. Yet it is dry or wet, according to the sub-soil on which it rests; when it is based immediately on the calcareous rock of the plain, it is dry; and it becomes wet when the sub-soil is the reddish silicio-argillaceous stratum which does not allow the water to pass through, and consequently preserves the moisture of the surface.

This soil, compared to that of the plain, is not of difficult cultivation. Rye, potatoes and buckwheat, grow well enough upon it; with manures, artificial meadows succeed; and trees of every kind, leafy (*feuillus*) and resinous, shoot up vigorously. On the whole, this portion of soil which touches the calcareous *plateau*, on which besides it rests, is superior in quality to the parts of the *plateau* which are more distant from it. It is even of more easy cultivation, and offers especially more resources than the magnesian soil; nevertheless, it contains no calcareous parts, heath, broom, and wild sorrel, which every calcareous mixture puts to flight, are met with on this soil in all parts of the 200 arpents of it which are left untilled.

V. The rest of the soil, under the plough, of which the property is composed, presents a gentle slope, on which the owner's house is situated. This slope forms the passage from the *plateau* to the plain, going along the valley; it offers 150 arpents of pretty good soil, suitable for all productions, for wheat, artificial grasses, trees, and especially for oaks; this soil is due to a mixture of the soil of the *plateau* and of the plain, but the mixture is not uniform.

VI. Lastly, it remains for us to speak of the little valley which separates the two parts of the property.

This narrow valley receives the waters of the plain and the *plateau;* it contains a great number of springs, which are doubtless the filtered waters of the two *plateaux* which have no visible springs. It is very remarkable that the springs come almost all of them from the side of the calcareous plain, the silicio-argilaceous plateau with its *impermeable* sub-soil, has scarcely admitted any filtration, so its side furnishes few or no springs in the valley.

A great part of the bottom of the basin is marshy, requires draining and seems to us very susceptible of being drained; one part is in pretty good pasture, another in tolerable meadows, and the rest in marsh, which is mown for litter.

The calcareous rock shows itself from time to time at the bottom of the valley.—The upper stratum of the soil, belongs rather to the magnesian soil of the plain than to the silicious soil of the *plateau.*—It is firm in all the parts which the interior waters have not diluted. Works judiciously made in the marsh have commenced its draining, the results obtained and a sufficiently great slope, promise, as we shall see hereafter, success to the undertaking. Vegetation in this valley is active, the trees are fine, and if the magnesian principle, as is probable, occurs there, it does not seem to injure vegetation; in this inundated soil, some principles probably exist which neutralize the destructive effect of the magnesia. * * * * * *

REMARKS.

It seems a singular and illegitimate conclusion of the author, that the sterility of the soil of "the plain" is caused by the small quantity of carbonate of magnesia contained. It would have been much more plausible, if the very large proportion of carbonate of lime contained had been considered as the true evil. The soils giving analyses 1 and 2, are stated to be specimens of the whole calcareous and magnesian plain—and No. 4 shows the sub-soil common to both, and to the whole plain. In these two varieties of the same general kind of soil, the proportion of carbonate of lime is 38 per cent. in the first, and in the second, 69 per cent. —and the sub-soil of both, (No. 4,) has 74 per cent. Surely these large proportions of carbonate of lime, are sufficient to account for sterility, after the continuance of exhausting and bad tillage for time immemorial, without looking for that cause in the presence of carbonate of magnesia, which these same three specimens contain respectively in the very small proportions of 23, 47, and 41 thousandths—or less than the half of 1 per cent. We do not believe that his earth (in much larger proportions,) is injurious to soils—but infer the reverse, from the great similarity of its chemical qualities to those of carbonate of lime—and from some of the richest soils in the world containing carbonate of magnesia. Thus M. Puvis himself states that it is in the soil of the rich valley of the Nile—and we have found it in the celebrated alluvial soil of the Red River. The authorities brought to sustain the position that the magnesian ingredient is injurious to fertility, if examined, are worth as little as the reasoning. Tennant, it is true, attributes injurious effects to the magnesia contained in certain limestones; but it is to magnesia brought to its *caustic state*, by the burning of the limestone, and so applied to the soil. This may well be the case, and all the injurious effects of such manure, referred to by our author, may be true, and yet the mild *carbonate of magnesia*, as it exists naturally in soil, may be either harmless or beneficial. Still less does Davy's view sustain this opinion of M. Puvis. That great agricultural chemist quotes Tennant's discovery and statement, but without seeming to concur entirely in the asserted ill effects of even caustic magnesia—and he certainly contradicts the notion that a natural and small proportion of the carbonate is injurious, by referring to the valuable qualities of the Lizard Downs, which have that rare ingredient.

But putting aside M. Puvis' deductions, the facts as to the presence of magnesia,

and the prodigious amount of calcareous earth in this poor plain, are sufficiently worth attention. We cannot, however, presume to reason with regerd to facts which are so concisely and imperfectly presented, or to explain away difficulties which oppose any general and uniform deduction. But we will venture to hint our opinion, that these highly calcareous plains of France, were at some far remote period immensely rich *prairies* like those of Alabama and Arkansas: and that the latter, if exposed to a similar long course of exhausting tillage, will hereafter be as poor, and as difficult to be improved, as these calcareous plains of France, or the chalk *downs* of England.

The Chinese Duck.—On the lakes and rivers there are of course many kinds of wild ducks and other waterfowl, in their natural and unreclaimed conditions; and the manner in which these are often captured is ingenious, though well known. The sportsmen incase their heads in large gourds or calabashes, with holes for sight and respiration: they then walk or swim deeply in the water, so that nothing but the fruit is seen above the surface; and the unconscious ducks, accustomed to floating and innocuous calabashes, approach them without fear, and are respectively pulled under water, for the purpose of having their n cks wrung, and being fastened to a poulterer's gridle. On the banks of the Yang-tse-kiang, and along the shores of the Po-yang-hou, during the progres of Lord Amherst's embassy, wild ducks and geese occurred in large flocks on both the lake and river, and were so tame that they might be approached within a few yards. It is known that prodigious numbers of tame ducks are kept in the various provinces. The peasants hatch the eggs in ovens or in dung, and putting the young ones into boats carry them down to the sea shore at low water; and as these boats keep company, there are consequently several flocks of ducks, not only near each other, but frequently intermingled, while searching for shell fish or other marine productions. Yet no sooner does the guardian strike upon a basin, than each flock flaps away to its own boat. Indeed, among the more singular sights to be seen in the neighborhood of Canton, particularly about Whampoa, are the duck boats, which not only contain the aquatic bibeds, but are used as the dwelling of their owners. The ducks inhabit the hold, while the keepers are accommodated in the uppe portion of the vessel. These boats are very abundant about the rice fields near the river, just after the harvest has been gathered in, the birds at that period being abla to glen a plentiful supply of food. Each owner moves about from place to place according to the favourable opportunities that may offer for the feeding of his broad-billed flock. "On the arrival of the boat," says Mr. Bennet, "at the appointed spot, or one considered proper for feeding the quacking tribe, a signal of a whistle causes the whole to woddle in regular order from their domicile across the board placed for their accommodation, and then rambling about undergo the process of feeding. When it is considered by their keeper that they have gorged sufficiently, another signal is made for the return of the birds; immediately thay congregate and re-enter the boat. The first duck is rewarded with some paddy, the last is whipped for being dilatory; so that it is ludicrous to see the last birds (knowing by sad experience the fate that awaits them) making efforts *en masse* to fly over the backs of the others, to escape the chastisement inflicted upon the ultimate duck."—[Edinburgh Cabinet Library, Historical and Descriptive account of China, Vol. 3.]

Chinese Art of Computation.—The Chinese, in their arithmetic, employ the decimal notation and they perform its operation by means of an instrument called *Swan-pen*. It consists of a frame, divided into two compartments by a bar in the direction of its length. It is next crossed by ten wires or slender rods, which pass through the middle bar, and terminate in its longitudinal opposite sides. Each corss-rod has on it seven moveable beads, which admit of sliding backwards and forwards; five of these are on the part of the rod between the sides of the wider compartment, and two on the part which crosses the narrower. Beginning from one extremity of the frame, each of the five beads on the longest part of the first rod represents a unit, and each of the two on the shorter stands for five. In like manner, each bead on the longest part of the next rod, towards the left hand, stands for ten, and each on the shorter part for five tens or fifty, and so on. It is easy to understand, that by detaching a proper number of beads, which represents units, and tens, and hundreds, &c., by sliding them from the position in which they are represented in the figure, towards the bar which crosses the rods, any number whatever may be indicated; a single bar on the shorter part of the rod answering to all the five on the longer. In this way the Chinese perform their arithmetical operations, just as men re koned by counters in this country in the manner explained by the old writers on arithmetic, particularly by Robert Recorde, who lived about the time of Queen Elizabeth. The *swan-pen* seems the more convenient mode of the two; and by its assistance the traders in Canton transacts their business with a dexterity and expedition quite remarkable. It must, however, be admitted, that although this machine be well adapted for explaining the principles of arithmetic, it would be a very inadequate subtitute for our Arabic numerals, more especially in those laborious calculations which the progress of European science has rendered indispensable.—[Edinburgh Cabinet Library, Historical and Descriptive Account of China, Vol. 3.]

China Deficient in Timber.—China, like every other country which is densely inhabited, is deficient in the supply of timber and dyewood. The neighboring countries, therefore, which are in a rude state, furnish it, in the same manner that America and the north of Europe supply England, France, and Holland; and if capital were abuudant, and freights low, they would export a much larger amount. The supply of wood and other rude produce from the surrounding countries, is a branch of trade into which we think it not improbable that the British merchant will sooner or later enter. The timber furnished at present consists chiefly of fancy-woods; as sandal-wood, from Malabar, the Sandwich and Feejee Islands; that of the first is nearly three times as valuable as those of the two last, being of greater size, and containing more essential oil. The English and Americans, in 1834, imported of this commodity about 300 tons, worth 50,000 Spanish dollars. Rosewood comes from Siam, and ebony from several of the Malayan Islands, but the best as well as the largest quantity of late years has been sent from the Mauritius, while the inferior kind is brought from Ceylon. The woods or barks for dyeing, consists chiefly of sapanwood from Siam, and the barks of several species of *Rhizophora*, or mangrove, from the Malayan Islands. Under this head may be mentioned rattans and canes, of which the importations, both by native and European vessels, chiefly from Borneo, Sumatra, and the Malayan Peninsula, are very large for such a commodity. We perceive tha, of the former, the weights imported by British ships, in 1830, was equal to 35,000 cwt. valued at about £18,000.—[Edinburgh Cabinet Library, Historical and Descriptive Account of China, Vol. 3.]

Improvements and Embellishments in Paris.—The granite for the pedestal of the obelisk of Luxor has arrived, and only awaits the decrease of the waters of the Seine to be landed. It consists of seven blocks, one of which weighs 120,000 lbs.—The Hotel Dieu, it is said, will shortly be taken down, to carry on the beautiful line of quays which extend along each bank of the Seine. The sick will be removed to the Invalids, which establishment will be broken up, and formed into several branches, in various parts of the conntry, where articles of provision, &c. are cheap.—[Paris Advertiser.]

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

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D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.]   SATURDAY, OCTOBER 1, 1836.   VOLUME V.—No. 39.

CONTENTS :

For the Railroad Journal.

COVINGTON, TIOGA CO., PA., }
August 15th, 2836. }

TO THE PRESIDENT AND MANAGERS OF THE TIOGA NAVIGATION COMPANY.

GENTLEMEN—The Engineer Department of the Tioga Railroad was organized and surveys commenced about the 1st of November, 1835. The examinations preparatory to the final location were completed during the past winter, and a definite location would have been made also, for a considerable portion of the road, had it not been for the uncommon severity of the winter.—The 28th of March was the earliest day on which the final location could be commenced, since which time the entire length of the road has been prepared to let, and from the 28th of April to the present time, and at different periods $19\frac{17}{100}$ miles of the most expensive part of the road has been put under contract and the work commenced with considerable energy, considering the difficulty of procuring laborers in this section of country. The time given for the graduation to be completed, expires on the 1st of December next, with the exception of two or three heavy sections, on which this time was extended.

There is so much uncertainty in procuring laborers, at present, that it is impossible to say with any degree of assurance that the contracts will be complied with, by the time specified; but as the work is let to responsible men, we have good reason to believe that they will use every exertion to comply with their engagements.

In December last, proposals were received and contracts made for the delivery of all the timbers necessary, for the entire length of the road. These contracts have been partially fulfilled, and the contractors are still proceeding to comply with their engagements which the severity of the winter prevented them from having, in as forward a condition as they expected.

The rail timbers are to be of sawed white oak or Norway Pine, 6 × 7 inches clear of sap, except 1 inch on the corners. The ground sills are required to be 6 × 12 inches, hewed level on two opposite sides, and furnished of white oak, pine, or hemlock at the option of the furnishers.

The cross-ties are to be furnished of white oak and chestnut exclusively, 8 inches in diameter at the small end, and 8 feet long.—There will be nearly one half of the cross-trees sawed 6 × 6 inches and 8 feet long.—The cross-ties will be placed 3 feet 9 inches apart from centre to centre.

All the timber under contract is required to be delivered on the line of the road, piled at stations half a mile apart, each station having a sufficient quantity at it, to construct half a mile of the road, viz:—One fourth of a mile, each way from the station. The contractor who lays the rails has in this way, only to transport his timber ¼ of a mile, the greatest distance.

The method which was recommended, and now pursued in letting the graduation and masonry is strictly that which has been adopted by the Baltimore and Ohio Railroad Company, for some years past, and as it is that plan which has resulted from years experience, I hope you will receive the full benefit of it. Before the day of letting, descriptions were given of each section, and the probable quantity of excavation and embankment each section contained, as ascertained from the centre cutting, and the form of the contracts were exhibited and all such other information as would assist bidders in forming a correct idea of the work to be done, and the manner of its execution.

From the preliminary survey, which was made on both sides of the Tioga river below Berry's bridge, an approximate estimate was made out by me, comparing the probable expense on either side. This estimate was submitted to Benjamin Wright, Esq., the consulting Engineer, on which he reported to you his views of the subject,—a copy of this report is herewith annexed.—As the subject has undergone your consideration, and resulted in directing me to confine the location of the road to the east side of the river to the State line. It is unnecessary to say more than, that your direction has been complied with.

I will now lay before you the estimated

cost of the graduation, masonry, and superstructure of the whole road.

ESTIMATED COST OF GRADUATION AND MASONRY.

1st Division, $12\frac{32}{100}$ miles,	Graduation of road bed,	$498,64 28
	Masonry,	5544 00
2nd Division, $13\frac{57}{100}$ miles,	Graduation of road bed,	471,29 05
	Masonry,	5906 50
		$108443 83

Making an average per mile of $4188 64 for the graduation and masonry.

The superstructure of the road is estimated to cost as follows, *per mile*, viz :

11,088 ft. Lineal Measure of rails or string pieces at $3\frac{68}{100}$ cents per foot lineal,	$403 04
11,088 ft. lineal measure of ground sills at an averaged price of $3\frac{1}{4}$ cts. per foot,	360 36
1,480 cross-ties at average price of 20 cts.,	296 00
$22\frac{37}{100}$ tons of iron $2\frac{1}{4}$ inches broad and $\frac{5}{8}$ inches thick at 80,00 dolls. per ton, delivered on the road,	1789 60
1000 lbs. of $4\frac{1}{2}$ inch spikes at 10 cts. per lb.,	100 00
Small nails for plates.	4 00
760 plates for joining of rails at $35,00 per thousand,	26 60
Laying rails per mile including transportation of timber and iron, also dressing off the road bed and opening drains,	960 00
Road crossings,	20 00
Cost per mile,	$3964 60

RECAPITULATION.

Graduation and masonry for whole distance,	108,443 83
27 miles of superstructure at $3964 60 cts. per mile,	107,044 20
This extra distance is allowed for second track at the Turnouts.	
5 turnouts and fixtures at $140 each,	700 00
Contingencies ten per cent.,	21,618 00
Total cost of constructing road,	$237,806 83

Making an average per mile of $9,181 73

In addition to the above sum to be expended in the construction of the road, a further outlay may be expected in putting the road in operation, after its completion, which may be nearly estimated as follows :

2 locomotive engines with tenders at $3500 each,	$7000 00
50 transportation cars at $140 each,	7000 00
5 passenger cars at $450 each,	2250 00
Depots, water stations, car houses &c., say	3500 00
	$19,750 00

With this addition to the cost of constructing the road, the capital to be expended before any of the advantages of the project can be realized will be $257,556 83.

It is true that the business of the road might be commenced with a small reduction of the above expense, but if the anticipated success attend the work, the above sum may be regarded as outlay for the first year.

If the above estimate shows a greater expenditure necessary than was first expected by the friends of this work, they may attribute the cause mostly to two things, the first to the rise of labor of every kind, on public works, and secondly, to the price of iron which has risen nearly 100 per cent. within the last six months.

My estimate of the value of the work, I think very liberal and more particularly so, as it was designed to push the graduation and masonry to completion by the coming fall.

I will here remark that the estimate for the graduation and masonry above is taken from that furnished you previous to the letting of the work, in which the road was divided into sections, and each section estimated separately. The work already let is a fraction under the estimate.

GRADES, CURVATURES AND DISTANCES.

The distance from Blossburg, where this road commences to its termination at the State line, near Lawrenceville, is $25\frac{90}{100}$ miles. The total descent in that distance is 355,56 feet, reckoning from the grade of the road at its commencement to the termination of the same at the State line.

From Blossburg to Covington, a distance of 5 miles, there is a descent of 149,43 feet, making considerably more than $\frac{1}{3}$ part of the total descent in $\frac{1}{5}$ of the distance.

The maximum inclination of the grade line is 39.07 feet per mile and this extends only 3737 feet, and occurs $1\frac{3}{4}$ miles below Blossburg.

The average grade from Blossburg to Covington, is 29.88 feet per mile. The grade from Covington to the termination of the road, varies from 5 to 25 feet per mile, and averages 9.86 feet per mile.

The road being on an average descent of 13.73 feet per mile from its commencement to its termination, will favor the expense of transportation very much, and the grades not being so great as to interfere with a return load of say $\frac{1}{5}$ part of that taken down are to be desired rather than to be regretted, considering the great object in view, being the transportation of coal.

The following table exhibits the different grades adopted on this road, together with the length of each :

Length of grade in feet.	Rate per mile.	Total descent.
3737	39.07	27.65
4400	36.96	28.45
2400	34.85	74.29
2900	33.79	92.85
3000	31.68	110.85
3900	30.62	133.47
2600	29.04	147.77
1000	27.46	152.97
1800	26.40	161.97
500	25.34	164.37
1400	23.23	170.53
1200	22.02	175.53
11400	21.12	221.13
3600	18.48	233.73
900	17.95	236.76
10045	15.84	266.93
700	15.31	268.96
1100	13.73	271.82
13100	13 20	204.57
15500	10 56	335.57
5662	7.92	344.06
11500	5.28	355.56
34413	Level	355.56

136.757 feet, or 25 $\frac{90}{100}$ miles.

The curvature on this road may be said to be gentle, there being no curve of a less radius than 666 feet, and but a short distance, comparatively, at this rate. The straight part of the road is to the curved part, as 7.10 nearly.

OF THE MOTIVE POWER.

As it is designed to use steam by Locomotive Engines, for the motive power on this road, I will take the result of experience in the application of this power, and apply it to the grades and curvatures of this road to show what may be done on it in the way of transportation.

1st. It has been ascertained that the grades are all descending from the coal mines, and that the average of them is 13.73 feet per mile.

2nd. That there is no curve of a less radius on the road, than 666 feet.

3d. It has been proved that a locomotive steam engine of $7\frac{1}{2}$ tons weight, including water and fuel will draw 112.5 tons on a level road, at a speed of nearly 12 miles per hour. The traction exerted in this case is therefore $112.5 \times 12 = 1350$ lbs. This traction is the measure of the adhesion, exclusive of the engine and tender, of 12 tons weight.

It has been also shown, by recent experiment, that a locomotive engine of $8\frac{1}{2}$ tons weight, will impel, on a level, a load of 211 tons gross, at the rate of $11\frac{1}{2}$ miles per hour, thereby exerting a tractile power of 2322 lbs., besides the resistance of the engine and tender.

If we consider, in the application which I propose to make of the above results, that a mean between them is the fair measure of the power of the engine which will be used on this road, we shall arrive at the following useful effects which may be produced :—

It is known that the friction or resistance on a level straight road, is about $\frac{1}{240}$ or per ton,	lbs. 9.50
The resistance from curvature on this road is estimated at	3.20
Total resistance per ton on a level	12.70

The force of gravity on an inclination of 13.73 per mile, is 5.83 lbs. per ton.

DESCENDING LOAD.

	Tons.
40 Cars weighing $1\frac{1}{4}$ Tons is	50
$2\frac{1}{2}$ Tons of coal in each Car	100
Engine and Tender	12.5
	162.5

The effect of gravity in descending the average grade line is 5.83 lbs. per ton, which taken from the total resistance by friction and curvature, there remains 6.87 lbs. per ton, as the amount of traction necessary to be exerted in propelling the train, at a speed of 12 miles per hour. The total amount of traction necessary for a load of 162.5 tons on the average inclination, is, therefore, 1116 37 lbs., and the mean of that exerted as herein stated is 1836 lbs. By this calculation there appears no difficulty in transporting 100 tons of coal at each load on an inclination of 13.73 ft per mile. Where the road is level, which occurs in a few places, there will be more power necessary, equal to $162.5 \times 12.7 = 2063$ lbs. to maintain the speed above named of 12 miles per hour, which may be reduced at pleasure, as a substitute for the necessary increase of power on light grades, or on level parts of the road.

RETURN LOAD.

The return load, at the same speed will be considerably reduced, if we are governed, in the calculation, by the maxim inclination of the grade line of 39.07 feet per mile. The force of gravity on this inclination is 16.58 lbs. per ton and the resistance from friction &c., is 12.70 making together 29.28 lbs. per ton, as the total resistance.—Then on returning with empty cars there would be a gross load of 62.5 tons against gravity, and friction equal to 29.28 lbs. making 1830 lbs. as the tractile power necessary to return at a speed of 12 miles per hour. So it is seen that the Engine will descend with a load of 100 tons easier than it can return with the empty cars on an inclination of 39.07 feet per mile, at the same velocity.

The speed being inversely as the increase of resistance, it will be easy to lessen the former when occasion shall require and by an application of this principle to the above results, it will be found that the engine will ascend an inclination of 39.07 feet per mile, at the rate of nearly 7 miles per hour, with a return load of 30 tons nearly one third of that taken down. The attainments of high velocities, we are aware is not desirable in the transportation of coal, but as this road will no doubt, become of general use, such velocities as we have named are of much importance.

As the above results are obtained from every day experience and when applied to this road fully answer the purposes for either transportation or travel, I will not pursue this subject any farther.

GENERAL REMARKS.

In the preceding estimate of the costs of this road, it will be seen that no mention is made of the damages done to the proprietors of land, either for land or fencing. It is difficult to make even an approximate estimate of these damages, for they vary so widely. In consideration of this circumstance together with the fact that you will soon be in possession of the actual cost of these damages, I decline entering into any calculations respecting them. It is not likely from the disposition generally manifested, that these damages will materially swell this estimate, for full two thirds of the owners have liberally relinquished all claims for damages.

Among the subjects for examination there remains one which I did not propose to investigate, as it has been carefully examined and resulted in a full conviction that this road, when completed, will nett an ample revenue to warrant its construction. We will not enter into a minute investigation of this subject, but examine a few of its leading points.

Under the head of *Sources of Revenue*, there may be enumerated several items of much importance, among these, and the principle of which, is that which will result from the toll and transportation of coal. It is easy to show that this article alone will warrant the expenditure herein estimated, if the supply and demand shall be constant, of which we cannot entertain a doubt, when the quantity of coal is abundant, and the demand for it already very great. For a complete and full investigation of the amount of coal capable of being raised in the Blossburg Coal region, I would refer to the very able report, on this subject, made by R. C. Taylor, Esq., in 1833. Mr. Taylor says that the quantity of coal in the neighborhood of Blossburg, is commensurate with the extent of any demand that can be contemplated. This being the case, and the demand for the article daily increasing, it would not be saying much, to say that as soon as this road is completed, and the mines properly opened, 300 tons will be furnished daily for transportation, for 300 days per year. The charter allows 2 cents per ton per mile, as the maximum toll, which on twenty-six miles will make 52 cents as the daily toll for each ton of coal. So that the toll even on 100 tons of coal for 300 days per year, would nett a revenue of $15,000, a sufficient sum to pay six per cent on the investment.

It may be necessary to remark, that no notice is taken of the transportation, which is distinct from the toll. If the transportation should be done by the company, they will of course so arrange their charges, as to gain expenses.

Among the sources of profit, we may estimate a considerable revenue from the lumber which will be transported on this Road, the supply of which article is very abundant and the variety extensive.

The income from Passengers, will be another source of much profit, especially if this road is connected with the Williamsport and Elmira Rail road, now about to be commenced. Your Charter provides for this connection, and it would certainly be a very desirable one, which I am told can be affected in the distance of 14 miles.

The proposed Rail road from Jersey shore on the West Branch of the Susquehannah to Willardsburgh, would intersect your Road at or near Willardsburg, about 7 miles from the State Line, and whatever the amount of tonage might be on this road, you will be certain to receive a great proportion of it for transportation for at least one fourth part of the entire length of your road. One of the objects of the road from Willardsburg to Jersey Shore is to reach coal on Pine Creek, which has been discovered of good quality and very abundant.—The length of this road will be about seventy miles, and its direction from Willardsburg will be up the valley of Crooked Creek to Wellsborough, near the head waters of Crooked and Pine Creeks, then it will descend Pine Creek to its termination at Jersey Shore.

I deem it unnecessary to refer to the extension of your road into the State of New-York, with which you are acquainted, further than to state, that the work has been commenced on the 14 miles from the State line to Painted Post, where there will be a communication with the New-York and Erie Rail road at or near the head of the feeder of the Chemung Canal. As the extension is commenced under the charge of another company, to effect the same object, we have every reason to believe that they will prosecute their work to completion, as soon as you can finish the portion you are constructing—a coincidence highly important to the prosperity and interest of both works.

In concluding this report I acknowledge with much pleasure the valuable aid I have received from Mr. Miller Fox, the Principal Assistant ;—Mr. William McDougall has also been a valuable member of the party.

Respectfully Submitted,

WILLIAM MATTHEWS,

Engineer of the Tioga Rail road.

TO THE PRESIDENT AND MANAGERS OF THE TIOGA NAVIGATION COMPANY.

GENTLEMEN—I have examined the report of W. Matthews, Esq., Engineer, dated the 15th of August, 1836, in which he has given a full account of the progress of the Engineer Department of the Rail road between Blossburg and the New-York State Line and an estimate of the cost of the Road amounting to $237,806 83.

I have examined the several items forming this estimate and consulted with Mr. Matthews, and compared minds in relation to the whole subject including the necessary engines, tenders, transportation cars, and passenger cars, water stations, &c &c, And I think the estimate a fair one and such

as ought to complete the Road and put it in operation.

I therefore approve of this Report and its statements as correct.

BENJ. WRIGHT,
Consulting Engineer,
Tioga Navigation Co.

Lawrenceville, August, 15th, 1836.

TO THE PRESIDENT AND MANAGERS OF THE TIOGA NAVIGATION COMPANY.

GENTLEMEN—Having visited the line of your proposed Railroad now under charge of Mr. Matthews, from Blossburg, to the New-York State Line near Lawrenceville; I now beg leave to present to your board, my views upon the whole plan.

It is proposed by Mr. Matthews, and approved by me to grade the Road for a single track,—with five turnouts. The cutting to be fifteen feet at bottom, which allows for one track, and good ditches or side drains. The embankments to be fifteen feet on the top, and the slopes to be one and a half to one, except where there is rock or earth, that will permit a steeper slope.

The superstructure to be of timber, laid first as ground sills, then cross ties, then wooden rails on which the iron bars are placed. The track I would propose to conform to the New-York and Erie Railroad, which is intended to be four feet eight and a half inches, between the rails.

The size of the several timbers having been before given to the road, by Mr. Matthews, and contracts made, therefore I shall not enter into detail—the turn-out I would plan as follows.

One near the northern termination at the New-York State Line, one near Willardsburg, one at Mansfield, one at Covington, and one at Blossburg. There can be added at any time hereafter such additional turn-outs, as the demands of the country require.

The line as located by Mr. Matthews, from Blossburg to Berry's Bridge, appears to me as far as a permanent location has been made, and from the experimental line below the permanent location to the point referred to above, near Berry's Bridge to be done with good judgment and such as I approve.

From near Berry's Bridge, to the N. Y. State Line there have been examinations and surveys on both sides of the river—distance nearly equal being about 8¼ miles.

The comparative estimates which have been made by Mr. Matthews, present the following results:

On the west side graduation of road will cost,	$40,279 00
Bridges over the Tioga and Crooked Creek,	$6,600 00
Alteration of road at Depuy's,	500 00
	$47,379 00

EAST SIDE.

Graduation of road,	$35,044 00
The land and fencing wil cost more on the east, than on the west, equal to	1,384 00
	36,428 00

Difference in favor of E. side, $10,951

Thus we have a difference of ten thousand nine hundred and fifty one dollars in favor of the East side.

This comparative view of cost, ought not however to be decisive upon this matter; a view ought to be taken of the commodation of the country; and the general advantages to the stockholders, and the future prospects of trade and business on the road.

If we pass across the river above Berry's Bridge, we pass through Willardsburg and through Lawrenceville, we accommodate these two villages, and we give a favorable connection to the proposed Railroad up Crooked Creek, to the West Branch of the Susquehannah at Jersey Shore, if it should be made and we facilitate an easy connection for the Railroad up the Cowanesque should the wants of the country hereafter require it.

On the other hand we have a bridge over the Tioga river, at or near Berry's, a bridge over the Crooked Creek, and as we ought in a certain degree to consider that part of the road to be constructed in the State of New-York, although never another charter so intimately connected as to have a bearing on the interest of this road. If we take the west side of the Tioga from Willardsburg, there must be a bridge erected by the directors under the New-York charter, over the Cowinsque and over the Tioga. The expense of these latter bridges cannot of course enter into any calculation under the Pensylvania charter, but as far as risque of interruption of trade by the destruction of bridges in the New-York part of the line into the location on the Pennsylvania part, it is fair to consider its bearing. Thus we have the expense and resque of two bridges in Pennsylvania, and the risque of interruption by the destruction of bridges on the New York part of the line.

These are the offsets against the advantages of accommodation and trade of two important villages which are daily growing in trade. I regret gentleman that a little more time had not been given for the Engineer to have made a more perfect comparison of cost of the two sides of the river, by obtaining a more correct estimate of damages on both sides. And a better estimate of the expense of bridges over such streams, as these which we must cross, on the route of the west side.

It appears to me, gentlemen, that your local knowledge of the present and future prospects of this country will enable you to determine this question more correctly than any Engineer. The data given above presents the question fairly as far as I can understand its bearing. The question of damages may however be misunderstood by me, and I make the estimate on that part with diffidence. There is one point which has suggested itself to my mind in relation to the guaranty of the State under the suplimental act of April 14th, 1835, which says, "*the Road from Blossburg to Lawrenceville*" it appears to me a question may arise, if the road does not touch Lawrenceville, as every law must be construed strictly. I however throw out this as the impression of my mind, and your better judgment will take it for what it is worth.

I have reflected upon the subject of iron rails, since, I have written Mr. Matthews, and sent him the form of rails which I would prefer. I find the price of iron has raised so much and the delays in obtaining any new pattern are so great, that I have consulted with Mr. Matthews and we have agreed upon altering the rails, and would now propose to the Board to adopt the common plate rail of two and one quarter iron, wide and five eights thick. This will make a saving of about four or five tons per mile in the weight of the rail.

I have now to touch upon a subject which perhaps the Board may consider as settled by their act, and therefore not properly belonging to the engineer. I mean the location and termination of the road at Blossburg.

The experience of all railroad companies, has pretty well settled the importance of one very large depot for the establishment of work shops to repair locomotive engines, and cars. The location and business of the road would seem to point out that an establishment for this purpose should be made at Blossburg, and another at the point where it terminates on the Chemung Canal Feder. If the Board should determine upon such a depot for work shops, car houses, &c. &c, they ought to have fifteen or twenty acres of land, and the privilege of a small water power for the work shops.—In looking over the ground about Blossburg, it is easy to select such place as would furnish ground suitable, and water power, which can now be obtained, as I am informed, at fair prices. I would therefore beg leave to recommend to the Board the propriety of securing at an early day such location of ground as shall be required there.

In carrying on a great coal trade such as this work will no doubt have, as soon as this project is completed, there will be at least three or four hundred cars kept on hand, some out of repair and the remainder in use.

If one locomotive can take down one hundred tons of coal in 40 cars, and return with the empty cars, there ought to be estimated at least three hundred tons per day, taken down.

Then for one locomotive.
40 cars on the road,
40 cars unloading, and
40 cars loading,

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120 cars required for each locomotive. Then three locomotives will require 360 cars, and making allowance for cars in the work shop, and we shall find 400 cars rather less than the absolute wants required to carry 300 tons daily to the canal. The Board will see from this view of this matter the very great necessity of securing plenty of room for the work shops and for these cars to be collected at the southern termination of the road, these together with

the mass of materials of wood and iron necessary to have in store require space, and if 20 acres could be obtained in good form for this purpose it will be very important to have it secured.

Respectfully submitted,
BENJ, WRIGHT.
Consulting Engineer.
Covington, May 5th, 1836.

From the Farmville Journal.

CHARLOTTE RAILROAD CONVENTION.

It will be seen from the sketch which we have published to-day of the proceedings of this Convention, that they have recommended a railroad to be constructed from Farmville to Danville, from Farmville to Petersburg by the way of Nottoway Court House, and from Richmond to Farmville and thence to Lynchburg. There was much diversity of opinion, as was to be expected in such a body, respecting the routes which the railroads should pursue, but none as to the propriety and importance of a great railroad communication from the tide water to the southwest.

The objections to the recommendation of the direct Richmond route seemed principally, to be the probability, and, almost certainty, that it will not be chartered by the Legislature—and that the road might be constructed from Farmville through Petersburg, to Richmond, with less expense, and little increase of distance, giving to the planter the choice of an additional market, and conflicting so little with their favorite James river monopoly, that it could hardly be doubted that it would be able to secure a charter from the Legislature. We would not willingly believe, that there is no expectation on the part of the Richmond people of obtaining a charter for the road through Farmville to Lynchburg, andthat their only object is ro prevent the construction of the road through Nottoway to Petersburg, until some *future* period when they may be able to procure a charter from the Legislature for the ridge road from Lynchburg. We fear, that whatever may have been *intended*, this will be the result. We hope that the people of Petersburg and Nottoway will not so lightly give up a scheme, which is so intimately connected with their interests.—For ourselves, we do not believe that the ensuing legislature will charter the ridge road from Richmond to Lynchburg through Farmville. We hepe therefore that the route by Nottoway Court House, will be forthwith surveyed, and its claims be presented to the Legislature—that if the influence of the James river Company should prevent the charter of a road from Richmond to Lynchburg direct, we might still present them claims free from all rivalry to that Company, by interposing the Appomattox between them. We do not feel at all certain, that both roads would not be well sustained.

A Convention is called to meet soon, at Salisbury, in North Carolina, to take steps for opening some channel of communication to the country bordering upon the Yadkin, and there is a good deal of probability that they will recommend the construction of a railroad to Danville. Should the roads from Farmville to Danville and to Lynchburg be constructed, there will be travel enough we think, to support both routes, and we see no reason why the Petersburg road might not expect to divide the travel with the other route, and secure a reasonable proportion of it. We hope, therefore, the people of Nottoway and Petersburg will not "give up the ship." Faint heart never won fair lady, and in the presen age of activity and enterprise, commercial advantages are not to be secured without strenuous and enduring effort.

CHARLOTTE CONVENTION

At a meeting of delegates of the Counties of Prince Edward, Charlotte, Nottoway, Amelia, the town of Farmville, and the city of Richmond, at Charlotte Courthouse on the 5th day of September, 1836, for the purpose of taking into consideration the propriety of constructing a railroad from Danville in the county of Pittsylvania, to Farmville in the county of Prince Edward.

The meeting being called to order, Colonel Clement Carrington was appointed Chairman, and Branch J. Worsham Secretary:—whereupon the following delegates appeared. to wit; from the city of Richmond, J. B. Harvie and Wm. Wren; from Farmville, Tazewell S. Morton, Henry Thweatt, Nathaniel Price, Wm. L. Morton and James Madison; from Prince Edward county, Richard N. Venable, James H. Wilson, Branch J. Worsham, Henry E. Watkins, Wm. H. Venable, Wm. S. Morton, James D. Wood, John J Flournoy, John A. Scott, and John Clark; from Amelia county, Thomas E. Jeter; from Nottoway county, Archibald A. Campbell, Robert Fitzgerald, Jun., Wm. N. Fitzgerald, John H Knight, Peter I Gr gg, L. C. Bouldin, and W. J Dupuy; from Charlotte county, Dr. A. D. Alexander, Robert Morton, J. D. Richardson, Wm. B. Green, Richard I Gaines, John Armstead, Henry A. Watkins, Edward W. Henry, George Hannah, Henry E. Scott, Thomas Edmunds, Isham Harvey, J. Boothe, John Harvey, Samuel D. Morton, Dr. John Armistead, Henry Madison, John D Spraggins, Clement Carrington, and William B. Watkins.

On motion, Dr. Pitman B. Spencer of Petersburg, was invited to take a seat with this Convention. and accordingly appeared and took his seat.

The Convention then proceeded to elect a President, and Col. Clement Carrington being nominated, was unanimously elected.

Mr. Watkins, of Prince Edward, submitted the following resolution:

1. Resolved, That this Convention recommend the construction of a railroad from the town of Danville to the town of Farmville, to pass through the county of Charlotte by or near the Court house.

Mr. Harvie submitted the following resolution:

2. Resolved, That it be recommended by this Convention, that a railroad be made from the city of Richmond to the town of Lynchburg or New-London, with a branch from the main stem to Farmville.

Mr. Campbell submitted the following proposition:

3. A proposition of a railroad from the neighborhood of Petersburg to New London, on the ridge dividing the waters of the Appomattox and the Albemarle sound, with branches to Farmville and Danville.

Mr Watkins of Prince Edward, also submitted the following resolution:

6. Resolved, That this Convention recommend the construction of a railroad from Lynchburg to Farmville.

On motion of Mr. Gaines the several resolutions and propositions were referred to a Select Committee, to be composed of one delegate from each county, town and city, represented in this Convention.

The Chair then announced the Select Committee as follows: Mr. Edward Watkins, of Prince Edward, Mr. Harvie of Richmond, Mr. Madison of Farmville, Mr. Jeter of Amelia, Mr. Campbell of Nottoway, and Mr. Gaines of Charlotte.

Mr. Madison submitted the following:

That the Committtee be directed to inquire into the expediency of surveying a route for a railroad from Petersburg by Nottoway Courthouse, Burke's &c. to the town of Farmville.

On motion, the Convention then adjourned to meet again ro-morrow morning at nine o'clock.

TUESDAY, SEPTEMBER 6th, 1836.

Convention met agreeably to adjournment.

The President being absent, on motion, Wm. S. Morton was elected President pro tempore, and took the chair.

Mr. Watkins, from the Committee to whom was referred the several resolutions presented yesterday, made the following report thereon:

Your Committee report the following resolution to be adopted by the Convention, as a substitute for the 1st resolution referred to him:

Resolved, That this Convention recommend that an application be made to the next general Assembly for the passage of an act incorporating a company for the construction of a railroad from Farmville, by or near Charlotte Court-house, to some suitable point on Staunton River, with the privilege of extending said road to Danville if it should be found expedient. Your Committee recommend that the 2d, 3d, and 5th resolutoins referred to them, be rejected by the Convention.

Your committee report the following resolution to be adopted by the Convention, as a substitute for the 4th resolution referred to them—Resolved, that it be recommended by the Convention, that surveys be made, for a railroad from Petersburg to Farmville, the one by Nottoway Courthouse, the other through Amelia.

Your Committee recommend that the 6th resolution referred to them be adopted by the Convention.

Mr. Watkins of Prince Edward moved to reject so much of the said report as proposes a substitute for the 1st resolution referred to the committee.

Mr. H. A. Watkins of Charlotte moved to amend the substitute reported by the committee, by striking out the words "by or near Charlotte court house," and inserting the words "by the most eligible route."

Mr. Green offered to amend the amendment offered by Mr. Watkins of Charlotte, by striking out the words "by the most eligible route," and inserting the words "by Charlotte court house." The question was then taken on the amendment offered by Mr. Green, and rejected. The question was also taken on the amendment offered by Mr. Watkins of Charlotte, and rejected.

The question was then taken on the amendment of Mr. Watkins, of Prince Edward, and decided in the affirmative; so the substitute reported by the committee of the first resolution was rejected, and the resolution as originally submitted, agreed to.

Mr. Harvie moved to reject so much of the report of the select committee as recommends that the 2d resolution be rejected by the Convention, and offered as an amendment to the 2d said resolution and report the following:

Resolved, That it be recommended by this Convention, that a railroad be made along the ridge between James and Appomattox Rivers, from the city of Richmond to Lynchburg or New-London, with a branch road from the main stem, from the most convenient point to Farmville.

Mr. Watkins of Prince Edward, moved to lay the resolution and amendment on the table, which motion was rejected; and the question being taken upon the adoption of the amendment offered by Mr. Harvie,

Mr. Campbell called for the yeas and nays, which were ordered, and are as follows:

Yeas—Messrs. Harvie, Wren, Wilson, Worsham, W. S. Morton, Flournoy, Alexander, Green, Gaines, H. A. Watkins, Scott of Charlotte, Edmunds, Isham Harvey, and Morton of Charlotte—14

Nays—Messrs. T. S. Morton, Thweatt, Price, W. L. Morton, J. Madison, R. N. Venable, Watkins of Prince Edward, Wood Jeter, Campbell, R. Fitzgerald, Knight, Grigg, Bouldin, Dupuy, Henry, Boothe, J. Harvey, M. Madison, Spraggins, Wm. B. Watkins—21.

So the amendment offered by Mr. Harvie was rejected.

Mr. Harvie then offered a second amendment to the 2d resolution and report, which is as follows:

Resolved, That it be recommended by this Convention, that a railroad be made along the ridge between James and Appomattox rivers, from the city of Richmond to Farmville, and thence to Lynchburg.

The question on the adoption of the resolution was taken and decided in the affirmative—yeas 19—noes 11.

So much of the report of the Select Committee as relates to the 3d and 5th resolutions referred to them, being read, and the question taken thereupon, was concurred in.

So much of the said report as relates to 4th resolution being read, the question was taken thereupon, and the report of the select committee as rejected; the question then recurring upon the adoption of the 4th resolution was originally offered, and the vote taken thereupon, was decided in the affirmative.

On motion of Mr. Watkins of Prince Edward, leave was given to withdraw the 6th resolution.

On motion of Mr. Gaines, Resolved, that a Committee be appointed in the counties of Charlotte and Prince Edward, consisting of five persons in each county, to raise a fund to defray the expenses of a survey of the proposed route for a railroad from Farmville to Danville.

The Chair then announced as a Committee for the county of Charlotte—Dr. A. D. Alexander, Richard I. Gaines, Edward W. Henry, Samuel D. Morton, and Henry Madison; For the county of Prince Edward—James H. Wilson, Wm. H. Venable, James D. Wood, John A. Scott, and John Clark.

Mr. Wren offered the following resolution, which was unanimously adopted:

Resolved, That the thanks of this convention be tendered to the President pro. tem., and Secretary, for the prompt, zealous and impartial manner in which they have discharged their duties.

On motion of Mr. Knight, Resolved, that the proceedings of this convention be published in the Farmville, Danville, Richmond and Petersburg papers.

The convention then adjourned sine die.

WM. S. MORTON, Pres. pro. tem.

B. J. WORSHAM, Secretary.

RESOLUTIONS ADOPTED.

1. Resolved, That this convention recommend the construction of a railroad from the town of Farmville to Danville, to pass through the county of Charlotte by or near the court house.

2. Resolved, That it be recommended by this Convention that a railroad be made along the ridge between the James and Appomattox rivers from the city of Richmond to Farmville and thence to Lynchburg.

3. Resolved, That this Convention recommend the construction of a railroad from the town of Farmville to Petersburg, through the county of Nottoway by or near the court house.

The following article from the Staunton Spectator, will exhibit the spirit which actuates the people of Augusta in reference to the Valley Railroad:

VALLEY RAILROAD.—On Monday last, pursuant to notice, books were opened at the Court House of this county, for subscriptions to the stock of the Valley Railroad.—There was quite a respectable attendance of citizens on the occasion. A. H. H. Stuart, Esq., addressed the people at great length and with much ability, in favor of the enterprize—going fully into the advantages of the improvement, its effects upon the prosperity of the country, the objections urged against it, and the necessity for present and decided action on the subject. We are sure we speak but the general sentiment of those who heard him, when we say, it was one of the best efforts of our gifted townsman. Mr. Stuart concluded his speech about 5 o'clock, and from that time until sun-down there were $65,000 subscribed. The books are still open, and if the people of the county are only true to their interest, we have no doubt the amount expected of us will be obtained in a few days. We congratulate the friends of the improvement on the cheering prospect.—For is it not cheering? If fifty-eight citizens give a subscription of $65,000, who can doubt that one hundred or one hundred and fifty thousand more will be taken by the balance of the country! Are there not a thousand citizens at least, who could and ought to make an average subscription of two shares each? We have heard of two gentlemen who were not present on Monday that will take between them seventy shares, and there are no doubt many others who will subscribe from five to ten. Nothing, we are persuaded, is now wanting but a moderate degree of exertion to obtain the requisite subscription on our part. Then shall we slumber and sleep, or waste our time in idle chat over what we have done,—or shall we seize the crisis, and with a spirit worthy of the noble enterprize, push on with freshened zeal and untiring energy to its accomplishment! Remember, the prize is not won, though it be within our grasp.—'Once more, then, unto the breach, dear friends, once more.' If nothing else will do, let us district the county, visit every house, and make thorough work of it.—[Spectator.]

From the London Mechanics' Magazine.

EFFECTIVE POWER OF LOCOMOTIVE ENGINES ON LEVELS AND INCLINED PLANES.

Question put to Mr. Robert Stephenson, C. E., by the Committee on the London and Brighton Railway; and Mr. Stephenson's Answer.

QUESTION.

Supposing that for a long distance there is a certain strain which may be represented by any figure or letter, and that that is broken on another line by a series of ascents and descents; supposing that the total amount of strain in both instances be the same, what is the difference of effect upon the engine?

ANSWER.

In order that the following answer may be fully comprehended, it is necessary to premise, that by the terms of the question, it would appear that it is meant to determine the difference of effect of locomotive power upon two series of planes, from a point A to a point B. In the one the strain is constant, and may be represented by 1, whilst the other is varied by ascents and descents, but so that the total expenditure of mechanical power is the same; hence it is evident that the ascents upon the latter must be more abrupt than on the former, or else they would not compensate for the descents.

Assuming these data, there cannot be a question that the lesser and more uniform strain is best adapted to locomotive power, both as regards speed and load, for the following reasons:—

1st. As regards speed. It is evident that, to render this comparison perfectly fair, it is only necessary to assume two engines of equal power and load to start simultaneously from A to B, and then assuming that on every part of each line the engine to be capable of exerting its whole power, that is, both on the ascents and descents of the undulating line, while she proceeds uniformly on the other line. On this assumption, as equal power will be so exerted in equal times by each engine, and as the total expenditure between A and B is the same, they would then both arrive at B together.

But in the case of the undulating line, this hypothesis cannot hold, except within certain limitations, for it is manifest that in practice a variety of circumstances limit the speed at which an engine can be allowed to travel, both as regards safety, wear and tear of machinery, and also the arrangement, especially of the slides for the admission of steam to the cylinders.

For these and other reasons, a speed of 35 or 40 miles per hour is as much as can be travelled safely, especially on descending planes, in the present state of our experience; hence, in order to compensate for the slowness of ascending speed, the accelerated velocity may be far beyond that which can be permitted with prudence; hence the difference of time consumed on the descending planes by the regulated velocity, and the extreme accelerated velocity is lost on the undulating principle.

For instance, between London and Brighton, by Sir John Rennie's and Mr. Stephenson's proposed lines of railway, the respective distances from London Bridge to Sir John Rennie's terminus at Brighton is 49 miles, 68 chains; and from Nine Elms to the back of Brunswick-terrace, by Mr. Stephenson's line of railway, is 54 miles, 68 chains; and going and coming the respective distances, therefore, are 99 miles, 56 chains, and 109 miles, 56 chains.

There are on Sir John Rennie's line, as described by Dr. Lardner, 32 miles of gradients to be characterised by $\frac{1}{270}$.

On Mr. Stephenson's, 28 miles by $\frac{1}{330}$.

Now assuming an engine to start on each line of an equal power and with the same

load, with which load on the level it can travel at a speed of 40 miles an hour, using its whole power, then assuming the friction to be 9 lbs. per ton, or $\frac{1}{250}$, and that its whole power is consumed, the distance to and from Brighton will be travelled on each at a speed of 40 miles per hour, and the respective times will be 2. 29. 30. and 2. 44. 30. without adding for delay on the Croydon inclined plane.

But this assumes that on Sir John Rennie's descending planes the engine to travel 720 miles per hour. Whereas we will suppose them limited on each to 40 miles per hour; hence in going and coming there will be 32 miles of descending planes, the time to be added will be the difference between travelling 32 miles, at 720 miles per hour, and at 40 miles per hour, that is, of 45 minutes, 20 seconds, making the total 3. 14. 50. by Sir John Rennie's line; whilst on Mr. Stephenson's the time to be added is the difference between travelling 28 miles at 16 miles per hour, and at 40 miles per hour, that is, of 31 minutes, 30 seconds, making the total time 3 hours, 16 minutes.

To this must be added the time consumed in stoppages, that is, on Stephenson's $2 + 3$ minutes, being once at the Southampton Junction, and once for water. On Sir John Rennie's, $3 + 3 = 9$ minutes, being once at Greenwich Junction, once Croydon at the station, and once for water; besides delay on Croydon incline, for which 5 minutes will be a very moderate allowance.

Thus by Rennie's line . . .	3	14	50
Extra stoppages .		14	0
	3	28	50
By Stephenson's	3	16	0
Extra stoppages		6	0
	3	22	0

The difference being 6 minutes, 50 seconds, in favor of Stephenson's line. This is abstracted from the curves; now, Dr. Lardner admits that the total curvature

On Rennie's is measured by 840 deg.
And on Stephenson's, by 790 do.

Or, reduced to curves of a mile,

Rennie's . . 7 miles, $\frac{3}{3}$ of a mile radius.
Stephenson's 6 $\frac{9}{10}$ ditto.

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Thus the total length of the respective journeys —

On Rennie's	3	36	30
On Stephenson's	3	29	0

But it may be well here to remark, that Dr. Lardner is in error as regard the curvature on both Stephenson's and Rennie's line; as the curvature

On Rennie's is . . . 15 m., 1 m. radius,
And on Stephenson's $11\frac{1}{2}$

which would make the time a little more favorable to Stephenson's line of railway.

Now, it may be observed, that the foregoing calculations are altogether independent of a difference of opinion as regards proportion of power of engines to what they are ordinarily called upon to exert, or of their varying power at different speeds, because this is equally applicable to each line; but rest upon clear mechanical principles, independent of all hypothesis.

Next, if the comparison be as regards load, then the thing is very simple; for the load is either measured by the adhesion of the wheels, or else by the pressure of steam in the cylinder; in either case, the engine being identifical in power and weight, the maximum load is measured by the friction on a level plus gravity; hence the uniform or more easy gradients have a clear advantage.

Thus, between Sir John Rennie's and Mr. Stephenson's lines, the proportions are as

$$15 . 80 = 9 \times 6 + 80 = (\tfrac{2240}{330})$$
$$\text{to } 17 . 50 = 9 \times 8 + 50 = (\tfrac{2240}{264})$$

That is, a difference of 11 per cent. in favor of Mr. Stephenson's line in gross load; but the effective load has a different proportion still more favorable to Mr. Stephenson's line, as Mr. Rastrick admitted in his evidence, a difference of 14 per cent. in favor of the western line, but which may under various considerations amount to 20, or even a higher per centage.

From the Journal of the Am. Institute, for August.

REPORT FROM THE HON. HENRY L. ELLSWORTH TO THE SECRETARY OF STATE, AND TRANSMITTED TO THE SELECT COMMITTEE ON THE PATENT LAWS.

PATENT OFFICE, 1836.

SIR: I have the honor to acknowledge the receipt of the inquiries made by the honorable chairman of the committee on the patent office, in the house of representatives, and referred by the honorable Secretary of State to this office for my report in part. As the answer must in some measure depend upon the organization of the office, I will respectfully reply, first, to the following inquiry, viz: "what alteration or improvement of the law, relating to the granting of patents, has experience shown to be requisite to effect all the objects which it is desirable to obtain in this department?" A brief reference to the history of the patent law, and the practice under it, will be necessary to learn the "mischief," and provide the "remedy."

It is nearly half a century since the present patent law was enacted. Previously to 1793, all petititions for patents were presented to the Secretary of State, Secretary of War, and Attorney General, who examined them, and granted or refused a patent at their discretion. This duty having been found an arduous one, and also a great interruption to other business, the law of 1790 was repealed, and the present act passed, which is more in conformity with the practice in Great Britain.— Few alterations have been made in the existing law since 1793, if we except the extension of a privilege to a certain class of foreigners. While a laudable spirit prompted our legislators to encourage the arts, the poverty and distresses of the country forbade the passage of any law for the protection of inventors which might increase the burdens of the community. Such a tariff of fees was accordingly established as to defray, as far as possible, the expense incurred by government in giving patents. Hence it is not strange, that glaring imperfections now appear in the law. It has been a matter of astonishment that so important a branch of domestic polity should have been so long neglected. The time has now arrived when the amount of revenue derived from this source, the magnitude of the claims dependant upon the patent law, the great delay and embarrassment experienced by patentees at the office, all conspire to demand a thorough survey of its present organization. To insure attention to this subject, it need only be mentioned that the number of patents issued annually, for a long time, did not exceed one hundred, whereas, at present, the number is about eight hundred, and will soon increase to one thousand. Such is the desire to secure patents, that individuals have taken out more than fifty patents. The amount of fees for patents annually ($30 being thefee) is about $25,000. The present year it may exceed $30,000. To this amount fees for copies and recording are to be added, making the sum larger still; and notwithstanding the rapid increase in the business of the office within a few years, very little additional force has been allowed for its accomplishment. Patentees complain of delay, and very justly, but this delay must soon be greater than at present, without the interference of congress. It may be asked if such are the profits, why not apply the funds received to the discharge of accruing business?— The answer is readily given. All the money received is, by law, paid over into the treasury, and although to be credited to "the account of clerk hire," cannot be appropriated to this use without a special act of congress. The superintendent has requested additional assistance, but the honorable Secretary, although anxious to afford every facility, has not felt authorised to increase the expenditures on his own responsibility. Patentees and suitors in courts have suffered much during the last year from delays in the office; cases are sometimes continued for the want of copies, which would readily be furnished at one half the lawful fees now charged if the superintendent was permitted to get the work done. A few facts need only be added, to show the propriety and importance of a revision of the patent law. The whole expenses of the patent office do not exceed one-fourth of its income. The number of applications for patents since the 10th of July (at which time my superintendency commenced) has been upwards of six hundred. The correspondence has trebled within a few years. No less than two thousand letters have been written by the superintendent since July last. More than one hundred suits are now pending in the United States courts touching rights of patentees. These suits will increase until some check is put to the fraud now openly practised, but irremediable without the aid of congress.

Questions are frequently asked at the patent office, which require several days search to answer. Each patentee (if he is honest) wishes to know whether his patent

will infringe upon others. This is apparently a simple inquiry, but only a reference to seven thousand patents can settle the question. And here, what an embarrassment must arise from the want of systematic arrangement of the papers. Previous to July last, not a single letter received was filed, and even now none are indexed. Many volumes of records are also wholly unindexed, and must remain so until more help is provided. And was not an hourly reference to these volumes and correspondence necessary, the unsystematic arrangement of papers would be less tedious and perplexing.

The injustice and inexpediency of the present law, will appear in reference for the charges made for services performed at the office, besides the fee of thirty dollars. By the law of 1793, each copy of one hundred words is charged at twenty cents, certainly twice as much as it costs to make the copy, if labor is computed at one thousand dollars or twelve hundred dollars per year for a clerk. It may be mentioned, as a singular fact, that copies of the papers in the State department, are charged only ten cents per one hundred words. Each drawing, whatever its size or complexity, is charged at two dollars. A few drawings are worth less than this sum, but most of them twice as much, and some are worth forty or fifty dollars. A fair remuneration ought to be charged to each applicant.—There are now applications pending for drawings, where the draughtsmen will be compelled to labor several days, at a salary of three dollars and thirty-three cents per day, and earn for the government but two dollars for the whole time.

So sensible are the patentees that the price is much less than the usual charge for the same thing out of the office, that they frequently apply to the superintendent to get the original drawings executed in the office at two dollars. This request is always refused, for patentees are bound to furnish original drawings, and the patent office is only required to give copies of drawings of patents granted.

The delay of patents has been alluded to. This is one of the greatest evils. Applicants are always impatient; some travel to this place from a long distance, and are anxious to carry their patents home with them; other patentees are urgent for papers to be used in courts; especially where old patents are adjudged invalid, and the right of action is suspended until a new patent is obtained; nor will an additional number of Clerks produce the desired relief, without some alteration of the present requisites. According to the existing law, the patent must be signed by the *President*, the *Secretary of State*, and the *Attorney General*.

The Attorney General has the right to retain the patent fifteen days for examination. It must be apparent to all conversant with public business, that there will be delay in the signatures of such high functionaries, since their time is demanded for more imperious duties. How much greater must this delay be, when the person whose signature is wanted, is absent from the seat of government; nearly one half of the patents issued since July have been transmitted more than two hundred miles for single signatures. It may be asked, how is this difficulty to be remedied? it is believed that two of the three signatures can be dispensed with; can it be necessary or useful to have the whole number?

The rights of the patentee are the same with the signature of the Secretary of State, as with the addition of the President and Gttorney General. The great seal can accompany the Secretary's signature, and the patent be issued in the name of the United States. It is true the Attorney General is bound to examine the patent; but is this necessary? Among all the patents transmitted since July, only one has been returned as imperfect, and in this case the defect was not fatal to the validity of the patent. The best examination can certainly be made at the patent office, where the drawings and models are deposited. If the signature of the president and Attorney General could be dispensed with, considerable labor and much interruption would be avoided. If additional help was given to examine the patent and the signatures of the Secretary of State, and the head of the bureau, only required, it is believed that a patent might be issued in a few days, whereas now the average time is two or three months.

The present arrangements are not economical. Congress appropriated, a few years since, $14,000 to bring up the records of the office by employing clerks at a compensation not exceeding twelve and a half cents for every hundred words. A small part of this appropriation remains unexpended, and a temporary clerk is employed under the act. The employment of temporary clerks is objectionable: unskilled, they are liable to commit errors; besides, the compensation of twelve and a half cents per hundred words is much higher than the salary of a clerk at $1,000 or $1,200. It is due to those who labor in the patent office to state, that services required and performed there are not exceeded in any of the bureaux of government. Great caution, much skill, and some legal science, are requisite in issuing every patent.

Notwithstanding the superintendency is in form a separate bureau, (yet in law a clerkship,) and the superintendent charged with the whole responsibility of issuing the patents, disbursing the special appropriation of $14,000, and the contingent fund of $2,000, accountable for all the fees received in the office, and personally required to conduct the correspondence, still his compensation is lower than that of chief clerk in either bureaux of auditor or commissioner. If the patent office was placed upon the same footing with the land office or Indian bureau, the compensation allowed would secure competent assistance. And it is desirable that those who are in the office should receive a fair remunaration as an inducement to remain after they have become acquainted with its minute details. The salaries in the patent office, as compared with those of the land office, Indian bureau, or either auditor's office, will be found from thirty-three to fifty per cent. less. Hence there is in the patent office a constant desire to change situations, and this comparatively low compensation will prevent able and permanent assistance.—Will a clerk remain satisfied to labor for $1,000 in the patent office, when the same clerical services in adjoining offices bring $1,250 to $1,500. The aggregate pay of superintendent, three clerks, machinist, and messenger, in the patent office, amounts to $5,400, whereas the pay of the commissioner of Indian affairs, four clerks, and a messenger, is $3,700. One third of the revenue received from patents would defray all the disbursements for salaries, and leave two thirds to be appropriated as congress might direct.

I have alluded to frauds under the patent law. These frauds are daily practised by persons who take out patents without making any new discovery or improvement.—The law gives neither the superintendent nor others any judicial powers. Every applicant has a right to demand a patent if his papers are in order; and several patents are often issued for the same thing. Congress seemed to have noticed the impropriety of granting two patents for the same thing by giving the Secretary power, in case of two pending interfering applications, to order them both to arbitration to decide upon the right of patent, but under the rules established to direct the office no applications are deemed interfering unless the papers of both are complete in all respects.—Should two applications be precisely alike, and one of them need only a trifling requisite, such as an additional witness, it then would be no interference; and as there is seldom a case when the papers of both are in the same state of forwardness, an arbitration under the law is a rare occurrence.

The oath of inventors has been too often justly compared to the "custom-house oaths." There are, however, inventions made by persons living in different parts of our country, when both can claim originality; for no sooner are the wants of the public known than men of ingenuity attempt to supply them. The late burning of baggage on railroad cars produced immediately many inventions to remedy the evil, and several interfering applications were made. The issuing of patents to those who have no claim to originality is truly a great evil. Every facility is now extended to pirates. Even copies of models are taken by visiters at the model rooms, and patents demanded of a similar kind. During the last week a patentee was explicitly told that his patent, if granted, would be a direct infringement upon previous patents: "but a patent must be had;" it was demanded, and accordingly ordered to issue. It is believed that several hundred thousand dollars are paid annually in the United States for patents improperly obtained.

The success of past villany has emboldened many to continue their deception upon the credulous. The public attach high reverence to the great seal which the patentee is careful to exhibit. Fraudulent patentees are shielded in some measure by the expense of litigation, and many, very

many, pay commutation, and submit to imposition, rather than be dragged into courts of justice. How easily, for instance, can an individual take out a patent resembling one granted to a citizen of Maine, and sell the same in the south-west part of the republic! An arrest of the infringer might be uncertain, and indemnification still more doubtful. The pirate, after selling out his rights to States, counties and towns, might easily pass over the borders of our territories and be safe. There are a great number of cases arising out of the patent law before the United States courts. How much will the number be increased when the eight hundred patents granted this year shall appear with their many interfering specifications? There will be a rich harvest for the lawyers; but how many honest mechanics and inventors will be ruined by the expense of litigation. Is there no remedy?

The remark of Mr. Jefferson, who, while Secretary of State, was one of the board of examiners of patents, is worthy of observation. In his letter to Mr. Cooper, on this subject, he writes, "instead of refusing a patent in the first instance, as the board was authorised to do, the patent now issues, of course, subject to be declared void on such principles as should be established by courts of law. The business, however, is but little analogous to their course of reading, since we might in vain turn over all the lubberly volumes of the law, to find a single ray which would light the path of the mechanic, or mathematician. It is more within the information of a board of academical professors, and a previous refusal of a patent would better guard our citizens against harassments by lawsuits. But England had given it to her judges, and the usual predominancy of her examples carried it to ours." I would respectfully suggest the following remedy: To vest in the head of the patent bureau, or some other tribunal, a discretion to arrest a pending application for a patent, if it interferes with any prior patent, or caveat on file, and also if the application is destitute of novelty.

If scientific men could be induced to take an office in the patent bur au, as examiners of patents, their examinations, aided by a suitable library, would detect almost every interference or want of novelty. Nor is it to be believed there will be any objection to appropriate the sum necessary to obtain a good library.

To show the importance of possessing the foreign works of art, on the subject of patents, I would remark, that in looking accidentally at a German work, a discovery was there found, delineated in a drawing, which has been patented in this country, and which is now selling as a new invention. A complete collection of prints and books, in reference to the patent law, would be highly useful to patentees, and citizens in general, as well as the courts of justice. Caveats in the United States, though frequently entered, give no protection to the inventor. The existence of the caveat can be attested as evidence of certain knowledge at the date of the same, but proof furnished from the patent office gives no additional weight to the testimony. In England a caveat protects the inventor from interference for a certain period, during which time, if any interfering application is made, the person who entered the caveat is notified. An exparte hearing is had before the Attorney or Solicitor General, who decides upon the case; if there is an interference, one of the applications is rejected.

I ought, however, to remark, that such in England is the danger of giving publicity to inventions before signing the patent, that caveats are kept secret. Indeed, so great is the anxiety to conceal from the public the discovery, that the letter of the invention is sometimes only lodged for a caveat, as for instance: "New improvements on steam engines," "spinning cotton," "navigating vessels," &c. Great importance is attached to the novelty of the invention; hence, when artists in the employment of an inventor have mentioned to a stranger the discovery, and that stranger has by dexterity set up a model of the same, even after application for a patent, and before signing it, the patent has been lost for want of novelty. Our courts have adopted a more liberal policy, and very justly decided that public experiments to test the value of the invention, do not destroy the right on the ground of publicity.

In conformity with the established decisions of this country, a caveat, if recognised by law, could be safely lodged on file, describing (as fully as possible) the whole invention, to protect the inventor against interfering applications. Our law also makes novelty a requisite for a good patent. Many have supposed the example of England and other foreign governments worthy of imitation by us. Patents in England are not confined to new discoveries there, but granted upon importation, or introduction of discoveries from abroad, and this is done upon the principle, that the arts will be benefitted by the encouragement afforded. On this point much might be said. When this system was adopted in England, communication with other countries was comparatively limited, and the improvements in the arts correspondingly low. But at the present time, such are the facilities of intercouse, and such the reading spirit of the people of the United States, that it is evidently better to confine patents here to new discoveries.

Scientific journals bring speedily to our shores every invention from abroad, and these inventions are introduced into immediate use, with barely the cost of manufacture. Who except the patentee would be benefitted by the issue of a patent for a foreign invention? thereby increasing the price at least thirty-three or fifty per cent. There would seem no occasion for offering further bounty to patentees. During the last sixty days, more than two hundred applications have been made for patents, a number greater than the average number issued annually in England for the last ten years.

I cannot omit noticing one thing more, viz: in the failure of the patentee to sustain his patent, if he claims more than is original, or presents a defective description. The description of the whole object, however limited the improvement, is a common error. The patentee knowing fully the extent of his own discovery, or improvement, ought certainly to specify the same with perspicuity. Cases will arise, however, where (in a large machine for instance) some small part described might not be new. Here a trifling error destroys the patent. While there is no sympathy for fraudulent patentees, who attempt to deceive the public by patented discoveries, there is some feeling for an honest mechanic, who, having published his patent, and believing it to be correct, is not only deprived of recovering any damages of the infringer, but obliged to pay cost to a defendant, who has enriched himself by the discovery of the plaintiff. In England an effort is making to prevent a total failure of action for partial defects, by authorising certain disclaimers to be put in a subsequent procedure to judgment. The principle upon which surrendry of invalid patents is permitted in this country, is an expeditious mode of correcting errors arising from "mistake," or "inadvertence." And if a discretion was allowed to the court, to tax or withhold costs in favor of the defendant, our practice would be more simple than the complex pleading which disclaimers must introduce. Such is the temptation to patent in this country, that it might be well to compel each patentee to publish his specification, or at least his specific claim.

We can scarcely eat, drink, sleep or work, without using some patent. Take for instance the farmer; he dares not use a plough without paying for the patent right, when, perhaps, the only new thing claimed in the specification of the patentee who offers this fine plough, is a simple *bolt*.—While cupidity induces patentees to connect their improvements with inventions of others, ostensibly claiming all as their own, it is certainly proper that the government should annex some penalty to such imposition. A judgment against the validity of the patent, is a suitable penalty. Should it appear objectionable to confer the power of arresting interfering applications on the head of the patent bureau, &c., the objection may perhaps be lessened, by referring the interference to three indifferent arbitrators, skilled in the art in question, and as the arbitrators might make an improper award, an appeal could be allowed to the Secretary of State, or other tribunal. The present mode of appointing arbitrators in interfering applications, is to allow each party o choose one, and the Secretary of State the third. This makes a court of strong bias, as each applicant generally selects a particular friend. I ought to add that, at present, there is no compensation allowed or paid to arbitrators. Each appelant might be required to pay a reasonable fee, to be fixed by law. Interferences will generally be found to arise from ignorance or fraudulent intent. Information will correct the former, while a rigid scrutiny will induce impostors to withdraw their pretensions. It should be recollected that the first applicant is not always the original inventor; those who pirate upon inventions are generally dexterous in securing their

patents as soon as possible. In such case, where the honest inventor has not been guilty of gross neglect, equivalent to a legal abandonment of his right, the superintendent might allow the patent to issue, and the rights of parties would be settled in a court of justice; these cases will, however, be of rare occurrence. Should the above remedy not be thought expedient, an entry on the patent issued that it was deemed an infringement, or was destitute of novelty, would, it is believed, go far to check improper issues, and caution the public against imposition. It has been supposed if a small part of the money received from patents was appropriated for the publication of all specifications of patents, or at least the claims under the specification, and the distribution of the same in different States, the money would be well spent. The public would then know what patents were issued, and be able to guard against spurious ones. Copies could also be easily procured without sending to the patent office, and the publication might be made with so much care as to justify the introduction of the published copies as prima facia evidence in courts of justice.

There is a common error in the assignment of patents; partial assignments for States, counties or towns, are not recognised by law; and still such a large amount of property is now held, in this manner, that it deserves consideration whether some provision should not be introduced to remedy the evil in future, and to protect past assignments. Few patentees seem to understand the law of assignment; the present law authorizes an assignment of the whole patent, or any individual part of the same, as one-half, one-third, one-fourth, &c. But the assignee must stand in the place of the original inventor, both as to right and responsibility. In the United States courts, where a plaintiff averred himself the assignee of the original inventor. with the exception of three counties in one State, a non-suit was ordered, because the plaintiff, by his own shewing, proved himself not to hold any legal right under the assignment. It is respectfully suggested, whether the time allowed for recording patants should not be limited. The same reasons for a limitation applies to transfers of patents as to transfers of real estate. It has been before remarked that the fee of thirty dollars is paid into the treasury. It often happens that this is the first step taken by the patentees. A farther examination satisfies the applicant that his patent could not be sustained, and he, of course, seeks to recover his money.—This, however, having passed into the treasury, cannot be paid without an application to congress; the sum is a small one; too much to lose, and yet hardly worth the trouble and expense of recovery.

Applicants often forward the thirty dollars directly to the superintendent, supposing that he is authorized to receive the money. As he is not permitted to do this, it becomes necessary for him to return the money, however distant, for the applicant himself to pay into the treasury. It is suggested whether the head of the patent bureau could not, (by giving bonds, if required,) receive and pay over this money directly into the treasury, and save the hazard and delay of remitting it to the patentee; and it is also suggested, whether there would be any danger in authorizing the treasury to repay such patent fees as should have been received into the treasury through mistake or ignorance, upon a petition approved by the superintendent of the patent office. In answer to the inquiry, what additional room is needed for the patent office, I would observe, that the building in which the patent office is now kept, was finished for the joint use of the post office and patent office. It is evidently too small for both. The post office department needs the whole building, while the rooms allowed to the patent office are entirely too small; the model rooms are full; several hundred models are stored away in the garret.—Those now received are piled up, waiting for better accommodations, and what shall be done with the thousand models to be received annually? While it becomes necessary to procure more room for the patent office, it is desirable that some should be rendered as secure as possible from fire. The destruction of the present models and records would produce very great embarrassment, especially as so many original patents and assignments are lost. It is a satisfaction to state that the patent office has not been, and need not be, onerous to the government. There now remains in the treasury about $150,000 to the credit of the patent office, after paying all expenses since its first organization. A part of this sum would furnish a commodious and permanent building: and should all the patents be so arranged, in systematic order, to show the progress of the arts in the country, it would be an exhibition highly gratifying, as well as instructive. The present limited room prevents such an arrangement. In answer to inquiry, what additional expense would be incurred by an exhibition of the models of machinery, and specimens of fabrics and other manufactures and works of art not patented? I reply, that the keeper of the models in the patent office could superintend this exhibition without any extra charge, and when rooms were constructing for patented models, additional rooms could be made for the recption of fabrics and models unpatented, with little expense.

It is believed that there are many inventors who would delight to exhibit their improvements in machinery and manufactures, if room was allowed them, while they do not desire to take out a patent; such a collection and exhibition would be a repository of national ingenuity, and might be made highly honorable to the country. Who could fail to be instructed by such an exhibition? And who that was about to invest in machinery, would not be amply compensated by visiting the patent office. The exclusion of foreigners from the benefits of the patent law cannot fail to be noticed as an exception to that reciprocity which this government has ever cherished. Citizens of the United States are daily taking out patents in France and England, and the subjects of those countries are greatly disappointed in being refused a similar privilege here. Congress has sanctioned the principle of granting patents to foreigners who apply to that body. Should foreigners be permitted to take out patents, and pay fees corresponding to those demanded of our citizens in their countries, it would not be inequitable. The following table will show the comparative charges in several countries for patents:

In Great Britain, or England, and colonies	122£		$542 21
Scotland	19		84 16
Spain	60	16s.	299 97
Ireland	137		607 77
France	46	10	206 66
Austria	43	06	196 68
United States of America	6	10	30 00

It would be desirable that all foreigners should be allowed to take out patents for a fixed sum, (perhaps one hundred dollars,) since it would be difficult in some cases to ascertain what the particular country to which the patentee might belong charged for the same. By the present law, foreigners residing here two years are allowed to take out patents on the same terms as citizens. There is an evident propriety in granting patents to those who declare their intention of becoming citizens. Why visiters for two years should enjoy any privileges over other foreigners does not readily appear. I now proceed to answer more definitely the remaining inquiry. How many persons are necessary for the prompt and efficient performance of all the duties connected with the office, and what should be the respective and particular duties.—Under the present organization two additional clerks are absolutely necessary.—This would give the following force: one superintendent, three clerks, one examiner, one draughtsman, one machinist, one messenger.

The duties might be distributed as follows:

The superintendent to conduct the correspondence; issue the papers for patents; and exercise a general supervision. Chief clerk to keep the accounts; compare records and transfers; index caveats; file the applications for patents, and transmit the same; and aid, if required, in the correspondence. Second clerk to transcribe on parchment the specifications. Third clerk to aid in transcribing specifications; and filling up patents, and recording the same; and recording letters. An examiner, who should compare, critically, every specification, drawing and model; ascertain its interference with pending applications. The duty will be very arduous, some specifications containing ten or twelve pages of closely written matter, with many references to drawings. In this duty the examiner might be assisted by a scientific draughtsman, whose labor in drawing could only occupy part of his time. A machinist is necessary to repair the models and keep them in order; to classify and arrange them; to exhibit them to strangers;

and to answer the many inquiries made respecting them by patentees and visiters.—The models are of much value, and the large rooms should have at least one person in attendance to protect the property. A few models have already been injured by visiters. What effect the new organization might have in reducing the number of patents cannot be determined. Some present duties would doubtless be lessened by the proposed alterations; others would arise; applications would require a very strict scrutiny to detect interferences with prior patents, or a want of novelty. To avoid the embarrassment from the delay in furnishing copies where the pay is specific, it is most respectfully submitted, whether it would not be advisable to authorize the head of the patent bureau to emply (if necessary) occasional assistance in transcribing said copies, reimbursing the whole expense from the fees received. This discretionary power would dispense with the appointment of another permanent clerk, and meet the sudden exigencies as they arise, without suspending the ordinary business of the office. I have omitted to mention that a few hundred dollars will be required to procure suitable tools for the machinist to repair the models.

I am, most respectfully, yours,

HENRY L. ELLSWORTH.

Hon. SECRETARY OF STATE.

APPLICATIONS OF CHEMISTRY TO THE USEFUL ARTS, BEING THE SUBSTANCE OF A COURSE OF LECTURES DELIVERED IN COLUMBIA COLLEGE, NEW-YORK, BY JAMES RENWICK, PROFESSOR OF NATURAL EXPERIMENTAL PHILOSOPHY AND CHEMISTRY.

V.

CARBON, HYDROGEN AND THEIR COMPOUNDS.

4. MANUFACTURE OF COKE.

AUTHORITIES.—KARSTEN. Metallurgie de Fer. DUMAS. Chimie appliquee aux Arts. BEAUMONT and DUFRENOY. Voyage Metallurgique.

Rationale.—Coke bears the same relation to bituminous coal, which charcoal does to wood, and is, like it, obtained by distillation at a red heat. Bituminous coal is a compound of carbon, hydrogen, and oxygen, in very various proportions. In the variety called cannel coal, the proportion of hydrogen amounts to 5½ per cent. in the Liverpool coal it is about 3¼ per cent., and in the slaty varieties does not exceed one per cent. The quantity of carbon varies from 75 per cent. in cannel coal, to 90 per cent. in that of Newcastle. The proportion of oxygen in cannel coal is about twice as great as would suffice to convert the hydrogen into water; in the Newcastle coal about four times as great; and in the slaty varieties, it but little exceeds the proper relation.

Coals may be divided into three varieties:

1. Those which contain at least three per cent. of hydrogen, and, at most, as much oxygen as will convert half the hydrogen into water.

2. Coals which contain oxygen in such quantity as to convert two-thirds of the hydrogen into water.

3. Coals which contain oxygen enough to convert the whole of the hydrogen into water.

The first of these varieties fuses when heated, and the excess of hydrogen uniting with a part of the carbon, escapes in the gaseous form; by the formation and escape of gas, the coke is rendered light and porous. The second variety fuses also, but the quantity of gas formed is not sufficient to render the coke porous, it is therefore compact and massive.

The third variety does not fuse, and the escape of the vapor of water reduces the mass to the form of powder.

Coal of the first class increases in volume when it is coked; the other two varieties yield coke in less volume than the coal employed. In their uses in the arts, the first furnishes the most valuable coke; the last that of least value.

Coke may be prepared in iron cylinders or retorts, but this is only done when the volatile products are to be collected; this method will therefore be described when we treat of the preparation of gas for illumination. Treated in this way, cannel coal yields about 50 per cent. of coke, and that of Newcastle as much as 80 per cent.

When the distillation is performed at a low temperature, the weight of coke is increased, but its volume and porosity are diminished. It is therefore advantageous, when the volatile matters are not the principal object, to effect the decomposition of the coal by a sudden and high heat.

Preparation.—When coal is rich in hydrogen, it may be readily coked in heaps resembling the *pits* used in preparing charcoal. The coal must be in pieces having not less than three or four inches in each dimension. The heaps are conical, having a base 15 feet in diameter, and a height of about 30 inches. The heap may be best covered with straw, on which is laid a layer of moist earth, the straw being so applied that the earth cannot enter into the spaces between the pieces of coal. But as the use of straw is expensive, it is more usual to cover the large coal for about the height of a foot from the ground with smaller pieces, and the outside with coal-dust; the top of the heap is covered with the refuse coke which is left in the form of powder, in handling that obtained in previous operations. The heap being finished, a few lighted coals are dropped into an opening of six or eight inches in depth left in the top; the space is then filled up with fragments of coal, and when the combustion has fairly commenced, the whole is covered with earth or refuse coke. The rest of the process is much the same as that of preparing charcoal, but is easier, as coal when in mass will not continue to burn after the gaseous matter has escaped, unless new surfaces be exposed to air.

In heaps of greater diameter and height than we have described, the combustion would be too slow at first to form a porous coke, and so rapid at the end as to render it difficult to extinguish. Yet so large is the quantity of coke which is required in some instances, and particularly in the manufacture of iron, that heaps of so small a size would be attended with inconvenience. The shape of the heap is therefore changed in such cases from a cone to a long prism. The breadth of this must not exceed 15 feet, nor its height 3 feet, but its length may be unlimited. This prism must be set on fire in the mode we have mentioned at several points on its upper edge. In this way not only may a greater quantity of coke be prepared at a single operation, but the time is shortened, the conical heaps requiring three or four days for their conversion into coke, while the prisms are finished in 24 hours.

The product is usually about 40 per cent., but some coals, that of Virginia for instance, yield 50 per cent. If a coal, in consequence of its containing but little hydrogen, does not burn freely, it cannot be converted into coke in this way. Such a coal was found in Yorkshire, (England,) in association with minerals which would render the manufacture of iron profitable. In order to apply it to this purpose, an intelligent manufacturer (Wilkinson) imagined the application of a chimney, for the purpose of obtaining a more powerful draught. This chimney is conical in form, about a yard in height, and as much diameter at bottom; the diameter at top is two feet; it is built of brick, the lower courses of which are laid in such manner as to leave openings. Around this chimney the coal is piled in a heap, whose radius is about 6 feet greater than the outer radius of the chimney. This heap is composed of alternate layers of large and small coal, the lowermost layer being of pieces of the largest size. The surface of the heap is covered with ashes or refuse coke, and fire is applied by throwing burning fuel into the chimney. Wet ashes are kept on hand to close any cracks which may occur in the cover of the heap. Dense smoke flows from the chimney, and is followed by a blue flame; as soon as this appears, the top of the chimney must be closed by a plate of cast iron and the combustion will speedily cease.

The coal of Pittsburgh, Pa., as far as we can learn, must resemble in quality the coal employed by Wilkinson, for although far removed in character from anthracite, it has not hitherto been converted into coke by the use of the mode first described. We cannot but express our belief that the method of Wilkinson would be found sufficient for the purpose and that by its aid the manufacture of iron from the ores might be introduced into that city, which at present receives almost all the pig iron used in its extensive foundries and forges, from the opposite side of the Alleghany range of mountains.

This method has also been introduced, with some modifications in Staffordshire, where the coal is of better quality. Here the coarser coal is placed in contact with the chimney, and the finer at the outside of the heap, the whole being covered with ashes or refuse coke, leaving a few openings for the admission of air. As soon as the coke is finished, water is poured on the heap to extinguish the combustion. In

this way the product of coke is raised from 40 to 50 per cent.

All the methods of which we have spoken require that the coal should be principally of that size which is of most value for other purposes, namely in coarse fragments. Much however of all good coal is reduced to dust in its extraction from the mines, and in the handling it must undergo. This, in most parts of England, is totally lost, and it has even been necessary to burn it in heaps in order to get rid of it.—In France, where coal is more scarce, and consequently of more value, it has become an important object, that none but such refuse coal should be converted into coke, and the coarser pieces left to be employed for other purposes. This object has been successfully accomplished in the neighborhood of St. Etienne.

The heap in which the coal is burnt may have the form either of a truncated cone or oblong truncated pyramid. The latter form is the most easily constructed, and described. A case of plank is formed, having the desired figure, say a base of 50 or 60 feet in length by 4 feet in breadth, a height of 3½ feet; and the planks are so inclined as to make the dimensions of the upper surface two feet less in each direction than that of the base.

The planks which form the ends of the case are each pierced with four holes: one at the base, one directly over it and near the top, the other two at half the height of the plank, and in the vertical plane of the upper edge of the sides. Each side is also pierced with three ranges of holes, having the same arrangement in quincunx as those of the ends, and at the same distances.

These holes serve for the introduction of tapering spars. The spars of the lowermost layer are passed through the holes in the sides and ends, at right angles to the respective direction of these surfaces, and at the angles where the spars meet each other, vertical spars are set up. The second range of spars is inclined to the sides in such manner as to meet the vertical spars; and the third layer has the same direction as the first.

The fine coal is prepared by mixing it into a paste with water, by means of a hoe. It is then thrown into the case, and well rammed upon the lower range of spars, until a bed has been formed to receive the second range of spars. This latter range being placed, more coal is thrown in and rammed, until the height of the third range of spars has been reached, and this being introduced, the rest of the case is filled in the same manner.

In order to lessen the expense of the wood employed, the heap may be built in successive portions, each ten or twelve feet in length, and when one portion has been finished, the planks and spars are removed to enclose and form passages in a second portion. The spars form conical passages in the mass, by which air may be admitted during the combustion. When the heap has thus been completed and covered with ashes and refuse coke, all the wood is removed, and the heap is set on fire by igniting small heaps of coarse coal upon each of the openings left in the upper surface by withdrawing the vertical spars. It has been found that in pyramidal heaps, about $\frac{1}{20}$ part of the coal to be coked is required for this purpose; but in small conical heaps, where a single vertical spar will suffice no more than $\frac{1}{40}$ will be used.

The attention of the workmen must be directed not only to close the cracks which may appear in the cover, but to keep the passages left by the spars open by means of iron rods. The completion of the process is known by the cessation of the flame. Water is then introduced into the lower passages, whose steam in passing through the incandescent heap is decomposed, and furnishes hydrogen which escapes in flame. The heap is then covered closely with earth, and left until it cools.

In this way coal which would otherwise be lost, yields 50 per cent. of coke of excellent quality.

When coal of the first variety (with the exception of cannel coal) is distilled in close vessels it yields from 70 to 80 per cent. of coke, by the combustion of about ten per cent. of coal. As the best of the methods we have yet described yields no more than 50 per cent., and the most common of them no more than 40, there is obviously a very great waste. In the neighborhood of coal mines this is more than compensated by the simplicity and facility of this process. But at a distance from mines a more economic process is necessary, unless coke can be transported from this vicinity, which is by no means easy, in consequence of its friable character, and its being liable to injury by being wet. The best apparatus for this purpose is called the coking oven. This is formed of a cylindrical wall about 2 feet in height surmounted by a dome, from the summit of which rises a chimney about 18 inches in height. In the circular wall is a door about 18 inches by 12 inches, having an iron shutter. The coal is introduced through the chimney, and spread by a rake over the floor, to an uniform depth of about 4 inches. Burning coals are then dropped through the chimney, and as soon as the ignition is fairly commenced the door is closed. When a blue flame begins to appear at the chimney, the top of it is closed by a plate of iron. In this method about one half more coke is obtained than by the ordinary heaps.

Large spheroidal kilns, and reverberatory furnaces have also been used, but their principal object was the preparation of the coal tar. As this article has not proved to be of any great value, and is besides produced at gas-works in quantities greater than can be consumed, it is unnecessary to describe these kilns and furnaces.

It may be here mentioned that turf or peat may be carbonised as well as coal or wood. The fuel thus produced is of very excellent quality, and may be applied to the same purposes as that obtained from wood or bituminous coal.—Pits as used in preparing charcoal have not been found well adapted to the preparation of the charcoal of turf. The little that has been made of good quality was prepared in iron cylinders, but as this is too expensive for manufacturing purposes, it appears probable that if it should ever be necessary to carbonise turf on a large scale it will be done in kilns like those described under the head of charcoal.

5. LAMP-BLACK.

AUTHORITY.—Encycolpedie Methodique.—Arts at Metiers.

Lamp-black derives its name from its having been originally obtained by collecting the soot of lamps. This method is still used in some cases. Linen wicks are immersed in linseed oil and lighted; the smoke is received in a copper vessel on which the soot is deposited. What is called ivory black was made at first by receiving the smoke of similar wicks upon plates of ivory.

At present lamp-black is manufactured on a large scale, by burning refuse resinous substances, or even from the soot of coal. When resinous matters are employed, they are placed in a kettle over a furnace, and free access of air is admitted over the mouth of the kettle. The resinous matter being heated fuses at first and finally takes fire, giving out a dense smoke. This smoke instead of being carried off by a chimney, enters a lofty circular chamber; the roof of which is conical with a single opening in the centre. From this roof a cone of sheet iron is suspended by a pulley, and nearly fills up the area of the chamber; this cone has also an opening in the centre. The interior of the chamber, and the lower surface of this cone are covered with coarse woollen coth or with sheep skins. Upon these the soot settles, and may, when the combustion is over, be separated by drawing the sheet iron cone up and down by means of the pulley.

Lamp-black is extensively used as a paint, and there are other forms of vegetable charcoal which are applied to the same purpose. Even common charcoal reduced to powder is sometimes so employed

Blue black is formed by burning the kernels of the peach in crucibles, to which the covers are carefully luted, with but one opening for the escape of the gas.

A very fine black is made by treating the twigs and tendrils of the vine in the same manner. The article called black chalk, and used in the manufacture of crayons, or for drawing, without preparation is the charcoal of a shrub (*fusain*) which grows in France.

The black used in Europe by engravers is made from a mixture of wine-lees, peach-pits, ivory and bone, calcined and ground to powder. It is prepared for use by making it into a paste with linseed oil.

6. ANIMAL CHARCOAL.

AUTHORITIY.—DUMAS, Chimie appliquee aux Arts.

History.—In the preceding section we

have mentioned the original mode in which ivory-black was prepared. For that method, the calcination of fragments of ivory in close vessels was substituted, and it was speedily found that an article little inferior was to be obtained from bones. Still, so long as the sole use to which either was applicable was in the art of painting, this observation was of little value. At the end of the last century, however, it was discovered that carbon, in any form, had the property of discharging the colors, taste and smell of liquid vegetable substances. Common charcoal was at first used for this purpose, but in 1811 it was discovered by a chemist in the south of France, that animal charcoal was much more powerful in its effects, and was capable of separating rapidly and certainly, vegetable coloring matter from any liquids whtasoever. Since that time the manufacture of animal charcoal has risen to great importance, and we shall hereafter have occasion to cite several important applications that have been made of it in the arts.

Preparation.—Animal charcoal is usually prepared from bones, and at the same time ammonia is obtained. We have had occasion to refer to this process under the head of that alkali. Some farther details are, however, necessary. The carbonisation of bones is performed in cast iron cylinders, similar to those used in the manufacture of nitric and muriatic acids. The tube which conveys off the volatile matter must be three inches in diameter, and connected with a series of three necked bottles.—The opposite end of the cylinder to that where the tube issues is closed by a dish, which has no opening in it. The bones are broken to pieces and freed from the fat by boiling. They are placed in the cylinders and kept at a red heat for thirty-six hours; at the end of this time they are taken out, and shut up in close vessels to prevent combustion, until the charcoal is cold. The charcoal is then stamped into coarse powder, and finally ground between millstones into fine meal.

If it is to be used as a paint, it is again ground with water, and then dried in earthen moulds. Another form of animal charcoal which was formerly lost, is that left in the preparation of Prussian blue. In this manufacture blood is calcined with potash, and the charcoal is obtained by washing off the alkali.

APPLICATION OF ANIMAL CHARCOAL TO THE DISCHARGE OF VEGETABLE COLORS.

The action of charcoal in discharging colors seems to be owing to the same cause as its power of condensing gasses; of one of which it takes up 90 times its own bulk. The action in this case is due to a mechanical attraction, and to this we may ascribe its powers of retaining the coloring matter of liquids filtered through it. Animal charcoal, upon this theory, owes its superior effect to its greater degree of division; this minute separation of its parts is evident from the fact, that the actual carbonaceous matter in calcined bones does not exceed ten per cent. and is yet sufficient to give its intense black color to the remaining mass of phosphate and carbonate of lime. In that obtained in the manufacture of Prussian blue the division is still more minute, as it is in fact a chemical precipitate from the blood employed, it has for this reason a still more powerful effect. In consequence of this divisibility a larger surface is provided by which the attraction may be exerted.

The liquids which best evince the powers of charcoal in discharging colors, are the solution of indigo in sulphuric acid and molasses. The relative powers of different forms of charcoal on these solutions are exhibited in the following table, the power of that obtained from bones, without further preparation being taken as the unit.

	Indigo.	Molasses.
1. Calcined bones,	1.00	1.00
2. Soot of vegetable oil fused with artificial phosphate of lime,	2.00	1.90
3. Calcined bones from which the phosphate of lime has been washed by muriatic acid,	1.87	1.60
4 Calcined bones again calcined with potash,	45.00	20.00
5. Albumen or Geatine calcined with potash,	35.00	15.50
6. Blood calcined with potash,	50.00	20.00

In order to render the above table useful it is to be stated that a given quantity of calcined bones will discolor the solution of one thousandth part of its weight of indigo, or nine times its weight of molasses. After producing this effect it will not act again until the coloring matter absorbed has been separated by calcining the charcoal a second time.

As an instance of the use of these substances in the arts, we may cite an article well known in our markets. The made wine, called Marseilles Madeira, is prepared from the common red wines of the south of France. Their deep color is discharged by filtering them through animal charcoal, and they are made up to the American palate by the addition of brandy. The peculiar smell and taste of the original wine is discharged at the same, and it is thus ready to receive such as may be given it artificially.

Animal has similar advantages over common charcoal in the rectification of spirituous liquors. By its use, all the peculiar and often offensive taste and smell of these liquors may be separated. We shall have occasion to treat of these uses of charcoal under their proper heads.

A carbonaceous substance, having powers in these respects about equal to calcined bones, has been prepared from a species of shale charged with bitumen, which is found in some geological formations, and particularly in the strata of coal fields. In the separation of the volatile matter the shale becomes extremely porous. It is therefore well adapted to the construction of filters, which may be made of slabs of the carbonised rock.

7. GAS-LIGHT.

Rationale.—Bodies which burn with flame must be either volatile, or capable of furnishing a gas when heated. Thus, phospherous and sulphur burst into flame, when their vapor escapes freely, and the vapor of alcohol is readily ignited. Any aeriform body whatsoever, if intensely heated, assumes the appearance of flame. In oleaginous, resinous, and bituminous substances, a red heat causes a decomposition, and new combination of their elements; these new combinations are both gaseous and volatile, are readily ignited, and in burning form flame. Thus in a common fire of bituminous coal, bitumen is first formed; this is again decomposed by the heat, yielding tar and gaseous carbeurts of hydrogen; the former yields vapor, which in mixture with the gas burns with flame. In a common lamp or candle, the wick composed of inflammable matter readily takes fire; the heat thus produced melts the tallow, when that is used; the liquid tallow, or oil, is drawn up by capillary attraction into the pores of the wick, and coming in contact with its ignited part, is decomposed and yields carburetted hydrogen; this is set on fire by the ignited wick, and flame is formed.

Gases do not become luminous, nor assume the appearance of flame, except at very high temperatures, far higher, indeed, than those at which solid bodies become luminous. If then, a gas, when heated in the act of combining with oxygen, so far as to become luminous, should deposite a solid body, or if the product of the combustion should have the solid form, the flame will be brilliant; but if the product of the combustion remain in the state of gas or vapor, the flame will give but little light.

Thus, when phosphorus is burnt, the whole product is solid, and the flame has the greatest brilliancy of any that is known; when heavy carburetted hydrogen, (olefiant gas) burns, a part of its carbon is deposited, which, disseminated through the flame in a solid form, gives it the lustre due to an intensely heated solid; but when hydrogen or alcohol are burnt, even by the aid of a stream of oxygen, which causes the greatest heat of any known combustion, the flame will have so little brilliancy as to be hardly visible in the bright light of day, because the products are aqueous vapor and carbonic acid gas.

Combustible bodies may not only be decomposed directly in a fire, or by the aid of wicks, but they may be heated in close vessels, and the gases which are evolved may be kept in proper reservoirs until needed for the purpose of illumination.—From these vessels they may be carried in pipes to the place where the light is needed, and inflamed by an ignited substance as they issue from beaks of some convenient form.

When combustible bodies, whose principal constituents are carbon and hydrogen, are decomposed by heat, these elements may be either wholly separated or may enter into new combinding. The products are therefore carbon in the solid form which remains in the apparatus where the decomposition is performed; hydrogen uncombined; light carburetted hydrogen, olefiant gas or heavy carburetted hydrogen;

liquid carburets of hydrogen; and tar. In the present case the resdiuum of carbon need not be spoken of, nor would we have any thing to add to what has been stated under the heads of Coke, and the several varieties of charcoal. Hydrogen has the smallest density of all known bodies, and in burning produces the most intense heat; but as the product of its combustion is aqueous vapor, and that extremely rare in consequence of being generated at a very elevated temperature, the flame has so little brilliancy as to be hardly visible in the light of the sun. Light carburetted hydrogen is a compound of one equivalent of carbon to two of hydrogen. The density of the compound is increased to eight times that of hydrogen, or the numbers which respectively represent these specific gravities are 1 and 8. In a close vessel it is not affected by a heat below one approaching to whiteness; but at a white heat or a little below, it is decomposed, and deposites its carbon. When burning freely, sufficient heat is generated to produce this decomposition, and the carbon deposited in the flame having the solid form, and therefore becoming more luminous than the hydrogen or the aqueous vapour which that gas forms, gives brilliancy to the flame. Light carburetted hydrogen is not absorbed by water to any appreciable extent.

Olefiant gas contains twice as much carbon as light carburetted hydrogen, and may be considered as a combination of one equivalent of each of its constituents; the volume of the hydrogen is reduced one half, and the density of the compound is fourteen. Even at a low red heat, olefiant gas begins to decompose, depositing half its carbon, and being thus converted into light carburetted hydrogen whose density is lessened in the relation of 8 to 14. At a full red heat it is completely decomposed. In burning therefore it deposites twice as much carbon from an equal weight of gas, furnishes a flame of equal size to that of twice its bulk of hydrogen, and which is far more brilliant, in consequence of the quantity of carbon deposited in the flame being twice as great.—Olefiant gas is therefore the most valuable of those generated by the decomposition of combustible bodies, and in the manufacture of them every exertion should be made to obtain it in the greatest quantities, which the nature of the material will admit, and to preserve it from waste after it is formed. The most obvious cause of waste is its having a greater degree of solubility in water, than the light carburetted hydrogen or pure hydrogen; water taking up one eighth of its own bulk.

Two liquid carburets of hydrogen were discovered by Faraday to exist in gas. These are very volatile, one of them boiling at 60 Fahr. and the other as low as the freezing point. Both of these may therefore exist in vapor at mean temperatures, and the latter under almost all circumstances. They both contain more carbon than olefiant gas, and therefore furnish a flame of greater brilliancy, but it may happen that all the carbon they deposite is not consumed, and thus, too great a proportion of them may take the form of smoke.

The vapors of these carburets agree with olefiant gas in one property, viz., they are decomposed by chlorine, rapidly and without the aid of light, while hydrogen, and light carburetted hydrogen, are condensed by it more slowly. As these vapors and olefiant gas are more valuable for illumination, the measure of the quantity of a given mixture which is condensed on the first application of chlorine, is the best of all tests for the value of gas intended for illumination.

Another liquid carburet, analogous to Naptha is likewise produced in the decomposition of coal. As this does not boil below 180°, but little of its vapor can be present at ordinary temperatures; but if present it produces a dense smoke, except in burners of the best form.

The tar need only be mentioned here in consequence of its being capable of decomposition by being returned to the apparatus, and thus of yielding the gaseous and volatile compounds just spoken of. In the laboratory, or under circumstances where the heat may be carefully regulated, the character of the products may be varied to a very great extent. From bituminous substances little else but tar may be obtained, and oleaginous substances will yield little but their own vapor, if the apparatus be not permitted to become red hot. If allowed to rise to a low red heat, olefiant gas, and the two volatile carburets will become the principal products; at a higher heat light carburetted hydrogen; and at a white heat uncombined hydrogen. In the successive stages of the process, the several substances will come over mixed in various proportions, and each in its turn will cease to appear.

In manufactories on the large scale, such nicety is impracticable, nor is it ever necessary. It is then sufficient to divide the matters which are used into two classes, each of which requires a peculiar management.

The first class comprizes those substances which do not decompose rapidly until the light carburetted hydrogen is formed. These must be subjected to a full red heat; for an attempt to obtain the more valuable compounds would be attended both with delay and a waste of the material. Still as some olefiant gas will be formed, no more water should be used in purifying them than is absolutely necessary to remove offensive matter.—Coal is a body of this class.

The second class comprizes those which may be decomposed with sufficient rapidity, at a temperature consistent with the existence of olefiant gas. These ought to be treated at the lowest temperature which will ensure the decomposition of their own vapor; one which merely gives a red glow to the surface of the iron vessel used in the process is sufficient for the purpose. To this class belong oils, and the solution of rosin in spirits of turpentine.

History.—The adaptation of a wick to oil or tallow, in order to obtain light by the decomposition of these substances, and the ignition of the gases and vapors they yield is among the oldest of human inventions. On the old continent neither tradition, written history, nor even mythological fable reach the epoch of its discovery.—Yet it must have been introduced prior to the separation of the races which peopled the two continents; for while in the ancient world there is no tribe so rude and savage as not to be acquainted with the use of the lamp, even the polished nations which occupied Mexico and Peru were ignorant of it. The only inhabitants of the Western hemisphere who used wicks were the Esquimaux, and if they be an ancient American race, they may have derived this information from Greenland, which was peopled at a remote era by a Norwegian colony.

The idea of separating the two processes which take place in the wick, effecting the decomposition at one time, and storing up the gases for use did not appear to have occurred to any one until the year 1785, when it was proposed by a French engineer of the name of Lebon. This was applied to the distillation of wood, and he endeavored to collect at the same time the pyrolignous acid which was evolved. It does not appear that this use of his invention was attended with any valuable result. In this country, however, about 30 years ago, the apparatus of Lebon was manufactured in Baltimore, and occasionally used for the distillation of bituminous coal. The retort employed was of the shape of a flower pot and made of iron; to this a cover was fitted by grinding, whence a pipe proceeded; and the pipe was usually divided into two branches each of which terminated in a burner. The retort being filled with coal was set in a common fire, and the gas ignited when it began to escape from the burner. In order to prevent the offensive smell of the gas from being apparent, the lights were kept beneath the chimney.

Previous to the year 1806 the factories of Watt and Bolton at Birmingham, and of Philips and Lea at Manchester were lighted by gas obtained from coal; and in the ten years succeeding, it was generally introduced into all the large manufactories of Great Britain. It was also occasionally used in smaller establishments, and in particular at Ackerman's in London, whose example had a powerful influence in bringing it into public notice. When first applied, no attempt was made to purify the gas, its use was therefore extremely offensive, and by no means wholesome. During the ten years of which we have spoken the character of the gases evolved in the decomposition of coal were chemically examined, and by the aid of science, the mode of separating every offensive substance, and most of those injurious to combustion discovered.

In 1815, some streets in London were lighted by coal gas distributed in pipes, and in 1816 the method became general in that city.

In 1817, Taylor and Martineau began the decomposition of oil, which, when properly treated, yields a gas of far greater illuminating power than is given by coal.

Previous to this time Mr. David Gordon, a gentleman for many years a resident of the United States, had proposed to render gas portable by condensing a number of atmospheres in strong metallic vessels. So long as no gas but that from coal could be obtained the method promised but little success. On the introduction of oil gas however, the plan was resumed and carried into successful operation. By this method, ships, steamboats, railroad and other carriages may be furnished with the beautiful and safe light given by oil gas; and if it was compelled to give way before the immense capital vested in coal gas manufactures in the British capital, there is little doubt that it might be applied to advantage in a new and open field; particularly in countries where coal bears as high a price as it does in most of our Atlantic cities.

The manufacture of gas from rosin as now usually conducted, was the invention of Professor Daniell of King's College, London. It has, however, been conducted on a large scale no where except in the city of New-York. Mr. Rembrant Peale was however, probably the first who prepared gas from this material, although he treated it in a different manner. The Museum in Philadelphia was lighted under his direction by gas prepared from rosin as long ago as 1814.

a. Coal Gas.

Rationale.—Bituminous coal is composed of carbon and hydrogen in variable proportions. It also contains sulphuret of iron, and according to some, oxygen and nitrogen. We are, however, rather inclined to ascribe the presence of the former partly to the water mechanically combined with the coal, and partly to atmospheric air which cannot be entirely excluded. The latter may also be accounted for, at least in part, by the presence of atmospheric air.

When bituminous coal is distilled at a red heat its elements enter new combinations, the greatest number of which are volatile, although the carbon which is left is greatest in quantity. The volatile products are partly gaseous and partly condensible. The condensible products are:

1. Water, arising from the moisture of the coal, or a new combination of its elements;
2. An oil of the character of Naptha;
3. Tar;
4. Sulphuret of carbon.

The gaseous products are:

1. Hydrogen, Light Carburetted Hydrogen, and olefiant gas, being new combinations of the elements of the coal;
2. Carbonic oxide, } arising from the
3. Carbonic acid, } combustion of the carbon of the coal in the atmospheric air which cannot be excluded;
4. Sulphuretted hydrogen, formed by an union of the sulphur of the sulphuret of iron with a part of the hydrogen of the coal;
5. Sulphurous acid formed by the sulphur of the sulphuret and atmospheric air;
6. Ammonia; the nitrogen of the air combined with hydrogen from the coal;
7. Nitrogen.

Of the condensible products so much of the oil as can be retained in the state of vapor is advantageous in the combustion, but is apt to be inconvenient and may be dangerous when it condenses in the pipes and burners. The sulphuret of carbon is luckily in small quantities, as it is condensible with difficulty. Of the gases; hydrogen and the carburets of hydrogen are the useful substances for illumination; carbonic oxide burns with a flame of little brilliancy, and is not injurious, although of little value. Carbonic and sulphurous acids, and ammonia do not burn; being also destructive of combustion they would lessen the heat, and therefore impair the brilliancy of the flame. Sulphuretted hydrogen burns, but has a most disagreeable smell, as have also sulphurous acid and ammonia. It is obvious therefore, that the vapors ought to be condensed, and all the gases except the hydrogen, its carburets, and the carbonic oxide separated.—Cooling in a proper refrigerator will effect the first object, and the condensed water will retain the ammonia, with some of the sulphurous acid and sulpuretted hydrogen. Lime has so great an affinity for carbonic acid that it may be employed to separate it, and the residue of the sulphurous acid and sulphuretted hydrogen, being soluble in water might be condensed by washing in that liquid, were it not for the loss thus caused of olifiant gas. In the course of practice it was however, discovered that lime has an attraction for sulphuretted hydrogen, and that its affinity for sulphurous acid is sufficient to cause that gas to be retained. The process of washing is therefore no longer considered absolutely necessary.

Manufacture.—Those coals which, in treating of coke, were arranged in the first class, are alone fit for the preparation of gas. Of these, cannel coal furnishes the largest quantity, and its product is richest in the most valuable gas, the olefiant. Any coal of this class, however, which can be obtained at a low price will answer the purpose. The decomposition was orginally effected in retorts, but is best performed in cylinders of cast iron. As it has been found that the front of the retorts resisted the fire for the longest time, and that the opposite end might be burnt away, while the first remained perfect, they are now usually formed of two pieces. These are united by screw-bolts, and their joint rendered tight by a cement formed of iron-filings sulphur and muriate of ammonia. The front of the cylinder is slightly bevelled, in order to receive an iron stopper.—This is held in its place by a screw adapted to the middle of an iron bar, which is fastened over the stopper. The pipe by which the volatile matter escapes, proceeds from the top of the cylinder near the stopper. Such a retort is represented in fig. 1.

a, Anterior portion of the retort;
b, Posterior do. do.;
c, Projection, built into the wall of the furnace;
d, Stopper;
e, Screw;
f, Pipe which carries off the gas.

Five such cylinders are usually arranged in one furnace, and the number of furnaces increased with the quantity of gas needed. The several furnaces communicate with a single large chimney, usually of a conical shape; and in some of the best establishments, a separate flue is carried up from each furnace, for a short distance within this cone.

In order to exclude atmospheric air, when any of the retorts are opened for charging and cleansing, and to prevent the reflux of the gas into the retorts where the decomposition is complete, the tubes which convey the gas are bent down into a common receiver, usually of a cylindrical shape and placed horizontally. This cylinder is about half full of water, into which the several tubes dip, each to the depth of an inch. The bend of the tube must be so high above the surface of this water as to prevent the pressure of the gas from forcing the water over it into the retort.

The condenser is formed of a series of cast iron pipes immersed in a cistern of water, which must be kept cool by constant renewal. The pipes must be laid in a sloping position, or communicate with a sloping pipe, in order that the condensed matter may run along them. At the lowest point in this series, a pipe proceeds downwards to a reservoir which receives the condensed substances. In order to prevent the entrance of air, the end of this pipe must be constantly immersed in water. The reservoir will receive by this pipe the tar, water charged with ammonia, with a part of the oil, and of the sulphuret of carbon.

(Concluded in our next.)

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ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

HUDSON AND DELAWARE RAILROAD.

NOTICE TO CONTRACTORS.

SEALED PROPOSALS will be received at the Office of the Hudson and Delaware Railroad Company, in the village of Newburgh, until the 10th day of October next, at 2 o'clock, P. M., for the Grading, Masonry, Bridging, &c., of their road from the west side of Chamber's Creek to Washingtonville, a distance of ten miles.

Plans, Profiles, Specifications, &c., will be in preparation, and exhibited ten days previous to the letting. JAS. B SARGENT, Engineer.

Newburgh, Aug 24, 1836. to10—35

NOTICE TO CONTRACTORS.

PROPOSALS for excavating and embanking the Georgia Railroad from the upper end of the work, now under contract, to Greensboro', a distance of 34 miles, will be received at the Engineer's Office, at Crawfordville, on the 21st and 22d days of October next.

—ALSO—

At the same time, for the Branch to Warrenton, 4 miles. And if prepared in season, the Branch to Athens, length 37 miles.

J. EDGAR THOMSON,
33—t22o Civil Engineer.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	$2\frac{1}{2}$	by	$\frac{5}{8}$,	15 ft in length,		weighing	$4\frac{68}{100}$	per ft.
280 "	2	"	$\frac{1}{2}$,	"	"	"	$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$	"	$\frac{1}{2}$,	"	"	"	$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$	"	$\frac{1}{4}$,	"	"	"	$1\frac{25}{100}$	"
90 "	1	"	$\frac{1}{4}$,	"	"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car Axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON,
28—tf Philadelphia, No. 4, South Front st.

OFFICE PONTCHARTRAIN, RAILROAD Co.
New Orleans, 19th May, 1836.

THE Board of Directors of this Company, will pay the sum of five hundred dollars to the inventor or projector, of a machine or plan to prevent the escape of sparks from the Chimney of Locomotive Engines, burning wood, and which shall be finally adopted for use of the Company. No further charge to be made for the right of the Company to use the same.

By order of the Board,
JNO. B. LEEFE, Secretary.

28—3m.

☞ THE NEWCASTLE MANUFACTURING COMPANY, incorporated by the State of Delaware, with a capital of 200,000 dollars, are prepared to execute in the first style and on liberal terms, at their extensive Finishing Shops and Foundries for Brass and Iron, situated in the town of Newcastle, Delaware, all orders for LOCOMOTIVE and other Steam Engines, and for CASTINGS of every description in Brass or Iron RAILROAD WORK of all kinds finished in the best manner, and at the shortest notice.

Orders to be addressed to
MR. EDWARD A. G. YOUNG,
feb 20—ytf Superintendent, Newcastle, Del.

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co.,
July 25th, 1836.

Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cut stone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unknown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.
E. H. GILL, Chief Engineer. 30—to10

NEW ARRANGEMENT.

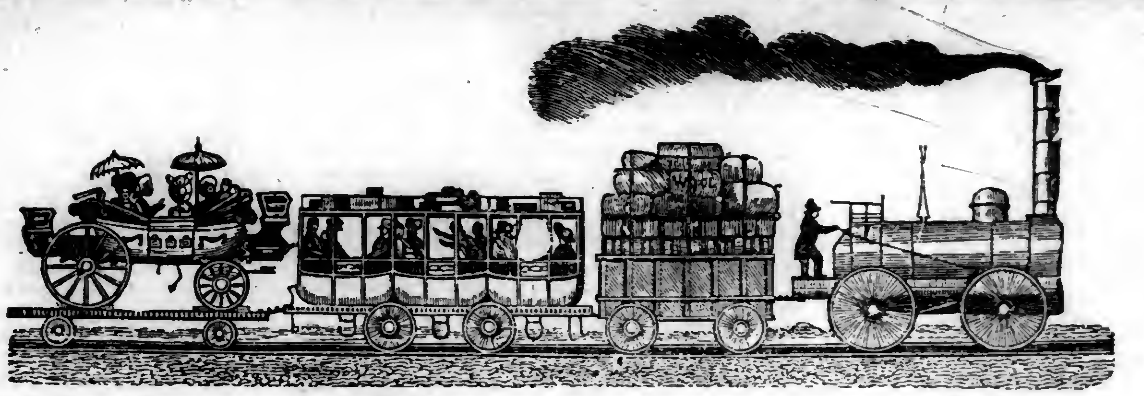
ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND,	GEORGE COLEMAN,
ROBT. C. FOLGER,	SYDNEY S. DURFEE

33—tf.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, OCTOBER 8, 1836. [VOLUME V.—No 40.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, OCTOBER 8, 1836.

The New-York and Erie Railroad Company have decided upon Dunkirk, as the terminating point of their road, upon Lake Erie.

ROTARY ENGINE.—AVERY'S PATENT.

This Engine has now been in successful operation for more than four years, and to use the significant expression of Dr. Jones, Editor of the Journal of the Franklin Institute, "it has not yet exhibited the *first symtoms of decline*"—but it has, we may truly say, convinced *many of the most determined unbelievers* in its usefulness and economy—and become almost a *universal favorite*—so *strong and general* are the convictions of its value, and so great and increasing are the demands for its use, that measures have been taken, to employ a large number of mechanics in its manufacture as soon as the necessary buildings and machinery can be prepared for the purpose.

A company has been formed and a location fixed upon at NEWBURGH on the Hudson river, about sixty miles from this city—and buildings sufficient to accommodate one hundred men will be erected this fall; in the meantime, however, the manufacture will be carried on in this city on a small scale.

IMPROVEMENTS OF THE ALLEGANY RIVER

The following circular only reached us on the 3d of October, and we are not therefore able to give it as early an insertion as could be desired; we will, however, endeavor to make the most of the time which remains.

The improvement of the Allegany river is now a matter of great importance to *this city*, and especially to the whole valley of the Mississippi.

The period is near at hand when the New-York and Erie Railroad will be in readiness for the transportation of merchandise from this city to the head waters of the Allegany river and to Lake Erie at all seasons of the year; and it is therefore important that such improvements should be made in the navigation of this river as will enable those merchants, residing on the waters flowing into the Mississippi, to avail themselves of the ea ly navigation of the Ohio river, direct from our own city. This can be done at a small expense when compared with its great importance; and we do not fear contradiction when we say it *will* be done and at no distant day—yet it is highly important that the proper measures should be devised, and therefore, that judicious men should be selected from *this city* and every county in this State at all interested in this important improvment.

This city especially should be ably represented—and the counties along the line of the Erie Railroad between here and Olean, Orange county, and the village of *Newburgh* especially should send delegates to the *Convention* to be held at *Olean*, on the 19th inst.,—as stated in the following circular—and we call upon, and would respectfully urge, all interested to do their duty to themselves and to the public.

"OLEAN, CATTARAUGUS COUNTY, September, 17, 1836.

To the Editors of the Railroad Journal:

"GENTLEMEN—Pursuant to a resolution adopted at a convention held at Warren, Pa., on the 6th instant, a General Convention of Delegates from the several counties in New-York and Pennsylvania interested in the improvement of the Allegany River, will be held at Olean on Thursday, the 19th of October next. The improvement of the River is a work of great importance to our Sta e. as well as those bordering upon the River, and through which it passes; and we doubt not that it can be improved in such a manner as to enable steamboats to ascend it as far as Olean, at a trifling expense, when compared with the benefits which would accrue to the country from such improvement. The New-York and Erie Railroad and Olean and Rochester Canal when completed will form a junction with the River at this point, and in connection with it, will complete a line of internal water communication from New-York to New-Orleans, opening a safe and expeditious channel for trade between the northern and southern States. We regard the project as being of a national character, and request your co-operation in the effort to procure appropriations from Congress for the purpose of prosecuting the proposed improvements. Meetings have already been held in several counties and delegates appointed to the convention to be held at this place. As it is desirable that every information should be collected which relates to the subject, and that all who are interested should give their opinions and assistance towards it, we invite the inhabitants of your county to take such measures immediately as shall be necessary to secure a representation therefrom in the proposed General Convention.

Respe tfully, your obedient servants,
FREDERICK S. MARTIN,
DAVID DAY,
BENJAMIN CHAMBERLAIN,
HENRY BRYAN,
HORACE JACOBS,
Corresponding Committee."

The following affords us a double gratification. We rejoice not only when the spirit of enterprise and improvement goes forth, but also when able and competent men are entrusted with the execution of such improvements.

We rejoice, to find that the people of Richland county, have secured the services of one of our most energetic engineers, Col. Bell.

MANSFIELD AND NEW-HAVEN RAILROAD.

We would call the attention of our readers to the fact that the preliminary surveys for this important road are now rapidly progressing, under the charge of Col. James H. Bell, the distinguished engineer of the Mad River and Lake Erie railroad; as far as it has progressed, the results of the survey, we are told, have proved highly satisfactory, even more so than had been at first anticipated.

The report and estimate of Col. Bell will be looked forward to with great anxiety by the citizens of this place and vicinity, to whom the completion of this road will afford those facilities for forwarding to the lake shore, at Sandusky city, that would make Mansfield the great focus, at which would centre an immense trade, and concentrate large capital. The agricultural products of Richland county are not probably surpassed, either in quantity or value, by those of any other county in the State; yet from its position in relation to its distance from the lake shore and the canal, there is no county upon which the tax for transportation falls so heavily.

The completion of this railroad, would, in connexion with the New-Haven and Monroevill railroad, the survey of which has just been completed, and the Monroeville and Sandusky city railroad, now almost finished, open at all seasons of the year an outlet to one of the finest harbors on Lake Erie.

That these reasons, should no other exist, are abundantly sufficient to prompt our citizens generally through the county, to interest themselves in forwarding this work, no reasonable man, we think, can doubt.—But there is another inducement, that should urge us on. It is the fear of losing that high station which Richland county has held among her neighbors. for her agricultural wealth, her activity and enterprise. Our neighbors all round us, are pushing onward with giant strides in the cause of internal improvement, by railroads and canals. Already has Huron county her two railroads nearly finished, terminating at Sandusky city. Seneca and Crawford counties, are reaping a benefit in the rapid advance in the price of their lands and agricultural products, by the energetic progress of the Mad River and Lake Erie railroad. Wayne and Lorain counties will rest not until their Black River canal is finished; and Knox county is concentrating all her energies in the construction of her canal down the Owl Creek. Let us not, then, be backward in this enterprise, but rouse ourselves as becomes us, and Richland county will not be the last in the contest.—[Richland Whig.]

We insert the following, more for the sake of showing the rivalry existing between the different railroads in England, than for any information or use in the testimony itself.

This evidence is brought by "the line without tunnels," against "the line with tunnels."

A very slight examination will serve to show the utter worthlessness of this evidence—many points being in absolute contradiction—such as the extreme heat, and extreme cold, testified to by the same physician. Many other parts are equally absurd.

To be sure, tunnels are to be avoided, from considerations of economy, of money and of time—but not from the reasons given below. Indeed, we cannot but remark, that in all the testimony on the subject of railroads, &c., before the House of Commons, there is constantly to be found a most puerile state of feeling and knowledge.

We would advise, most respectfully, that the next time such a subject is before them, that the House of Commons send for an American Engineer, instead of listening to the mass of nonsense usually offered.

From the New-York American.

DANGER TO HEALTH OF TUNNELS.

The following examination of Physicians before a Committee of the House of Commons, respecting the insalubrity of Tunnels, is curious at least. It must be borne in mind, however, that these examinations were elicited by a rival association.

BRIGHTON RAILROAD.—The proprietors of the railroad without a tunnel, have circulated the following "Medical reasons, independent of superior engineering and other grounds, for recommending the Brighton railroad without tunnels to the adoption of the public."

Extracted from the evidence of gentlemen, eminent in science and of great professional experience, given before the Committee of the House of Lords, on Tuesday, the 26th of July.

Sir Anthony Carlisle, Vice President of the College of Surgeons, &c., has been a public practitioner about 44 years.

"The difference of temperature in tunnels will expose persons in health to the common affection notoriously termed catching cold, the source of other disorders.—On persons of weak constitution, or who are invalids, passing through a tunnel will cause more striking and more remarkable effects.—Would not permit one of my patients to go to Brighton by a railway that had a tunnel in it.—Certainly would dissuade any patient from subjecting himself to such perils.—It is impossible to change the atmosphere in a tunnel six hundred yards long.—The air is a commixture, with other gaseous substances; it is also a damp air."

On cross examination—"The transition would endanger a person, even during the duration of one minute. I have known a person become erysipelitic from a minute's exposure to the air. I say that in the transit of only one minute he is in peril, and I would not so expose myself."

Re-examined—"Sulphuretted, carburetted, and carbonic gasses, would be emitted from the burning of coke; and the vapor of the steam would be condensing, and would keep the atmosphere damp, with effluvia of passengers, &c.; so that a quantity of stationary or stagnant air would remain impregnated with poisonous gases; it might be with scarlet fever, or the small pox." And "there must be a progressive accumulation of unwholesome or unsafe atmosphere within the tunnel.—I know a minute is quite sufficient to produce catarrh.—I would not send a person with diseased lungs through a tunnel.—It would be a great public benefit to have a railroad conveyance for invalids without a tunnel."

Dr. James Johnson, one of the physicians of his Majesty, of 18 years' practice.

"The difference of temperature in a tunnel (such as on Stephenson's line) would be upwards of 20 degrees.—Would not advise any person of delicate health to travel through it.—It would verp often be injurious, because we very seldom have a vicissitude equal to that in a whole day; and we know that the vicissitudes of temperature, and drought, and moisture, are the chief causes of pulmonary complaints, and many others, such as rheumatisms; and erysipelas is sometimes produced by it.—The reverberation would be tremendous with a locomotive engine, and give a very great shock to delicate people.—Would not send persons liable to affections in the heart or head through those tunnels.—Would not send a delicate lady by a railroad of this sort.—Nor a lady in a state of pregnancy; would advise her not to go by it.—There would be very considerable inconvenience from the heat of the engine, independently of any gas, or any deleterious atmosphere.—I think it impossible to alter the temperature."

Dr. A. Todd Thomson, another eminent physician, and high medical authority, Professor of Materia Medica to the London University, 35 years' practice.

"Thinks the change of temperature, in passing through the tunnels, would be extremely injurious to persons of susceptible habits, to dyspeptics, to convalescents from disease, to persons affected with pulmonary complaints.—Would not, as far as his influence extended, permit patients to go to Brighton by a tunnel railroad."

Dr. Augustus Sayer, a physician of 15 years' practice.

"For invalids, tunnel travelling would be decidedly prejudicial.—Would produce colds and rheumatic complaints."

John Propert, Esq., a general practitioner, in extensive practice nore than 20 years.

"The change of temperature in tunnels would be trying to all; but certainly more so to those who are susceptible, or to others suffering from any complaint.—The burning of coke, or coal, is very prejudicial to health generally; but more so when confined within the walls of a tunnel.—A tunnel never could be made perfectly clear of noxious air, arising from the passage of a steam carriage.—Should decidedly object to patients travelling through a tunnel.—The impression that might be made by half a minute, or a minute, might be equal in a debilitated constitution, to the effect produced in half an hour.—Has known instances of persons having caught so severe a cold from change of temperature, that they have lost their life.—Would prefer any way to that by tunnels."

Edward Clrv n Griffiths, in extensive general practice 24 years.

"Would not send invalids to travel by a railroad in which there were tunnels.—Went through one last year between Whitstable and Canterbury; and from experience, declares, it 'would be extremely dangerous to a person in delicate health.'—The cold was very severe, and affected the skin and eyes."

Other witnesses, medical gentlemen, Professors of Chemistry, &c., were present to

be called; but the foregoing was deemed sufficient.

For these very conclusive and irrefragable reasons against tunnels, on a road chiefly intended for passengers, it is humbly conceived that the report of their Lordships' Committee will be in favor of the line which is free from such cogent objections.

From the Morning (Montreal) Courier.

We have been favored with rather copious notes on the subject of the contemplated Railroad from Wellington Square, at the head of Lake Ontairo, to Goderich, on Lake Huron. This undertaking we introduced to the notice of our readers about twelve months ago; and since then, an Act of Incorporation has been obtained for it, from the Upper Canada Legislature. Our previous estimation of its advantages, every day only tends to increase and heighten, and amidst the several rival projects, with nearly the same ends in view, that have been started, this, in our conscientious belief, still maintains the supremacy. We are far enough removed from the scene of the projected undertaking, and its competitors, to be unbiassed by local or party considerations, in the opinions we may entertain o. any of them; and yet we are not placed at too great a distance to be uninfluenced by the success of one or all. Our immediat object, however, is to exhibit a view of the claims upon public support of the Wellington Square and Goderich Railroad, or, as it is designated in its charter, the Ontairo and Huron Railroad.

In estimating the value of any Railway project, the first consideration is to calculate the probable amount of business which will be done on the proposed route—to ascertain that the traffic on it will be sufficient to secure a reasonable profit on the capital expended in its construction, and cover all expenses for repairs. This once satisfactorily ascertained, the project loses its doubtful character; it then becomes rational, and promises to be as certainly profitable to its projectors and beneficial to the community as any thing in the womb of futurity can possibly be. On looking in this light, at the projected Ontairo and Huron Railroad, a superabundance of evidence presents itself, to satisfy the most sceptical that the traffic between the great inland seas it would connect is now immense, and doubtless, at no distant day will exceed all present calculation; and that were this railroad in operation, it would command, by its superiority in many respects to all other means of transport at present in existence between the proposed points, a very large proportion of this traffic. In saying, indeed, that this undertaking proposes to open a direct communication between the head of Lake Ontairo and Lake Huron, its value can be at once appreciated by all, who have watched the tide of commerce and population that is pouring to the *Far West*, and daily increasing in volume and velocity. The country bordering and beyond Lakes Huron and Michigan, which shall be brought within the immediate range of this Railroad, is famed for the fertility of its soil, and, according to estimation, could support a population of from twenty to thirty millions of souls. The only convenient route at present to this region, both for the thousands of emigrants from the eastern States, and for those from Europe, that are flocking to it, is by the Hudson and Erie Canal, Lake Erie, River Detroit, Lake St. Clair, &c.; and the enormous revenue of the canal, the crowded wharves of Buffalo, the number and capacity of the steamboats and other shipping on Lake Erie, all prove the vast amount of traffic between the Western States and Territories on the one side, and the Eastern States, Canada and Europe, on the other. Now, it cannot surely be doubted that the Ontairo and Huron Railroad, which, as we shall presently show, would be greatly superior in point of expedition, cheapness and safety to the extisting route, would engage a large share of business. We should deem it useless to dwell upon this point, did not the reasonableness of the undertaking entirely depend upon it; and hence the probability of its being executed, with advantage to the capitalist and to the country.

The project receives further support from the fact that two rival ones have been set on foot. It is proposed to construct a Railroad from Toronto to Lake Huron, or rather to Georgian Bay, with its shallows and islands, leading into that Lake; and also one from Dundas to Goderich, the very point at which the Road under consideration is to terminate. The Hamilton and Detroit Railway, likewise aims at securing a portion of the Western trade. Whatever may be the respective merits of these routes, and we may say more of them anon, their projection demonstrates the existence of a very general conviction, that a Railway between Huron and Ontario would be profitable, and that it would prove no visionary scheme.

Still regarding the Huron and Ontario Railroad merely as a means of transit between these Lakes, we shall now proceed to point out some of its astonishing advantages over the route by Buffalo. To reach any port on Lake Huron, say Goderich, from the Head of Lake Ontairo, by Buffalo, it is necessary to encounter the boisterous navigation of Lake Erie, the rapids of the River Detroit, the crooked channel and shallow waters of Lake St. Clair, and the river of the same name, and traverse a portion of Lake Huron—thus passing over a distance of not less than 450 miles. By the proposed road, the travelling distance would be reduced to 100 miles. It may be safely presumed, that these 100 miles could be traversed at a cheaper rate than the 450.

Again, the saving of time would be immense. Hours would suffice for what it now takes as many days to accomplish, even by the aid of steamboats. But in the transport of merchandize, the difference would be still greater. At present, a sail vessel from Oswego consumes on an average from eighteen to twenty-four days to reach a port on Lake Huron, as far in advance as Goderich. At this dilatory rate is the bulk of merchandize and agricultural produce transported between those Lakes. With the contemplated Railroad, however, in operation, and the substitution of steamboats for sailing vessels, on Lake Ontairo, the same point on Lake Huron could be reached in twenty-four hours, including an allowance of from four to five hours in the transhipment of goods.

That the Ontairo and Huron Railroad would attract from our neighbors a large share of the carrying trade, at present almost entirely monopolized by the Hudson and Erie Canal, cannot be doubted, not only in consequence of its superior advantages, but also in consequence of the . e ... us inconveniences experienced on the present route. At Buffalo harbor, for instance, the narrowness of the Lake, combined with the heavy current near the mouth of the harbor, constantly setting down the Niagara River, frequently causes a detention of from one to three weeks to sailing vessels, waiting for a fair wind. The navigation also of Lake Erie is frequently from four to five weeks later in being open, than on the other Lakes. So that merchants at Chicago, on the West and South shores of Lake Michigan, Saginaw Bay, Green Bay, or in the North-western States or Territories, could receive their goods by the projected Railroad, six or seven weeks earlier than at present, which circumstance would certainly induce them to give a preference to the new route.

The advantages of this road may be still further seen, by regarding the vast effect it, taken in connection with other improvements now in progress, would have in changing the direction of the intercourse between several of the greatest Commercial cities on this continent, and the North-western States and Territories. From New-York, for instance, to Goderich, and hence to any point on Lakes Erie or Michigan, the route and the time occupied in traversing it, would be as follows:—

New-York to Albany, say	150 miles	10 hours, by steamboat.
Albany to Utica, thence to Oswego, allowing 11 hours For detention,	170 do.	10 hours, by Railroad.
Oswego to Wellington Square at 12 miles per hour,	180 do.	15 hours, by steamboat.
Wellington Square to Goderich,	100 do.	6 hours by Railroad.
Miles,	600	41 hours.

The Railroad between Boston and Albany will bring the former into the same route as New-York, and should the contemplated Railroad between Lake Champlain and Ogdensburgh be constructed, it will be another feeder to the Ontairo and Huron Railway. It is almost unnecessary to remark, that when the improvements of the St. Lawrence are completed, the trade to and from the West, will be still more drawn in our direction, and in that of the Railway in question.

We have hitherto been regarding the proposed Ontairo and Huron Railway, in the sole light of an expeditious mode of communication between Lakes Ontario and Huron, and as a convenience which the inhabitants on their borders and emigrants from a distance, would very gladly avail themselves of. But, although in this view alone, the project could be not only justified, but holds out a most profitable in

vestment for capitalists; yet it is not the only one in which it ought to be examined, or in which alone it appears to good advantage. The Railroad will pass through one of the richest districts of Upper Canada, whose merchandize and surplus produce would be transported along it, and thus increase its revenues. To the landholders and farmers of the district within a short distance of the road, it would be of incalculable benefit. It would increase the value of their lands; it would, for instance, enable the farmer to convey his grain to market at a far less expense than at present. It is calculated that to take wheat to market either by sleighing or carting costs about 7½d. per bushel for a distance of 30 miles, when by Railroad, it could be conveyed the same distance for 1½d. In the case supposed an acre of land that produced 20 bushels of wheat would, in consequence of the facility of transport, become ten shillings of more value annually to its owner. A proportionate saving would be effected in every other case. In this view of the subject, we conceive that the Upper Canada Land Company, which possesses 1,100,000 acres of land in that quarter, and the other proprietors there, are deeply interested in the success of the undertaking, and ought most strenuously to exert themselves to secure its immediate completion.

Upon the whole then, whether we view the likelihood of this undertaking, when completed, intercepting a large portion of the transit trade between the Western and Eastern portions of this continent, or of its creating business for itself in the fertile district, which is now making rapid strides in population and wealth, where it will be located, the prospect is cheering—the conviction strengthens, that if any railroad ever paid the stockholders, this will.

We must bring these remarks to a close, without being able to give a comparative view of the advantages which the Ontairo and Huron Railroad, from Wellington Square to Goderich, possesses over the rival projects to which we have alluded.—We would add only one more observation, viz., that the proposed route is remarkably favorable to the construction of a Railroad.

From the New-York American.

NEW-YORK AND ERIE RAILROAD COMPANY.

From the forthcoming Report, made at the second annual meeting of the stockholders, on the 29th ultimo, by James G. King, President of the Company, which is to be published at their request, we are enabled to present the following summary outline, which we doubt not will be highly gratifying to the friends of this great National work.

1. *The route of the road* has been materially shortened and its grades improved, without adding to its estimated expense. The Directors have deemed it sound policy to revise with the utmost care, the survey of the road, to discover the best and cheapest line, believing it more advantageous to hasten the work during the next and the succeeding year after the surveys shall have been perfected, than to encounter the hazard of making mistakes by too precipitate selections of the route. The laborious examinations made by their Engineer Department, which has been greatly strengthened in numbers and talent during the present year, have already resulted in showing, 1st, that the grades of acclivity, especially in the counties of Chatauque and Allegany, and to a considerable degree also in Sullivan and Orange, may be very materially reduced and improved; and 2d, that the *tunnel* which had been thought necessary in passing the Shawangunk Ridge, and also the *inclined plane* at Lake Erie, (and which were in fact, the only constructions at all formidable as to expense, along the whole line,) may be altogether dispensed with. The length of the whole route from the Hudson river to Lake Erie, will probably be reduced from 483 miles, as first surveyed, to less than 440 miles,—and the expense of transportation, both in time and money, lessened in a still greater ratio.

2. *The cost of the road*, (including the necessary vehicles,) in the first annual report, (made last year,) was estimated at $5,474,000—to which the Directors, for greater caution, then added, for contingencies, $526,000—making the total of six millions. Of this sum, $2,817,000 was estimated for the grading, and $1,857,000 for superstructure.

To test the correctness of those estimates as to the grading, the Board, in November last, put under actual contract one of the most rugged and difficult sections along the whole route, embracing the 40 miles on the bank of the Delaware river, from the village of Deposit to the Callikoon creek. This portion of the line was selected, not only in order to subject the estimates to that severe trial, but because this section of the route being marked out by nature by the course of the river, admitted of no variation, and required no further survey. The expense of grading had been estimated at $366,000, but it was actually taken by 24 respectable contractors for $313,000. They are proceeding satisfactorily in performing these contracts, and have already done work to an amount exceeding $70,000.

Immediately after putting this section under contract, to wit, on the 5th of November, 1835, at sunrise, on the bank of the Delaware, opposite Deposit, the President of the Company, with a Committee of the Directors, actually commenced the great work, without ceremony or unnecessary parade, in the presence of a numerous assemblage of the citizens of that vicinity, who united heartily in the undertaking, and who then displayed, as the great body of their fellow-citizens have uniformly done throughout the whole line, the utmost zeal and spirit in promoting the progress of the enterprise.

3. *The cost of acquiring land* for the road bed, found to be so oppressive on most other works, (the right of way for the Utica and Schenectady Railroad having cost upwards of $4,500 per mile,) has been found to be trifling. The section of forty miles now under contract admitting of no variation as to route, in some instances passes over valuable flats on the margin of the river, and in others has disturbed buildings. Nevertheless, the proprietors almost unanimously have ceded the land *gratis*. In eleven instances, however, it became necessary to perfect legal proceedings to value the damages—and the aggregate amount, finally confirmed by the Vice Chancellor, has been less than $3600, or *ninety dollars* per mile. The Directors deem it probable that in the more easterly sections of the line near the Hudson River, where the land is more minutely subdivided, the expenditure on this account may be somewhat increased, but that even on these sections, they will be enabled by choosing between rival routes, to avoid any very extravagant demands.

4. *The financial condition* of the Company has been greatly improved. The principal difficulty which has ever been anticipated on this point, was—not the fear that the road when finished to the Lake would not be abundantly profitable—but the apprehension that the funds which could be raised by individual subscription would not be adequate to complete the whole undertaking without delay, and that in consequence thereof, the Stockholders might possibly be left with the work on their hands only partially accomplished. To guard against this contingency, and to lessen the amount necessary to be raised by subscription, it was therefore thought expedient to ask from the State a loan of three millions of dollars.

An application for aid to that extent was accordingly made to the Legislature at its last session, and with complete success. During the protracted and animated discussions which lasted nearly three months, the merits of the whole undertaking were most clearly vindicated and demonstrated, by the able arguments of the advocates of internal improvement in both branches of the Legislature, and to their efforts, the city of New York and the southern counties are deeply indebted.

The report of the President proceeds to advert to the services also rendered by his associate in the Board, *Samuel B. Ruggles*, (Comptroller of the Company,) "whose early attachment and constant adherence to this cause, were sufficiently known, but who, upon this occasion, at great personal sacrifice, was unremitting in his attendance at Albany, where he most successfully obviated the difficulties interposed, and imparted to the individual legislators such views of the importance, feasibility, value, nay, absolute necessity of the work, and the motives of the company in prosecuting the enterprise, as to remove the objections which had hitherto prevented their obtaining pecuniary aid from the State."

The details of the Loan Law passed April 23d, 1836, are calculated effectually to obviate the pecuniary difficulties above adverted to, and at the same time to expedite the progress of the work. It directs the issue to the company of $3,000,000 of the public stock of the State, irredeemable for twenty years, in the following convenient instalments, viz.:

$600,000 upon the completion of a single track from the Delaware and Hudson canal to the Chenango canal, 146 miles, estimated at $1,646,826.

$700,000 on like completion of 181 miles, from thence to Allegany river, estimated at $1,322,989.

$300,000 on like completion of 79 miles, from thence to Lake Erie, estimated at $640,547.

$400,000 on like completion of 77 miles, from Delaware and Hudson canal to the Hudson river, in Rockland county, estimated at $1,064,156, and

$1,000,000 when a double track shall have been completed the whole distance, the probable cost of which will be $1,857,000.

The sanction of the people of the State to this noble enterprize is thus most substantially evinced; and the benefits to flow from it are highly important to the stockholders, who will be required to advance so much less capital individually, and who will save in addition the difference of value between the rates of four and a half per cent. and seven per cent. per annum, for twenty years—equivalent to at least a million of dollars, to say nothing of the incalculable advantage to the State, to the southern counties, and particularly to the city of New York, of bringing into earlier use this long chain of communication with the great West, with all its dependent branches and tributaries.

It became necessary in obtaining this law, for the directors to make public the pledge early entered into between themselves to abstain from all individual interest in property along the line, so as to have no bias, beyond their duty to their stockholders

aid to the public, in making locations of the road; and it was also important to secure the services of the most competent engineers to aid them in the more speedy discharge of their duties, especially on Lake Erie, where rival claims seemed likely to arise.

The difficult and responsible duty of selecting the point where the road shall reach that inland sea, and at which place a flourishing and populous commercial city must speedily arise, has not been discharged without the greatest care and precaution. For the purpose of obtaining a minute and accurate survey of the coast and its harbors, the Board added to their corps of Engineers, Capt. *Andrew Talcott*, late in the service of the United States, and Professor *Courtenay*, of Pennsylvania—both combining all the requisites in character, intelligence and instruction, which the important functions committed to them demanded. Under their direction, the different harbors have been diligently and carefully sounded and measured, during the present season, and their maps of those surveys have been produced to the Board. Although the report in detail of those Engineers, which is daily expected, has not yet been received, yet from the verbal explanations of Captain *Talcott*, and recently confirmed most explicitly by Judge *Wright*, engineer in chief, the Board entertain no doubt but that the harbor of *Dunkirk* (on which the U. S. government has, for several successive years, expended considerable sums) is the proper point at which to approach the Lake.

The Company have also added to their professional force, another Engineer of eminent ability and practical experience, by the appointment of *Edwin F. Johnson*, Esq., to whom the Eastern Division of the line, extending from the Hudson river to Painted Post, in Steuben county, has been entrusted,—the remainder of the line, constituting the Western Division, being committed to Captain *Talcott*—both those gentlemen serving as Adjunct Engineers, while Judge Wright, as Engineer in Chief, continues his superintendance over the whole line.

The junction with the Hudson river, which the law loaning the three millions requires to be in Rockland county, has been fixed at *Tappan*, the only point in that county where the river could be advantageously reached. The spacious wharf, which the company are now building there, will be distant about 22 miles north from the public lands belonging to the city of New York, near Fort Gansevoort, at the foot of Twelfth street. It is proposed to petition the Common Council for a lease of those lands, to be used as a city depôt for merchandise destined for the interior, and for the supplies of provisions and other agricultural products to be brought to tide-water upon the road.

5. In addition to the pecuniary facilities afforded by the State loan, the Company ***have been still further strengthened in their resources by donations*** which have been voluntarily proffered to them by land owners along the route of the road.

The extent of these donations thus agreed to be made in aid of the present work, is without a parallel in the history of internal improvement; exceeding as they do in value at least ten fold the whole amount which was obtained by the State of New York during the period between the years 1812 and 1817, in which her public authorities solicited donations in aid of the Erie Canal.

The principal masses of property thus agreed to be given, consists of

1st. An equal fourth part of the whole town plot of Dunkirk, on Lake Erie; yielding to the company the equivalent of 5000 lots, and of which 169 in number have been recently sold for $128,000.

2nd. An equal fourth of the town plot on the Allegany river, laid out at the point of embarkation for the early spring merchandize destined for the Ohio and Mississippi vallies, yielding the equivalent of 4,500 city lots.

3rd. An equal eighth of the tract of 400,000 acres in the counties of Cattaraugus and Allegany, recently purchased of the Holland Land Company.

These donations, unsurpassed as they are in magnitude and value, are deemed to be highly important to the safety and success of the enterprise, in affording a basis for its support of adequate extent and stability. Their pecuniary value has been estimated to exceed two millions of dollars, and may even reach beyond that sum, in case the company shall retain any considerable portion of the property until they shall put the whole road in successful operation.

In addition to these grants, the proprietors of the lands at *Hinsdale*, a flourishing town in Cattaraugus County, possessing a valuable hydraulic power, and from which a branch railroad is contemplated to Buffalo,—at *Painted Post*, in Steuben County, an inland point destined to become of great commercial importance, as the place of exchange between the iron and coal districts of Pennsylvania and the salt and plaster counties of this State,—at *Owego* where the lateral road to Ithaca connects the main line with the Cayuga Lake,—and at *Binghamton*, *Deposit*, and other towns along the line,—have proffered voluntary conveyances of lands for the use of the Company, amounting in value to a very considerable sum.

At Tappan, on the Hudson River, the Company has also received a gratuitous conveyance of nearly 90 acres of land, consisting chiefly of water lots but capable of being easily filled in and profitably employed or disposed of.

It is also stated that associations of enterprising individuals are taking measures to improve other harbors on Lake Erie, within the county of Chautauque; and in case of success, so as to justify the construction of branches, they have given assurances of contributing to the enterprise, either by donations of land or by subscriptions to the stock.

The whole line of the road is represented as being pervaded by a healthful, active and liberal spirit of enterprise. The capitalists, whose attention has been drawn to this hitherto neglected portion of the State, have already begun to realise that in natural resources and the means of sustaining a numerous and prosperous population, it is not excelled by any other portion of our territory of equal extent. Its latent wealth may be expected to be still further unfolded, in the progress of the Geological survey now conducting under the authority of the State, while the rapid augmentation now taking place in its population and general prosperity, evinces the wisdom of the liberal measures of legislation which have found favor in our public councils.

It is also a consideration of no little importance, that this great channel of communication through this section of the State, is to be enriched and strengthened by numerous important branches, to all which the Board of Directors of the main line deem it their duty to extend any requisite facilities.

The report furthermore expresses the belief of the Board that it will not probably become necessary even to issue, in the whole, more than three millions of the stock of the Company, and certainly not until the whole road is ready for the superstructure, when, if it should be deemed expedient, the Company would avail itself of proposals from the iron masters of England to take stock in payment for the iron, either for the single or the double track.

The account of the Treasurer, *Peter G. Stuyvesant*, states the same received and expended by the Company up to September 29, 1836, the date of the report, and that the cash then in deposite was $85,251.

It further appears, that it will not be necessary, in order to meet the payments of the Company during the coming winter, to call in, previously to the month of April next, more than five dollars per share on the $2,150,000 of the stock now subscribed, and that even that call may be deferred in case it should be thought expedient to open the books for the balance of $850,000 required to complete the subscriptions to three millions.

In conclusion, the Directors declare to the Stockholders and the public, that their confidence, as well in the feasibility as in the productiveness and utility of this important avenue of trade and travel, not only remains undiminished, but has been vastly increased, during the present year; that the difficulties of the enterprize have been constantly diminishing, while, at the same time, its pecuniary resources have been steadily increasing; and that every motive of interest, as well as of public spirit and patriotism exists for persevering in the undertaking with unabated zeal, to its final completion.

RAILROAD MEETING.

At a large and respectable meeting of the inhabitants of the village of Goshen, convened at the house of John Baily in said village, on the evening of the 20th of Sept. 1836, the Hon. DAVID M. WESTCOTT was called to the chair, and Jesse Edsell and John J. Heard were appointed Secretaries.

The objects of this meeting as explained by gentlemen present, being to adopt measures to aid the Directors of the New-York and Erie Railroad company in obtaining sessions of the lands through which their road might finally be located; and also to appoint a committee to proffer, in behalf of the inhabitants of this village, to a committee from the Directors of the said company, who are expected shortly to visit this place for the purpose of determining upon the route of the said road, their good feelings towards them and their objects.

On motion of Mr. Bentor.

Resolved, That a committee of seven be appointed to draft resolutions expressive of the sense of the meeting as to the proper measures to be adopted to carry into effect the general views above stated.—Whereupon, Albert S. Benton, Esq., Hon. David M. Westcott, John J. Heard, Isaac R. Vanduzer, Esq., George M. Grier, Esq., Benjamin Gardner, and John I. Smith were appointed such committee.

On motion of Mr. Edsall, it was

Resolved, That a committee of six be appointed to obtain sessions from the owerns of lands on the contemplated route of the said road. Whereupon, Jesse Edsall, Hon. David M. Westcott, Henry Merriam, William N. Denton, John E. Phillips, Esq., and Gharles Monell, Esq., were appointed such committee.

The meeting then adjourned to convene at the same place, on Thursday evening next, to receive the report of their committee.

Thursday evening, Sept. 22d, 1836.

The citizens of the village convened pursuant to adjournment, and the meeting being organized.

Albert S. Benton, Esq., from the first above mentioned committee, reported the following resolutions, which after discussion, were unanimously adopted.

Resolved, That our confidence in the importance to this section of the State, of the New-York and Erie Railroad, remains undiminished; our anxiety for its early completion unabated, and our confidence in the zeal and integrity, of purpose of those having the charge and direction of this great work unimpaired.

Resolved, That we regret to learn, that with some, different sentiments are beginning to prevail, originating from a misapprehension of the causes which have thus far produced the delay, in locating the road through this section of the State; but we believe it extends to those only who do not sufficiently appreciate the care and accuracy of the various preliminary surveys, and examinations made necessary in the location of a work of such magnitude and importance, as the New-York and Erie Railroad, and the difficulty in obtaining amicable sessions of lands for the track of the same.

Resolved, That we consider it of the highest importance to the interest of this village and its vicinity, that sessions of lands upon the route surveyed in our neighborhood should be obtained previous to the expected visit of the Directors and Engineers of the company for the purpose of determining the location of the road through this county; and we have good reason to believe that if this preliminary difficulty be removed, the road will be located early in the next month.

Resolved, That we will use our utmost exertions in aid of the committee already appointed for that purpose, in ascertaining the extent of the difficulty above alluded to, and in obviating the same.

Resolved, That a committee of five be appointed to wait upon the Directors and Engineers of the company, on their arrival at this village or vicinity, and represent to them our local interests as connected with the location of the said road; and that committee have power to fill any vacancy therein. Whereupon, the Hon. David M. Westcott, Henry G. Wisner, Esq., John Baily, Isaac R. Vanduzer, Esq., and the Hon. Horace W. Elliot, were appointed.

Resolved, That the proceedings of this meeting be published in the papers printed in this village, and in the Railroad Journal

DAVID M WESTCOTT, Chairman.

JESSE EDSALL, } Secretaries.
JOHN J. HEARD, }

From the Pulaski Advocate.

A Meeting of the Commissioners of the WATERTOWN AND ROME RAILROAD, and of numerous citizens of the counties of Jefferson, Oswego, and Oneida, was held at the Court House, in the village of Pulaski, in the county of Oswego, on the 28th inst., for the purpose of receiving the Report of the Engineer selected to make a preliminary survey of the route for a Railroad from Watertown, Jefferson county, to the village of Rome, in the county of Oneida.

On motion of Isaac H. Bronson, Esq., the Hon. AVERY SKINNER was called to the Chair; and on motion of A. Z. McCarty, Esq., ROBERT LANSING, Esq., of Jefferson county, was appointed Secretary.

The Engineer, WILLIAM DEWEY, Esq., read a very interesting and succinct Report, detailing the progress and result of his explorations, and closing with a minute and accurate estimate of the cost of constructing the Road upon the route surveyed. The route was stated to be 76 miles, 45 chains in length—passing near or through the villages of Adams, Mansville, Washingtonville, Pulaski, Pineville, Williamstown, Camden, Vienna, and thence to Rome—the cost of the grading and superstructure for a single track was estimated at less than $6,500 per mile.

After the reading of the Report was closed, on motion of Isaac H. Bronson, Esq., it was unanimously accepted, and the Commissioners of the Railroad were requested to cause it to be immediately published.

A committee, appointed to draft resolutions expressive of the sense of the meeting, reported the following, which was unanimously adopted.

Resolved, That from the Report now presented by Mr. Dewey, as well as from previously ascertained facts, the feasibility and practicability of a Railroad from Watertown to Rome is demonstrated beyond question; and that we are well persuaded that no route, of the same distance can be found where a Railroad can be so easily and cheaply constructed; and that, in view of the immense advantages which will result to this section of country, from the construction of this Road, it becomes the citizens of this region to make the most persevering and energetic efforts for the accomplishment of this object.

Resolved, That we consider the time not far distant when this road will constitute an important link in an extensive line of internal communication extending from the city of New-York, across Upper Canada, to Lake Huron.

Resolved, That the thanks of this meeting be presented to WILLIAM DEWEY, Esq., Civil Engineer, of the city of New-York, under whose direction the survey for the route of this road has been made, for the very able and accurate Report he has presented; and, showing as his calculations and estimates most conclusively do, the practicability of the work, at a cost far below the most favorable expectations hitherto indulged, the thanks of all persons interested in the proposed improvement, are eminently due to him, for the energy and perseverance with which he has conducted the survey and investigation to a triumphant conclusion.

Resolved That the Commissioners of the road be requested to appoint a committee of three persons, in each town, through which the route passes, to exert themselves particularly in inducing the people to subscribe to the stock of the Railroad: and to cause such other measures to be taken as they may deem expedient; and that they be requested to address to the inhabitants generally, a circular upon the subject.

Resolved That Orville Hungerford, William Smith, and George C. Sherman, Esqrs., be requested to settle the accounts of the Engineer, and to receive from him the report, estimates, and profiles of his survey.

Resolved, That the several papers in the counties of Jefferson, Oswego, and Oneida, and the Albany Argus, and such others as may be interested in the works of Internal Improvement, be requested to publish the proceedings of this meeting.

AVERY SKINNER, Chairman.

ROBERT LANSING, Secretary.

RECEIPTS ON THE RAILROADS.—The amount received for freight on the main line of the Baltimore and Ohio Railroad during the month of August last exceeded the receipt in August of the preceding year $1-422 50—a gratifying evidence that the reduction of the tolls on the Chesapeake and Ohio Canal, while it has lessened the income of that important work, has ceased to produce the effect which, it appears, was principally intended.

The whole receipts in August on the main line of the railroad, were as follows—

For passengers, - - -	12,008.28
Freight, - - - -	12,294.43
	24,302.71
Proportion of receipts for the first eight miles from Baltimore to Washington, - - -	2,735.00
Total receipts for August, 1836,	$27.037.71
Receipts for August, 1835,	23,200.23
Increase during the year - -	$3,837.48

The gross receipts on the Washington Branch of the road, in August last, were $15,894.14.

The gross receipts on the Utica and Schenectady Railroad in August last, for travelling alone, amounted to $43 676.91. —[Balt. Gaz.]

AMERICAN INSTITUTE.—The American Institute held its annual Fair at Castle Garden, in New-York, last week. A large number of premiums were awarded, among which we notice one to Messrs. Leggett & Russell, of this city, for the best fur caps. Messrs. Leggett & Russell are two enterprising young gentlemen, and we are glad to learn that they have been able to bear away the prize so successfully.—[Troy paper.]

We desire to correct a mistake into which the Troy people seem to have fallen. It was not the American Institute, but the Mechanics' Institute, which held a fair recently at Castle Garden.

The fair of the American Institute will open on the 17th proximo, when we hope to see our neighbors of Troy again in the field. From what we have heard, we expect a most brilliant affair, quite superior to that of any previous year.

THE IMPORTANCE OF RAILROADS.

The importance and utility of Railroads to this nation was never more strikingly manifested than in the ease and rapidity with which ONE THOUSAND TROOPS, the *elite* of the Soldiers of Baltimore, were transported to Washington on the anniversary of the battle of North Point.—There can scarcely exist a doubt that if the Railroad to Washington had been completed during the late War with Great Britain, the unfortunate and disastrous occurrence at Bladensburg, and in the Capital would never have taken place. The facilities afforded by the Railroad could at a moments warning have poured upon the enemy the whole male population of Baltimore, and knowing this fact the enemy would not have dared to send his vandal legions to burn the peaceful temples consecrated to liberty. Five times the cost of the Railroad would have been saved to the Nation in actual money, and how much more in honor may be imagined from the bitter pangs of regret expressed by every American when the humiliating subject is mentioned.

We have obtained for publication the following letter from the Major General, which demonstrates the utility and importance of Railroads, and it is high time that every individual should now fully appreciate their inestimable value to the country.

Baltimore, Sept. 13th, 1836.

SIR—On the part of the First Light Division, I beg leave to return thanks for the very handsome manner in which the Baltimore and Ohio Railroad Company carried from 900 to 1000 men, with some Artillery, Guns and Horses to be transported yesterday from Baltimore to Washington and back again in the same evening with great safety, punctuality, ease and comfort.

The experiment was a *bold one*, but proved completely successful, and whilst it illustrates the great capacity of the road for rapid transportation of troops, I must beg leave to say that nothing could exceed the energy, skill and obligingness with which the whole movement was directed and executed by the *Agents* of the Company. I would especially mention Captain FITZHUGH and Mr. WOODSIDE, (though it appeared to me that all were equally ambitious to do their duty) but as you sir *were present*, giving your kind attention when it was required, I will say no more than that we all feel greatly indebted to the Company for the liberal arrangements made for our comfort, and equally indebted to yourself as well as the two gentlemen I have named and the other Agents of the Company who were employed in this special duty.

With great respect,
Your obd't serv't,
G. H. STEWART.

Col. WILLIAM STEWART, President pro. tem. of the Baltimore and Ohio Railroad Company.

IMPORTANT INVENTION TO RAILROADS.

The sparks emitted from the chimneys of locomotives on Railroads, have occasioned accidents by fire to merchandize and baggage, and have rendered Railroad travelling disagreeable to passengers, particularly to ladies; and Railroad Companies have expended larger sums to prevent those accidents and inconveniences, than the losses, which are considerable, that they have incurred by accident from fire.

Persons of the first mechanical talents in Europe and in the United States, have exerted themselves for some years past, to discover a mode by which the emission of sparks and burning fragments would be prevented, and at the same time to allow a sufficient action of air through the furnace to keep up the requisite supply of steam; hundreds of plans were tried, with a failure of the object, except in two or three instances the evil was in a small measure ameliorated, and those, from the lack of better, are now in use on several Railroads in other States; but to attain, if possible, a perfect preventation of the evil, the Pontchartrain Railroad Company offered a premium of five hundred dollars for such discovery, and the honor of the invention was reserved for Louisiana. Soon after the offer of the premium was published, numerous models were exhibited of much ingenuity; and the drawings of descriptions served to prove, that the theoretical and practical knowledge of mechanics possessed by many persons in New-Orleans, would do honor to any country. The Fulton locomotive was placed by the Company at the disposal of the competitors, and was used for no other purpose during the summer: several of the attempts succeded, peahaps as well as those now used at the north; but it was not until about ten days since, that the desideratum was attained, by Mr. H. TURNER, engineer of this city.

On Saturday evening last, the board of directors assembled for the purpose, and the Fulton locomotive was placed for trial at the head of a train of freight and passage cars, with a car reserved for the directors in the rear, without a cover; the trial proved successful; and during the time the train passed from the Lake to the Mississippi, not twenty sparks could be discerned escaping from the chimney of the locomotive, and those scarcely visible for an instant. The invention of Mr. Turner is viewed with the more pleasure, as it was found also to prevent those sooty particles escaping, which are nearly as injurious to clothing as the sparks.

The visitors to Lake Pontchartrain, who have heretofore been annoyed by a continued shower of sparks from the locomotives, while in the cars of the Railroad, and witnessing the frequent injury the owners of hats, coats or handsome dresses sustained, will hereafter have an opportunity to enjoy the cool breeze of the morning or evening, in the agreeable and attractive excursion to the shores of the Lakes, without the annoyance of soot or sparks, which has in many instances, no doubt, deterred many from partaking in the pleasures and enjoyments that a trip to the Lake affords, by its relaxation from the bustle and business cares incident to a city life.—[New-Orleans Bee.]

The London and Gore Railroad is progressing, and, so far, very satisfactorily.—The route has been surveyed by Mr. JOHNSTON, of Rochester, from Hamilton to near Chatham, and the results have exceeded the most sanguine expectations; it being found to be most admirably adapted for a Railroad. The high ground at the back of Hamilton will be ascended without the aid of any stationary engine, and, in fact, no power of this kind will be required throughout the whole route.

Amidst the rival Railroad schemes in the Western portions of Upper Canada, it would be not less difficult than invidious, to assign to one the pre-eminence over the rest, did not the variety of their location enable each to claim for itself peculiar advantages. But, if the question were, which of the projected lines of Railroad in Upper Canada would form the shortest and most direct means of communication between Lake Ontario and Lakes Huron and Michigan, the answer would undoubtedly be, the Wellington Square and Goderich Railroad.

The London and Gore Railroad will terminate at a point nearly opposite Detroit, between which and the head of Lake Michigan, a similar means of communication is about being established. The circumstance of these two roads traversing, the most fertile regions, and being in a direct line with each other, would inevitably tend to increase the traffic on both.—[Montreal Morning Courier.]

EXHIBITION OF DAHLIAS.—The unpropitious weather of yesterday prevented many from attending the exhibition—still open, however—at the *New-York Lyceum*, in Broadway, near Prince street, which the New-York Horticultural Society present this year to their fellow citizens.

A hurried visit by one who himself understands the arts and the delights of horticulture, enabled him to furnish for publication the following memoranda.

The tables, exceeding 200 feet in length, were literally covered with these brilliant flowers, arranged in six lines, and constituting, as will readily be imagined, a most splendid *coup d'œil*, embracing probably as many varieties as our country possesses. It was remarked, and the fact is exceedingly encouraging to our horticulturists, that the *seedlings* were uniformly superior to the best foreign flowers.

Among the most striking specimens were those contributed by

William Russell, three superb seedlings.

William Reid, six fine seedlings, one of which the *American*.

Levit Howe, a beautiful seedling Salmon delicately tinged with yellow.

John Morgan, fine seedlings.

Alexander Walsh, Lansingburgh, the *Daniel Webster*, a beautiful seedling.

Andrew Hyslop, fine seedlings.

Messrs. Hogg, very superior foreign Dahlias, Rose d'amour, Lady Hardwick, &c.

Noe and Ball, fine foreign Dahlias, Empress Josephine, Amanda, &c.

Mr. W. Clinchy, foreign, Bride of Abydos, &c.

Messrs. Thorburn and Neal, always great in the flower mart, presented many splendid Dahlias.

Mr. Knevell, Newburgh, Rose Apple, and a fine basket of Strawberries.

Mr. Wm. Rae, Newburgh, a plate of

double yellow Plums, and three fine sample Grapes.

Mr. C. Ludlow, Newburgh, superior Sickle and Vergaloo Pears.

Dr Cockroft, New-York, fine specimens Roman Apricot.

A *Sago Palm*, in flower, attracted general notice and admiration.—[American.]

The works of the iron railroad from Paris to Saint Germain are going on with great activity throughout the whole line. Notwithstanding that many laborers are occupied by the harvest, upwards of 500 men are employed in the tunnel at Paris, and on the embankment at the Batignolles.—At the hour of dinner every public-house at the Barriere de Monceaux is completely filled with them, and it would be impossible to count the number of persons who go daily out of curiosity to see the waggons running along the temporary railway. In 1815 there were only three houses at the Batignolles, and now the population amounts to 12,000 souls. This place is more populous than 38 out of the 86 chief towns of the departments.

Suger Refinery at East-Boston.—This establishment was incorporated a few years since with a capital of $150,000, which has since been increased to $250,000. It is located near the Ferry landing, and the building is one of the largest and best constructed in this part of the country. It is 135 feet in length, and 75 feet in width, and is eight stories high—including the basement, nine floors are occupied. The foundation rests on a bed of clay fifty feet thick, and is fifteen feet below the surface, the walls in the lower story are three feet thick of solid brick; this thickness gradually decreases towards the upper part of the building, where it is only twenty inches. As it is at times convenient to have large quantities of sugar deposited in some of their upper apartments of the building, it is proper it should be constructed in the most faithful manner—accordingly, the beams, post and woodwork generally, are of the best materials, and well calculated for strength and durability.

The works have been in partial operation for upwards of a year—and the quantity of raw sugar which is refined at the present time, amounts to about 40 boxes Cuba, daily, or upwards of eight tons. To do this, only about 40 laborers are employed, the greater part of the work being executed by steam power, which causes an enormous reduction of manual labor. The sugar boilers are put in operation by steam; the rooms are warmed by steam in winter; the ovens for the purpose of drying the leaves, are heated by steam; the water is furnished to every room in any desired quantity, by steam; the raw materials are all taken into the building by steam, and by steam transported from one apartment to another.

The sugar which is principally used for refining, is the brown Havana and Manilla, and the quality of the refined sugar manufactured at this establishment is said to be equal to any which is made in this country—and is in great demand—nearly all of it being sold for consumption in this vicinity. The company was fortunate to secure the services of Charles W. Woolsey, the superintendent of this establishment.

We understand that it is in contemplation to increase the business of this establishment to its full extent—when it is probable that about sixteen tons of brown Havana or Manilla sugar, will be transformed into superior loaf sugar, daily, or about 5000 tons per annum.—[Boston Mer. Journal.]

Bituminous Coal.—An inexhaustible bank of Bituminous coal has been discovered in Calhoun county, Illinois, about ten miles above the mouth of Illinois river. The Coal is said to be equal to the coal on the Ohio and Monongahela, and it is supposed that in another season St. Louis can be supplied with the article at six to eight cents per bushel. Heretofore it has been from 20 to 25 cents per bushel in that city, having to be brought about 8 miles in wagons.

Discovery has also been made of a coal bank on the Kentucky river, above Frankfort. It is also bituminous, of superior quality. The discoverer, it is said, will enrich himself, by having purchased for a trifle the fee of all the coal he might find on the tract, previous to making his discovery known.—[Buffalo Daily Com. Adv.]

The city of Conception and the port of Talcuahana.—We are informed by a gentleman who left Talcuahana, (the port on the Chilian coast, into which many of our vessels repair for recruits) about four months since, that the inhabitants of that country are rapidly getting over the effects of the great earthquake experienced by them about two years ago. The city of Conception is being rebuilt upon the old site—most of its streets are cleared of the ruins, and both there and at Talcuahana, the buildings which are being erected are of much better material, more firmly built, and greatly improved in other respects from the old style of architecture. Slight shocks of earthquakes are of almost every day occurrence, and some have been recently felt there of uncommon severity—but the inhabitants say they have done little or no damage because there were nothing to shake down save the new buildings, and these they believe to be earthquake proof.

Our informant has shown us two or three petrified round-clams, or *quahaugs*, which he says were taken from the inside of one of the highest mountains in that country—a mountain whose top was opened and turned off by the great earthquake. These petrified fish were found in the middle of the mountain, with a deal of other substances of a similar character, several miles from the sea, and hundreds of feet above water level. They lead to much interesting speculation in relation to the causes which placed them there and are matter of deep interests to the curious.

Talcuahana, which is the port of the city of Conception, has long been a valuable harbor for whalemen in the Pacific, and its speedy recovery cannot but be a subject of solicitude with the merchants and others engaged in gathering the products of that ocean.—[N. Bedford Gaz.]

The collection of Mr. Burton, jun., of Egyptian antiquities is now on view at Messrs. Sotheby's previously to sale. This collection, though, as a whole, not able to compete with the collection of the late Mr. Salt, or with that of Mr. Sams, is very curious, and contains some specimens of a rare character. Amonst them is an almost unique relic consisting of a basket containing a shirt, a curious specimen of the linen of the age in which it was fabricated; it was found in a tomb at Thebes. Amongst the objects in wood are several very curious painters' pallets; one of them is 16½ inches in length; it has two places for colors, with an inscription in hieroglyphics, containing the name of the scribe Phathmes. The sistrum, or musical instrument, used in the religious ceremonies and processions of the ancient Egyptians, is also in the collection. It is said that this is the most perfect specimen in existence. A very rare specimen of primeval animal and vegetable substances is "a prepared feast," emblematic of the profession of a deceased person, found in a private tomb at Thebes. It consists of two ducks, or water fowl, upon the original stand, composed of cane and papyrus plant, together with cakes made of corn, doom-apples, dates, etc. A tripod lamp of a less early age, from a ruined convent in the Western Desert, is singularly beautiful in its construction, though hardly to be called Egyptian. An almost complete collection of carpenter's tools, of great antiquity, is also worthy of inspection The collection is not very rich in signs, signets, scarabæi, and idolets, but it contains a few specimens of great beauty. It is, however, rich, in Coptic and other manuscripts.—[Times]

M. Arago, on Wednesday, in delivering a lecture on the theory of the central heat of the earth, related an operation at this time carrying on in Paris, which may be of the highest importance not only to science but to public economy. The municipality have ordered an Artesian well to be pierced near the Barriere des Martyrs; but the men employed, after getting to a depth of 900 feet without finding water, came to a stratum of chalk, so thick that the undertaking would have been given up, but for the interference of men of science, who wished it to be continued with a view to the above theory. According to observations made by means of a thermometer, *a maxima*, no doubt remains as to a fact, which hitherto it has not been possible to verify with any degree of precision, namely, that the temperature of the earth rises in regular proportoin towards the centre; so that at the tenth degree from the surface, all known matter must be in a state of fusion. At the point to which the perforation in question has reached, M. Arago expects a spring of water will arise of a sufficient degree of heat to warm public establishments, supply baths, and serve for other purposes. We cannot help thinking this expectation of M. Arago a very fanciful one.

APPLICATIONS OF CHEMISTRY TO THE USEFUL ARTS, BEING THE SUBSTANCE OF A COURSE OF LECTURES DELIVERED IN COLUMBIA COLLEGE, NEW-YORK, BY JAMES RENWICK, PROFESSOR OF NATURAL EXPERIMENTAL PHILOSOPHY AND CHEMISTRY.

V.

CARBON, HYDROGEN AND THEIR COMPOUNDS.

(Concluded from page 623)

The gaseous matter which remains is purified by bringing it in contact with the hydrate of lime. The first mode used for this purpose, when the separation of the carbonic acid was supposed to be the only purpose which could be effected by means of that earth, was to pass the pipe which proceeds from the condenser downwards, into a close vessel nearly filled with milk of lime. The gas, escaping from the open end of the pipe, rose upwads through the liquid, and was carried off by a pipe issuing from the top of the vessel. When the partial condensation of other gases was found to take place, it became evident that this effect might be increased by bringing larger surfaces of the two substances into contact with each other. This was at first attained by a contrivance by which the liquid was made to fall through the gas in a shower. This apparatus was complex n its form, and as it has been replaced by better methods, need not be described.

In one of these the gas is made to pass through a vessel filled with hay or moss, prepared by wetting, and then dusting it with hydrate of lime in powder. The gas will not pass through this without exerting a considerable pressure, and as it is necessary that it be generated at a low pressure, it is frequently received in a gasometer before it reaches the vessel filled with the purifying material, and drawn from this gasometer by pumps, which force it through the vessel containing the lime.

Even in this mode, the water absorbs a part of the olefiant gas. Hence, a method which has only been practised in one instance, namely, at Perth in Scotland, is to be preferred to any other. In this the gas is caused to descend through a number of successive layers of dry hydrate of lime.—In this instance, from the care with which the heat is regulated, and this improvement in the purification, gas from cannel coal has been made to approach in density and illuminating powers to that yielded by substances of the second class.

From the purifying apparatus the gas passes to the gasometer, which serves as a reservoir, where it is stored up until needed. This has the form and character of the vessels known under that name in laboratories, but is of course of great size.—The cistern of the gasometer may be constructed of brick laid in hydraulic cement, or of flaunched plates of cast iron, which are connected by screws. The receiver is usually made of sheet iron.

This receiver is counterpoised by a weight suspended from pullies by chains, and the chains are made of such a weight that the part which passes over the pulley as the receiver rises, shall be equal to the weight of the water displaced by that portion of the receiver eiwhich is raised from the water during the motion of that part of the chain. In this way the receiver may be always exactly counterbalanced by the weight and the chain.

In some cases the pullies are supported by a hollow column of cast iron, rising from the bottom of the cistern through the middle of the receiver. The receiver has a hollow cylinder of sheet iron formed around its axis for the passage of the column.—The counterpoising weights move within the hollow of the column.

These things being premised, we may proceed to the description of an apparatus for preparing coal gas, with reference to the annexed figure 2.

a, *a*, Retorts.

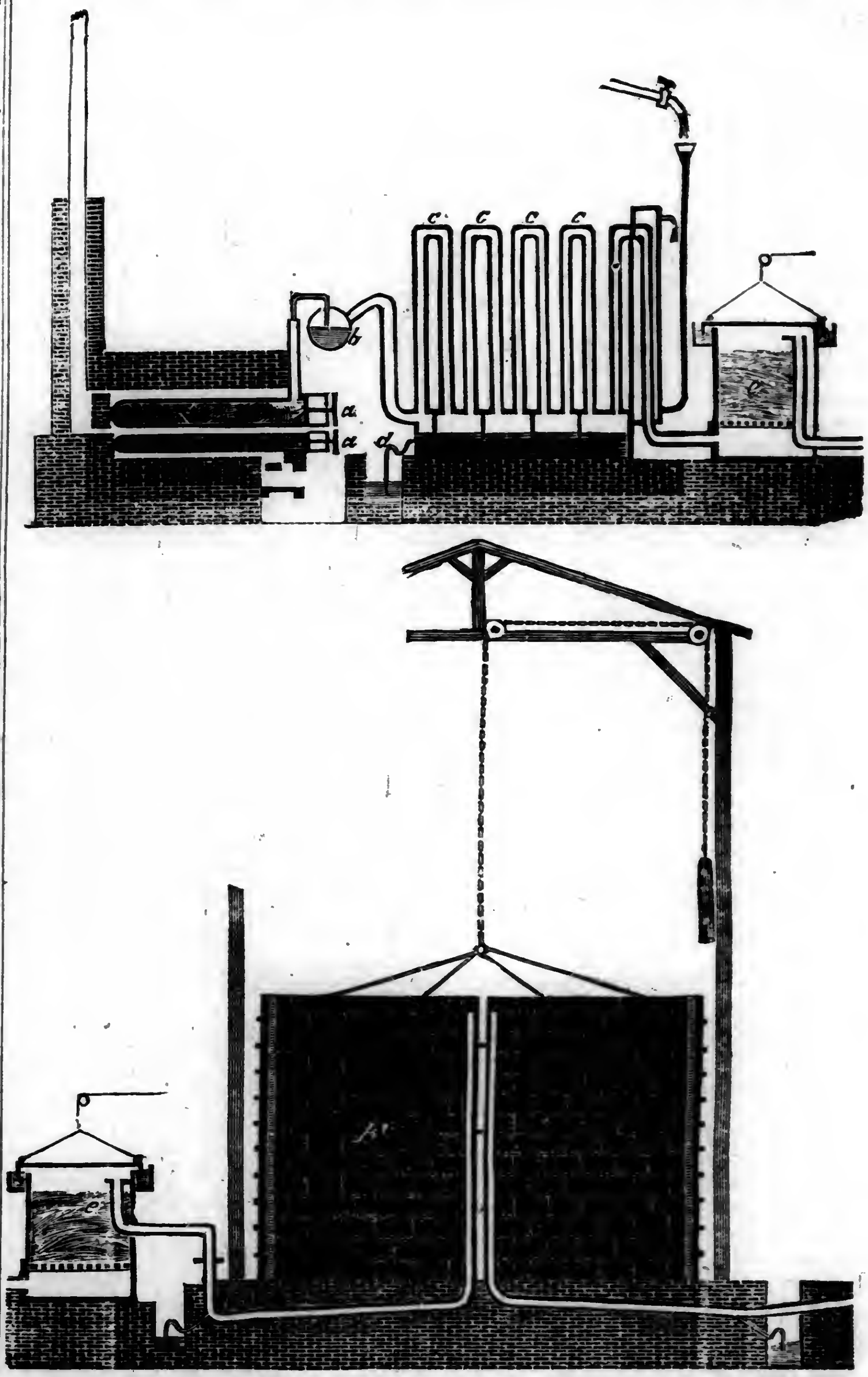
b, Receiver.

c, *c*, *c*, Condenser, composed of a system of iron pipes, kept cool by a stream of water.

d, Tube by which the coal-tar is discharged.

e, *e*, Vessels in which the gas is purified by means of quick lime.

F, Gasometer, which is represented as being enclosed in a cistern of cast iron.



It is usual to have but one, or at most two, gasometers, and to place them in the immediate vicinity of the place where the gas is manufactured. But it is a much better plan, where a large district is to be supplied with gas, to place in its different

quarters separate gasometers, each capable of furnishing the supply of a single night to the nearest burners. These are to be filled during the day time, and for this purpose a single gasometer, of the same size with each of them, will suffice. In this method the large main pipes may be replaced by smaller ones leading to the several local gasometers, and the rest of the distribution effected by small pipes. A great saving will thus arise in the cost of the pipes, and the supply will be more regular. The pipes which convey and distribute gas ought to be laid in the ground to such a depth as to be beyond the reach of any great or sudden changes of temperature. They are made of cast iron, in lengths of about 9 feet. One end of each is cast large enough to receive the smaller end of the next pipe, and the joint is closed by oakum dipped in white lead ground in oil. Melted lead is then run in above this packing. This is called a spiggot and faucet joint. It may be rendered more secure by casting flaunches near the ends of the pipes, and uniting them by screw-bolts and nuts. This method however cannot be adopted when the pipes are liable to endure changes of temperature.

In the preparation of coal-gas, the purification is the most important point. It is only in a single instance that its value has approached to that of good oil-gas, by reason of its containing more than the usual quantity of olefiant gas. The low heat at which alone such a decomposition can be effected would probably lead to an increase in the quantities of tar and naptha, substances now of but little value except to be returned to the retorts. It is therefore still a point on which we can state no positive opinion, whether coal shall be converted into gas in the usual manner, or whether by due regulation of the heat a less quantity of gas, but yielding a more brilliant light, shall be sought, in preference to a gas principally composed of light carburetted hydrogen. If olefiant gas become, by a resolution of this question in the affirmative, the important object, the rules mentioned under the next head must be resorted to. If, however, the production of such a gas should appear to be difficult, the mode now in use, of heating the cylinders to a high red heat, will probably be persisted in.

6. MANUFACTURE OF OIL-GAS.

Oil is decomposed in a cylinder or retort, similar in form and character to that employed in obtaining coal gas. This retort is filled with coke, and when it is brought to a dull red heat, a fine stream of oil is admitted at the end farthest from that to which the pipe which carries off the gas is applied. The oil therefore traverses the red hot coke, and is in a great degree decomposed. The products are,

1. Olefiant gas, light carburetted hydrogen and hydrogen;
2. Vapor of oil;
3. The two highly inflammable liquid and volatile compounds of carbon and hydrogen, which have been heretofore mentioned

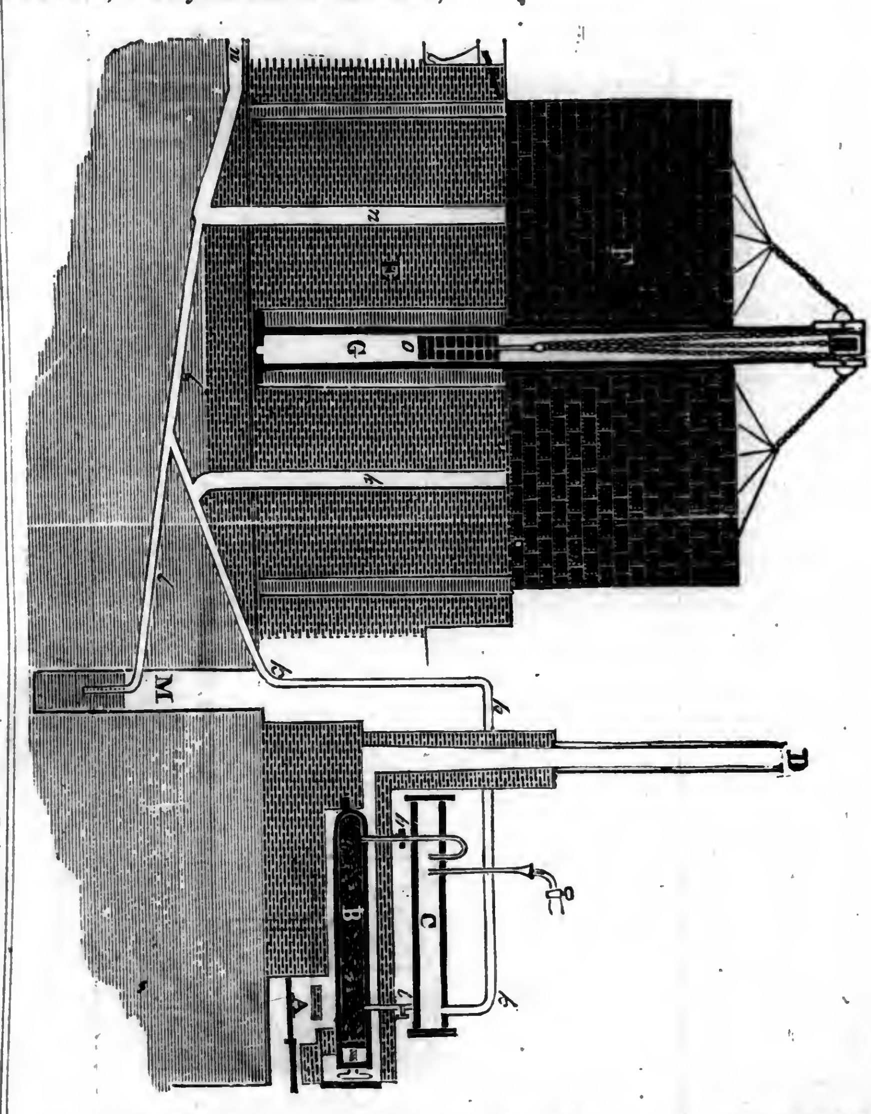
The gas in its escape from the retort, passes through the reservoir by which oil is supplied. Here a part of the vapor of oil is condensed. A pipe then conveys it from the upper part of this reservoir to the gasometer. This pipe must have one part of it laid in an inclined position, in order to permit the condensed oil and inflammable liquids to flow along it, and from the lowest point of this pipe another proceeds which conveys them to a proper receptacle.

The pores of the coke are gradually filled up with carbon deposited by the oil; it then ceases to perform its part in decomposition. It therefore becomes necessary to withdraw and replace the coke about once a fortnight. In opening the retort certain simple precautions are necessary to prevent the formation of an explosive compound, which might burst the retort.

It is not necessary that the oil whence gas is prepared should be of the quality which is required to give an agreeable light in a common lamp. Common whale, or even fish oil, and the unpurified oils of vegetables give a gas as good as that obtained from winter strained spermaceti. Its cost is therefore by no means as great as might be imagined. In this country in particular it might be applied to bring into use an article which is now generally permitted to be wasted, namely the seed of the cotton; and it is said that an attempt is now making in New-Orleans to light that city by gas from this material. The seed might also be used for this purpose without having undergone the operation of expressing the oil from it.

An apparatus for the manufacture of oil gas is represented. Fig. 3.

A. Furnace;
B. Retort, filled with coke;
C. Reservoir of oil;
D. Chimney;
E. Cistern of the gasometer, represented as built of brick;
F. Gasometer;
G. Hollow pillar in which the counterpoise of the gasometer moves;
h, Pipe which carries the gas in such manner as to cause it to pass through the oil;
i, Pipe which admits oil into the retort.
k, *k*, *k*, Pipe which conveys the gas to the gasholder;
l, *l*, Inclined pipe to carry off the condensed vapors;
M. Cistern in which the condensed matter is collected;
n, Main distributing pipe;
o, Counterpoise.



The manufacture of oil gas is obviously much more simple both in theory and practice than from coal. It requires, however, much more attention to the regulation of

the heat. If this be too low, less of the oil will be decomposed, and more of the condensible liquids generated. If it be too high, the gas will indeed be much increased in quantity, for at a high red heat it may be nearly doubled by the conversion of olefiant gas into hydrogen, but it will give less light than the less bulk of gas generated at the lower temperature. We shall examine this question further in speaking of the comparative value of oil and coal gas.

Oil gas may be distributed by pipes like coal gas. But it is more peculiarly fitted for being made portable. This is effected by forcing the gas, by means of a pump, into strong vessels of sheet iron or copper. The best form for these is a cylinder terminated by hemispheric ends; unless the size be small, when they may be spherical. In these the gas is compressed to the extent of thirty or even forty atmospheres; that is to say, the gas contained is thirty or forty times as much as the vessel would contain under ordinary pressure. In order to render them safe from accident, they are proved under a pressure of sixty atmospheres or nine hundred pounds to each square inch. The pump by which the compression is effected is represented. Pl.

(c) GAS FROM ROSIN.

Rosin may be decomposed and made to furnish a gas equal in quality to that from oil. The best method for this purpose is the invention of Professor Daniell of London. The Rosin is dissolved by heat in spirits of turpentine, and the solution treated in the same manner as oil. To obtain gas of the best quality, however, it seems to be necessary to attend even more particularly to the regulation of the heat than in the use of oil. At too low a heat, the vapor of the spirits of turpentine passes over, and will cause the gas to burn with smoke. At too high a heat, a larger quantity of elastic fluid will indeed be generated, but in spite of this increase it will give less light.—For a long time gas from rosin was used as portable gas, in London, and was found to answer the purpose as well as tha prepared from oil. In experiments at which the writer assisted, made at the New-York gas works, rosin gas was found to give as bright a flame, and as much light from the burning of a given bulk, as oil gas. It does not appear however, that the gas usually furnished by that establishment is of as good quality as that which was the subject of experiment.

(d.) COMPARISON OF THE VALUE AND ILLUMINATING POWERS OF GASES FROM THE SEVERAL MATERIALS.

AUTHORITY.—CHRISTISON and TURNER. Edinburgh Philosophical Journal No. XXV.

The illuminating power of a gas will depend upon the proportion in which the several compounds of Hydrogen and Carbon, and uncombined Hydrogen are mixed in it. Of the gaseous compounds of those two elements olefiant gas has the greatest density, and the vapors of the two liquid compounds are even heavier than it. As the flame of these three compounds is more brilliant than that of carburetted hydrogen, and as uncombined hydrogen which gives but little light, has has no more than an $\frac{1}{8}$th of the density even of light carburetted hydrogen, it will be obvious that the denser the gas the higher its illuminating power. This power however, does not increase exactly as the density, but to all appearance in a higher ratio. The densities of gas from different substances and prepared in different ways, is given beneath, in terms of hydrogen as the unit.

Coal Gas from the London works used by Mr. Dewey in his experiments,	2.10
Coal Gas from Westminister used by Brande,	6.64
Coal Gas of Edinburgh and Glasgow—nean,	9.00
Oil Gas of Taylor and Martineau,	13.54
Do. best,	14.49
Oil Gas of the worst quality made in England,	9.90
Coal Gas of Perth,	10.50
Oil Gas made in France,	6.98
Oil Gas made from Whale oil in Edinburgh,	15.75
Gas from cannel coal within the the first hour of distillation,	9.75
After ten hours,	5.17

The last named gas, which has the least density of all, contains—

Olefiant Gas and vapor	0
Light Carburetted hydrogen,	20
Hydrogen,	60
Other Gases,	20
	100

That obtained during the first hour, and having the density of 9.75, contains

Olefiant Gas and vapors,	13
Light Carburetted hydrogen	82½
Hydrogen,	0
Other Gases	4
	100

The French oil gas of the density of 6.96 consists of—

Olefiant Gas and vapors,	6
Light Carburetted hydrogen,	28
Hydrogen,	45
Other Gases	21
	100

The Oil Gas of Taylor and Martineau whose density is 13.54 contains—

Olefiant Gas and vapor,	38
Light Carburetted hydrogen,	46.5
Hydrogen,	3
Other Gases,	12.5
	100

The oil gas whose density is as high as 15.75 is probably almost wholly composed of olefiant gas and the vapors of the liquid carburets. Its illuminating power is probably even greater than that of pure olefiant gas prepared from alcohol, and bears to that of gas from common coal of the density of 6.10, the ratio of 4:1. The coal gas of Taylor and Martineau has an illuminating power bearing to that of the average gas from cannel coal of the density of 9, the proportion of 2:1. But as the manufacture of oil gas is attended with more difficulty than that from coal, it does not appear that when good cannel coal can be procured, it will be safe to count upon a greater superiority on the part of oil gas than 3 to 2. This rule may at any rate be considered to apply almost with certainty to gas from rosin, whose manufacture is even more precarious than that of oil gas. If however the oil gas is of good quality and the coal gas of the worst the relation is as 3 to 1.

In burning gas it will be observed that the flame is of a pale blue color near the orifice, then becomes white and brilliant, while towards the summit it again becomes pale. According to the rationale already explained this is readily accounted for. At the orifice, the burning of a part of the gas and vapor causes the deposite of carbon, which disseminated through the next part of the flame, gives it brilliancy; but as the carbon burns itself, it is exhausted before the summit is reached and the flame again loses its brightness. If however, the carbon be not wholly consumed it will make its appearance in the form of smoke, and we hence infer that the flame will reach its maximum of brilliany, jnst before it begins to emit smoke. It might however, be a question, whether the expenditure of gas will not equal or more than counterbalance the increase of light. This is a question which can only be settled by experiment, and we shall therefore, quote those of Christison and Turner.

In a flame from a single jet, fed by coal gas the following were the results:

Length of flame,	2 in.	3 in.	4 in.	5 in.	6 in.
Light	55 6	100	150.6	197.8	247.4
Expense of gas	60.5	101.4	126.3	143.7	182.2
Light from a given quantity of gas.	100	109.	131.	150.	150.

It will therefore appear, that by increasing the flame from two to four inches the light is increased from 55.6 to 197.8, or between three and four times; and that with the long flame one half more light will be given with an equal expense of gas than by the short flame.

With oil gas from a single jet the results were

Lenght of flame	1 in	2 in.	3in.	4 in.	5 in
Light	22	63.7	96.5	141	178
Expense of gas	33	78.5	90	118	153
Light from equal quantities of gas	100	122	159	181	174

PAPER READ BEFORE THE MECHANICS' INSTITUTE, JUNE 2D, 1836, ON THE ORDER OF THE CREATION. BY OLIVER SMITH, MEMBER OF THE INSTITUTE.

Let us go back in the history of the earth as far as we can; and how far will this be? Can we pursue this retrograde course any further than the sacred historian has done, when he says, that, "In the beginning God created the Heavens and the earth"? To this question we shall endeavor to give an answer; and that answer will be in the negative; though in coming to this conclusion we shall adopt a course that may be thought perhaps, to be a little circuitous. And first, we would make the remark, that it is no where directly asserted in the sacred volume, that there is a God, or Great First Cause of all other things; but that is always assumed there, as indisputably granted. To say that the material universe

around us arose and continues by chance, would be what the sacred penmen seem not to have expected to hear from any rational and sober man; and they appear to have made no provisions to meet one that would do so. In fact we may safely say, I think, that no one in the full exercise of reason, ever seriously believed this; and but few, comparatively speaking, have ever been reckless enough to assert it. And should it be contended that, although there may be a God, a Great First Cause, who has moulded matter into the present order of things, still matter itself is eternal, we might reply that if matter is eternal or coeval with the Deity, it must either constitute a part of this being or be independent of him. And if it exists independently of him, how does he control it as he plases, as we all profess to believe that he does? And again it may be asked how does he know exactly what it is, and how to use it, unless he made it? In short, we must believe that there is a God, and that he consists not of matter, nor partly of matter, but of pure intelligence and power, and rectitude, or something which we call spirit, but of which we can form no other idea than that of an assemblage of attributes where the ones just mentioned are prominent; and that he not only gave to the material universe its present structure, and sustains it as it is; but actually made or originated the materials of which he formed it? And if there are difficulties in this supposition, there are still greater ones to embarrass any other we can make upon the subject. We are none of us prepared to say there is no God; nor that matter exists independently of God; nor that it constitutes a part of his being.—What then can we do in this case but to adopt the simple language we have already quoted above, that, "In the beginning GOD created the Heavens and the earth"?

We can make suppositions with regard to the steps which the Creator adopted to accomplish this work, but they will be mere suppositions; and yet they may aid us to perceive how little we know with any degree of certainty, upon the subject before us. Let us then suppose that, among all the material bodies in the whole wide regions of space, the Sun was the first that was brought into being, and endowed with the property of attraction, and located, no matter where. As there was no body to attract it from its place, it must have remained there as long as the power that left it permitted it to do so. Next we suppose, that some one of the planets was formed, and being so formed, and endowed with the property of attracting other bodies, and of being attracted by them, it must have been immediately set to revolving around the sun; for otherwise, it would rush directly to it, and become united with it. Thus we can suppose that the whole solar system was brought into being and put in motion.

Now let us suppose that Sirius, the brightest star in the heavens, and for that reason conjectured to be the nearest, was located in the same relative position which it now occupies with regard to the sun; and made to revolve around the common center of gravity, betwixt its self and the solar system; while this system was made to revolve around the same center. In this way the bodies in question might be made to preserve the same distance from each other. And more too, a full system of bodies might be made to revolve about Sirius constituting a Sirian system.

Next we can suppose that Arcturus, apparently the largest, while Sirius is the brightest star in the heavens, was formed; and a system of bodies made to revolve around it; and this Arcturian system made to revolve around the common center of gravity betwixt itself and the solar and Sirius of which we have spoken; while these latter were revolving around the same center; and all this before the bodies in question had time to rush together; and thus, all three of these systems might be made to preserve the same distance each from the others; and so on indefinitely. From this it appears that the heavenly bodies may be kept in their *relative* positions, although creation is not interminable; but in order to preserve them in their *absolute* positions, it is necessary that they should be placed at proper distances throughout immensity; for the exterior ones, and such of course, their will be, unless they are infinitely extended, will tend toward the interior ones; and in order to prevent them from rushing together, they must be made to revolve about each other. But, as their natural attractions will be inversely as their distances apart, the motion in question must be very small in the systems around us, as the space between them is inconceivably great. Such a motion is suspected, but not yet positively proved, in the solar system; and till it is proved, we must suppose that creation is boundless as infinite space; for otherwise we cannot account for the equlibrity, which is doubtless no less real than apparent in the heavenly bodies. It is true that some of the stars have a motion, but this does not appear to be the one to which we have now reference; and if no such motion exists in the bodies above us, then no part of creation could have existed before the other; but the whole must have been thrown into being throughout immensity, at the same moment of time. So that it might well be said that "God spoke and it was done; he commanded, and it stood fast." We can suppose, and perhaps the supposition may aid our weak conceptions, that matter in its incipient state, was not endowed with the property of attraction. And in fact, from the representations that are given us of what the important telescopes of the present day are bringing to view in the regions above us. We have perhaps, some ground to supect there are masses of matter around us that are not formed into regular bodies, nor subjected to the laws of gravitation.—The Great Dr. Good, in that immortal work, his Book of Nature, more than intimates, as I understand him, that in his opinion, this is very possible. However, it must be admitted that all this is little better than mere conjecture.

As to the earth, or any one of the planets, as soon as it became endowed with the property of attraction, whether at the moment of its formation or subsequently, it must have been set in motion around some centre of attraction; and this motion, not affecting the senses of those who may happen to be upon the body thus moved, may be called its stability; and this is obviously all the sacred writers mean when they speak of the foundations of the earth. To common observation, the earth appears indeed to stand "fast."

We cannot go back in the history of the earth, then, beyond the period when it began to revolve around the sun, as it now does. It is true we can make suppositions—we can suppose it to have been made up in part or in the whole from the ruins of some other body or bodies; but this we are not likely to prove very soon; and even if we could do so, the result might not carry us very far into the history of those ruins.

About fifty bodies are found in the earth that are called simple ones; and they are thus denominated, not so much because they are believed to be absolutely so, as because chemists have not succeeded in their endeavors to decompose them. In fact they are all known to contain more or less of light, caloric, and electricity, and some of them magnetism; and if these latter are material substances, or modifications of any material substances, as they are supposed to be, then the bodies in question cannot be simple ones. From these, however, whether simple or compound, it is that all others with which we are acquainted are composed.

Now if we go back and suppose a time when these simple bodies were all put together, we shall gain but little in any respect; for they must, as a consequence of their mutual attractions, have assumed the same globular form that now characterises the earth and the other planets; and they must have commenced immediately to tend toward the sun, either by revolving around it, or by going directly to it; according as they received the proper impulse, or none at all; and furthermore, a chemical action must have taken place immediately among them, producing compound bodies similar to what we now find in the earth.

The first we can reasonably suppose of the earth then is, when it began to revolve about the sun, consisting as it now does of various compound and heterogenous materials. But we can reasonably suppose it contained caloric enough to render it fluid; so that it may well be said to have been "without the proper form" for animal or vegetable life; and to be, consequently, totally "void" of both; while "darkness," or confusion and disorder, so far as either of these kinds of life are concerned, "was upon the face of the deep," or upon the whole map of melted matter of which the earth consisted.

Now let us suppose what must have been true, that this caloric began to radiate to the vacant regions around us, till the surface of the earth became so far cooled, that a thin crust was formed around it. Meantime, the internal caloric was raging and caused a commotion that broke up this crust more or less in different places. Again the surface continues to cool, and another crust is formed including the ruins of the first, and consequently twice as thick as that was. This again is broken up in the same way, and a third one is formed including the fragments of both the others, and consequently three times as thick as the first one; and so on down to the present time. And something of this kind we actually see going on at this very day. Volcanoes and earthquakes, the first being obviously, and the other very probably, the effects of internal fires, are breaking up the crust of the earth more or less in different places. A large tract of country in Sweden is now actually rising; and other regions in Italy have risen and fallen, and risen again within a few hundred years past; and much the same may be said of many places in South America. In this way we may account for the irregularities in the surface of the earth.

We can make other suppositions, to be sure. We can suppose that the earth was thrown from the sun and the moon from the earth; and we can further suppose that other bodies have been ejected from the earth, and fallen back upon it again; and this will aid us to an explanation of the great confusion which appears occasionally among the rocks and stratums that present themselves in the crust of the earth;

and it is possible that the whole or a part of this did actually occur. But the simple formation and breaking up of these successive crusts, in the manner above suggested, will go far to explain all this confusion.

Now let us suppose that the surface of the earth is cooled down to about 85 or something less of Centigrade, or, what is the same thing, to about 150 or 100 of Fahrenheit; so that the water which may have been previously formed by the union of the oxygen and hydrogen that were found among the materials of the earth; and which, if thus formed, must have existed around the earth in a state of steam, is settled down upon the irregular surface, and begins to form oceans, seas, lakes and rivers there, according to what the historian has told us. The oxygen and nitrogen, which happen to be at liberty, arise, in consequence of their specific levity, and form an atmosphere around the earth; and the water that condenses upon it, is separated from the vapors that still remain above it; and as this water runs into the cavities as above suggested, the dry land "is made to appear."

Now we know that animalcules will make their appearance in warm water that is allowed to remain stagnant for some time.—They are called infusiora, because they are more apt to appear in such water when it contains an infusion of animal or vegetable matter; and perhaps they are not found in any water at this day, except such matter is present. As these animalcules, though being ranked as they are with animals, they are presumed to be organised, yet exhibit no proper organization, but simply spontaneous motion, we shall call them chaotics, in contradistinction to the higher grades of animals, which, exhibiting, as they do, more or less of organisation, we shall call the organics. And of these chaotics we find two groups; the first of which, being homogeuous, we call the homogens; while the second, having appendages about them, which however are not arranged in any order, call the appendiculates.

We have now spoken of the lowest of the animal kingdom, of nature's first effort from mere dead matter to animalisation; and similar remarks may be made respecting her first step toward vegetation. This step appears in the Fungals Algas and Lichens, some of which are but one short remove, to appearance from mere inert matter; while in common with animals, some of them contain nitrogen; and some even exhibit a contractile motion. They have no distinct axis of growth, nor any distinct circulation of fluids, nor do they bear either leaves, that may be properly so called, or flowers; nor do they produce their seeds in that obvious manner in which the higher grades of plants do; and hence they are called Cryptogrames, a term that implies having a concealed mode of furetification. These were undoubtedly the first plants, and the chaotics the first animals. that appeared upon the earth.

We now rise to a higher grade of animals, which we call the Organics, or those that are obviously organised; and the lowest groupe of these, and the first we shall speak of now, are the Zoophites, or the animals that resemble plants. They unite together and form compound masses, and partake of a common life, so that what one of them eats goes to nourish all the rest. They have no head, though some of them have a buccal opening, and this is sometimes surrounded by tentacles. And let us bear in mind we have not yet ascended to the animated animals, or to those whose parts are arranged along a common axis, and much less to the cephalic or headed ones; but all these lower grades are headless; and their parts radiate more or less from a common centre. The same opening answers for the mouth and the arms; and they exhibit nothing like a circulating system, and but little of a nervous one; and this nervous system, when discoverable at all, consists in these lower grades only of medullary matter in different parts of the body. The animals in question subsist undoubtedly upon the chaotics, which they probably seize by means of their numerous tentacles. We divide them into two groups: the Coralifers, or coral bearers or producers, and the Zoanthids, or the animals that resemble flowers; and these we shall call Clessis. The Coralifers catch the lime and other matters that are found in the ocean, and with these they construct their habitations, some of which are mossy, as the sponge—some woody, as a few of the Tubularies—and some horny, as several of the Gorgons; but the most of them are calcareous and stoney, and consist of the coral reefs and submarine mountains that are found in the seas of warm climates. Some of these animals. and especially those that inhabit the sponge, are too minute to be seen. And here I would observe, in passing, that I think this to be the proper class for the Encimates, or lilly-shaped animals, which have been differently arranged by different Zoologists.

The Zoanthids we intend shall include those Zoophites only, which do not construct any habitation at all, being entirely naked. Some of them float in the ocean, while the rest affix themselves to some other body; but these have the power of removing at pleasure. A part of them are fleshy, and the rest gelatinous; and hence we can make two groups or orders of them; and their tentacles, whether expanded or closed, resemble flowers in the same state, and hence their name. The most prominent among them are the Actinias, or sea anemones. These added to the Chaotics will make three classes.

From the Zoophites we rise to the Zoaides, a term we adopt in contradistinction to Zoophite, and which implies proper animals; and the first group we come to here, are the Meduses which we shall call a class. Their form is discate, and their substance gelatinous, and they float in the ocean and shine in the night; and have tenacles which extend down into the water from the under side of their disc.

(To be Continued.)

AGRICULTURE, &c.

From the Am. Gardner's Magazine.

ON THE CULTIVATION OF SEVERAL OF THE MOST BEAUTIFUL SPECIES AND VARIETIES OF CACTUS AND CEREUS. IN A SERIES OF PAPERS. BY J. W. RUSSELL.

Cereus flagelliformis (creeping cereus), is an old inhabitant of the *stove* and greenhouse. The stems of the plant, when in a healthy luxuriant state, resemble a whiplash, whence its trivial name, flagelliformis. This interesting species, when interspersed with some of its co-species, that are of a more robust growth, makes an elegant contrast, showing, to the most careless observer, the difference in the habits of growth in the same family of plants. The flowers expand their blossoms in the months of May and June, and are of a dark rose color, arranged indiscriminately along the stems of the plants,—although sometimes a number of them are closely set together, not in a *cluster*, but in one straight line, one or two inches apart. It is a native of Peru, and has been cultivated more than one hundred years.

Epiphyllum speciosum *Haworth* (Cactus speciosus *B. R.*) is also an old favorite: the stems of the plant are thin and flat, from one half an inch to two inches in width, and of a very irregular habit of growth; but by judicious pruning it can be made an elegant plant. Stands of a circular form, or flat, in the shape of a ladder, should be used for training this plant to; the shape of the stand, however, may be left altogether to the taste of the cultivator, as something of the kind is indispensably necessary, to train up the shoots, that they may be kept in regular order. The superfluous growths must be taken off with a *sharp* knife, remembering to *reserve*, if possible, the strongest growths. The admirable appearance of this plant when in full bloom attracts the attention of every person; its beautiful rose or blush colored flowers expand in June and July, and the plant presents a splendid show for a fortnight or three weeks. The flowers are produced from the sides of the stems, and the dark colored vein, which is generally observable, that leads from the centre of the stem to the bud, is almost a sure sign of a flower.—This species is a native of South America, and has been cultivated about twenty-five years.

Epiphyllum truncatum *Haworth* (Cactus truncatus *Lk.*) is a fine sort: the stems are flat, and about half an inch in width: the extremity of the shoot is scolloped out as though bitten off by an animal: the flowers are of a darker shade than those of speciosum, and more elongated—the habit of the plant more close and compact: this has been cultivated ten or twelve years.

Cereus Ackermani is a new variety, and rivals the far-famed Cereus speciosissimus in the beauty of its flowers; however, it is deficient of the fine purple tinge which is so prominent a feature on the inner petals of the latter plant. The flowers expand in a similar manner, and continue three or four days in great perfection, and they are also equally large; by some cultivators it is esteemed second to none of its co-species that are yet known. The habit of the plant resembles E. speciosum; the stems are more fleshy and broader, and of a lighter green color; sometimes the young growths are quadrangular or four-sided, but they ultimately grow out to a thin expansion, broad and flat. The time of flowering is in May and June: it has been cultivated but five or six years.

Cereus Jenkensonia is also a new variety, and resembles E. speciosum in its habit of growth: the flowers are of the same shape, only considerably larger. the color an elegant crimson: time of flowering June and July, and has been cultivated about four years.

Cereus Vandesia is quite new and scarce: this also resembles E. speciosum in its habit of growth; the flowers are of the same shape, but as large as those of Jenkensonia,

and a shade darker in color. It is a free grower, and well adapted for training to a trellis, or a round stand. Time of flowering, July and August.

Opuntia vulgaris *Haworth* Cactus Opuntia *L.* (Indian fig), has been cultivated more than two hundred years. It is too well known to need any description; with good treatment it will grow luxuriantly.—Its large fleshy broad stems are admirably well adapted for grafting all the kinds I have now spoken of upon, which can be done in the followieg very simple manner, viz:—first, take off the cutting from the plant that you wish to insert on the Indian fig—then make an incision in the stem with a sparp knife, as near the same shape and size as possible as that of the cutting; observe to take the piece out so as to allow the scion to be inserted about an inch deep. If this is neatly done there is no fear of success. Let any person imagine the splendid effect a large plant will have four or five feet high, spreading in every direction, with some of the sorts here mentioned grafted on it, growing most luxuriantly and flowering profusely; this I have seen —and I can assure every reader of this that it was a beautiful object.

I hope ere long to see this very interesting family of plants more generally cultivated, and the compost recommended in my former papers tried, which I think will be all that is necessary, to ensure its permanent use, in preference to the sandy soil, destitute of any richness, which is generally recommended.

Yours,

J. W. Russell.

Mount Auburn, August 8, 1836.

From the Genesee Farmer.

VAN MONS' METHOD OF RAISING FRUIT TREES FROM THE SEED.

We published a few weeks since, from the Boston Horticultural Register, Gen. Dearborn's introductory remarks to the account given by A. Poiteau, of the means which were employed by Van Mons to obtain excellent fruit from the seed. Omitting the speculative part of the article, we here give, as briefly as the nature of the subject will admit, the most interesting and useful facts, which were developed during the course of the experiments of Van Mons, with the hope that it may induce others to follow his example, even though it be on a very limited scale.

Van Mons' laid the ground-work for his experiments by collecting, during excursions through every part of the surrounding country, wild and natural stocks of fruit trees, which exhibited a favorable appearance, and which, from his familiarity with the characteristics, he was enabled at once to select. By means of these acquisitions, and repeated sowings from them, he had, in a few years, 80,000 fruit trees in his nursery, which enabled him to make his experiments on a large scale, and to obtain results more promptly and with greater certainty. "His repeated successive sowings," says Poiteau, "of annual flowers, and perennial shrubs which grew and fractified in a short time; his excursions to observe the wild type of our fruit trees, in places where they grew and reproduced in a state of nature; his new generations, which were obtained from wild and free or natural stocks, as well as from the first sowings in his nursery, his thousand upon thousand of observations collected from every quarter, have enabled Mr. Van Mons to establish a law which admits of no exceptions; this law is, that so long as plants remain in their natural situation, they do not sensibly vary, and their seeds always produce the same; but, on changing their climate and territory, several among them vary, some more and others less, and when they have once departed from their natural state, they never again return to it, but are removed more and more therefrom, by successive generations. and produce, sufficiently often, distinct races, more or less durable; and that finally, if these varieties are even carried back to the territory of their ancestors, they will neither represent the character of their parents, nor even return to the species [varieties] from whence they sprung."

Another very important conclusion at which Van Mons arrived from a long series of observations, was this:—While pear trees, in a state of nature, and in their native soil, always reproduce seeds, without any sensible variation; the seeds which a domesticated pear,—that is to say, one that has been for a long time in a state of variation in consequence of a change of climate or other cause,—yields at its *hundredth* fructification, produce trees not only very different from itself, but still very different from trees which have been produced from the seed of its *first* fructification; and the older a domesticated pear becomes, the nearer do the trees produced from its latest seeds, approach to a state of nature, without, however, ever returning to it. Having arrived at this conviction, he concluded that "by sowing the first seeds of a new variety of fruit trees, there should be obtained trees always variable in their seeds, because they can no longer escape from this state of variation, and which are less disposed to return toward a wild state, than those produced from seeds of an ancient variety; and as those which tend toward a wild state have less chance of becoming perfect according to our tastes, than those which are in the open field of variation, it is in the seminary of the first seeds of the newest varieties of fruit trees, that we should expect to find more perfect fruits."

The above quotation comprises the whole theory of Van Mons. "It was to verify it, and put it in practice, that from that period he collected in his nursery young wild trees, young free stocks,* and sowed large quantities of the seeds and stones, of various kinds of fruit trees, in order to have their *first* fruits, and sow their seeds in turn to obtain a generation, of whose novelty he was sure, and to take it as a point of departure for his experiments. Although Mr. Van Mons operated on thousands of various kinds and different varieties of trees at the same time, I will assume, in order to render what I say more clear, in explaining his progress, that he made his experiments on a single variety of pear.

"As soon as the young pear tree with which he began his experiments, produced its first fruit, Mr. Van Mons sowed the seeds. There resulted a first generation, the individuals of which, although of very different kinds, did not resemble their parent. He cultivated them with care, and endeavored to hasten their growth, as much as possible, by all the known means in his power. These young trees yielded fruit, which were generally small, and almost all of them bad. He sowed the seed of these, and obtained a second generation without interruption—which is very important—that were very different in kind, but did not resemble their parent, although they had a less wild appearance than their predecessors. These were cultivated with equal attention, and they fructified earlier than had their parent. The fruits of this second generation also varied us much as the trees which bore them, but part of them appeared less near the wild state than the preceding, yet only a few possessed the requisite qualities to entitle them to preservation. Constant in his plan, Mr. Van Mons sowed the seeds, and obtained a third continued generation, the greater part of the young trees of which had a *phasis* of good augury, that is, something of the physiognomy of our good domesticated pear trees, and they were consequently less various in appearance. Being carefully cultivated, as had been the preceding, these trees of the third generation fructified still earlier than had those of the second generation. Several of them produced edible fruit, although not yet decidedly good, but sufficiently ameliorated to convince Mr. Van Mons that he had discovered the true path to amelioration, and that he should continue to follow it. He also recognized, with not less satisfaction, that the oftener the generations succeeded each other, without interruption, the more promptly did they fructify it. The seeds of the fruit of this third generation, which had a good appearance, were sowed, and the trees managed as carefully as the preceding, and produced a fourth generation, the trees of which were a little less varied, and nearly all of them had an appearance of favorable augury; they fructified in a shorter time than the third generation; many of the fruits were good, several excellent, but a small number still bad.—He again took the seeds of the best kinds of those pears, sowed them and obtained a fifth generation, the trees of which were less various than the preceding, fructified sooner, and produced more good and excellent fruits, than those of the fourth."

He continued his experiments till 1834, when he had reached the eighth generation, and at each he always obtained fruit more and more perfect.

"Mr. Van Mons made the same experiment on almost all the other kinds of fruits. The apple yielded no other than good fruit in the fourth generation. The stone fruits, as the peach, apricot, plum, and cherry, became perfect in a still shorter time; all of them produced good and excellent fruits in the third generation; which should be the

*That is, natural stocks from domesticated varieties.

case, for our stone fruit always reproduce more or less good without any particular attention, and therefore they should with less difficulty, and in shorter time, arrive at a perfect state of amelioration."

The *time* required to arrive at a satisfactory result, that is, the number of years before each tree would produce its first fruit, and the number of generations necessary to advance the fruit to a state of sufficient excellence, was a subject of anxious importance. Van Mons found that three or four generations in uninterrupted succession, embracing from twelve to fifteen consecutive years, were sufficient to obtain no other than excellent fruit from the stones of peaches, apricots, plums, and cherries; and to obtain none other than excellent apples, four successive generations, and about twenty consecutive years were required.—With the pear, the difficulty was greater. "At first, Mr. Van Mons was unable to procure the seeds of varieties very recently procreated; the seeds he was obliged to commence his experiments with, were obtained from ancient varieties, whose age was much advanced, which from experience tended to retard the first fructification of his young trees. Nevertheless, Mr. Van Mons has been able to ascertain that twelve or fifteen years was the mean term of time from the moment of planting the first seed of an ancient variety of the domestic pear, to the first fructification of the trees which sprung from them. The trees from the second sowing of the seed of the first generation, have yielded their first fruit at an age of from ten to twelve years, as the mean term; those of the third generation, at an age of from eight to ten years; those of the fourth generation, at an age of from six to eight years; and finally those of the fifth generation, at the age of six years.—Mr. Van Mons being actually at the eighth generation, has informed me that he has obtained several pear trees which fructified at *the age of four years.* From this decreasing progression, it may be seen that the fear of a lengthened experiment ought to decrease in proportion as it advances; and that adding the requisite years of the first five generations of the pear, a point is reached where none other than excellent pears are obtained, at the end of forty-two years. But if in each generation, as has been shown, there are always several trees which do not await the mean term named for their fructification, the time may be estimated at thirty-six years, for obtaining from the pear, in five uninterrupted generations, new trees and fruits, all of which are of excellent quality. The time can still be more abridged; for in one of his last letters Mr. Van Mons informed me that from two of his first sowings of pears, there were trees produced which fructified at the age of six years."

His method of treating his seedlings was as follows: He left them in the seed bed two years; he then took them up, threw away a part as worthless, and transplanted the most vigorous at a proper distance to allow them to develop themselves. He planted them sufficiently near to force them to run up tall, and to form pyramidal tops, without pruning; this hastens, he states, their fructification. This distance was about ten feet. While waiting for them to fructify, opportunity was afforded to examine the characteristics of their future excellence. It was generally not until they were four years of age, that they began to develop distinctly these characteristics.—From long continued observations, he was enabled to establish the following prognostics:

"1. *Prognostics of favorable augury.* A good form, a smooth and slightly shining bark, a regular distribution of the branches, in proportion to the height of the tree; annual shoots bent, striated, a little twisted, and *breaking clean without splinters*, thorns long garnished with eyes or buds, their whole, or nearly whole length; eyes or buds plump, not divergent, red or grizzled, leaves smooth, of a mean size, crimped on the side of the middle nerve, borne on petioles rather long than short, the youngest in spring, remaining a long time directly against the bud, the others, or the inferior, expanded, hollowed into a gutter from the bottom towards the top, but not their whole length.

"2. *Prognostics of bad augury.* Branches and twigs confused, protruding like those of the hornbeam, or broom, thorns short, without eyes; leaves averted from the bud, from their first appearing, small, round, terminating in a short point, guttered their whole length. These characteristics indicate small fruit, flesh sweet and dry, or baking fruit and late.

"3. *Prognostics of early fruit.* Wood large, short; buds large and near.

"4. *Prognostics of late fruit.* Wood slim, branches well distributed, pendent, the shoots a little knotted, generally denote late delicious fruit; with leaves round, point short, stiff, of a deep green, borne on petioles of mean length, are analogous signs, but less sure."

We close this article with an account of the severe disappointments which this distinguished man has been doomed to experience of late years. While pursuing his experiment on a very extensive scale in his nursery at Brussels, in 1819, the ground which was occupied by his vast collection of new fruits, was declared to be indispensable for streets and building lots, and he was summoned to vacate it in the short space of two months, under the penalty of seeing all his trees cut down and thrown into the fire. As professor of the University of Louvain, he resolved to remove his nursery to that city, that it might be more completely under his control; but the period assigned for evacuating his nursery, was unfortunately in the winter. His loss was consequently great and irreparable; and being obliged to confide nearly the whole care and labor of removal to others, it was with great difficulty he saved a twentieth part of his nursery. After his removal to Louvain, with the exception of having a great number of young plants kroken down and drawn out of the ground, by the masses of ice which were left upon it, after a great freshet in the river which passes though the city, and which overflowed his nursery to the depth of seven or eight feet, he enjoyed more or less quietly this new location during the following thirteen years. His correspondence was renewed and extended, his losses were replaced by new acquisitions, and the mass of his observations was augmented, and his new varieties were liberally disseminated. "But," observes Poiteau, "*public utilitc* had sworn that she would finally embitter his old age. In 1831, we besieged the citadel D'Anvers, and although Mr. Van Mons' nursery was fourteen leagues distant from the army, the engineers could not find a more commodious place than that nursery to bake the bread of the soldiers in; consequently a great part of his trees were destroyed, having constructed their ovens on the ground where they grew, and the fruit of the others was exposed to pillage. Still the philosophy of Mr. Van Mons sustained him in this unexpected devastation; he hired two other tracts of land into which he removed his young plants; he was consoled because he had time to collect, although it was summer, scions of the trees which were sacrificed to afford a place for the erection of ovens; but *public utility* had not yet exhausted all her severities against him.—Unfortunately, there was not a Chaptal in the council of the prince, and the engineer, seeing nothing, decided again in 1835, in the name of *public utility*, that Mr. Van Mons' nursery was the sole and only point on the globe, proper for establishing a gas house for lighting the city. Heaven grant that these gentlemen may be enabled to see better for the future; but it is not in their power to prevent the true friends of intellectual light, and of public prosperity, from regarding their decision as an act of ignorance and the grossest vandalism.

"Mr. Van Mons is actually seventy years of age; he has consecrated his whole, all his life, a large part of his fortune, to public utility, and yet it is in the name of *public utility* that they have slain him, assassinated him! O age of light, how dark thou art!

"In the commencement of September, 1834, Mr. Van Mons, on sending me a box of pears, which were the first of a seventh generation, observed in his letter, 'when you taste these pears the trees which bore them will no longer exist.' In fact, I learned a few days after, that the destructive axe had prostrated these trees and many others, that the nursery was dishonored, lost, and Mr. Van Mons frustrated in his dearest hopes, which were to send us the products of his labor.

"It is impossible to foresee, or rather I dare not express my fears, as to what will become of the ruins of an establishment, which wanted encouragement, which was of a nature to elevate the glory of an empire."

A note is added, stating that he had been ordered to evacuate the whole of the land before the end of February.

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

				lbs.	
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280 "	2 " ½,	" "	"	$3\frac{50}{100}$	"
70 "	1½ " ½,	" "	"	2½	"
80 "	1¼ " ⅜,	" "	"	$1\frac{25}{100}$	"
90 "	1 " ¼,	" "	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

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E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

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NOTICE TO CONTRACTORS.

PROPOSALS for excavating and embanking the Georgia Railroad from the upper end of the work, now under contract, to Greensboro', a distance of 34 miles, will be received at the Engineer's Office, at Crawfordville, on the 21st and 22d days of October next.

—ALSO—

At the same time, for the Branch to Warrenton, 4 miles. And if prepared in season, the Branch to Athens, length 37 miles.

J. EDGAR THOMSON, Civil Engineer.

33—t22o

NOTICE TO CONTRACTORS.

PROPOSALS will be received at the Engineer's Office, in the city of Lancaster, on Wednesday, the 19th day of October next, for the Excavation, Embankment, Wall, &c., required on twenty-five miles of the Susquehanna Canal, commencing at Kline's run, (three miles below the Columbia Bridge,) and extending along the West side of the Susquehanna river, to the "Maryland State Line."

The work will be ready for examination by Contractors, at any time after the 25th inst., and the Map, Profile and Specification, may be seen at the office, one week previous to the letting.

The unusually heavy character of the work, (which affords excellent winter jobs,) offers great inducements for the attendance of Contractors possessing energy and enterprise.

It is expected that the extension of the Canal to "Tide Water," will be ready for letting about the 1st of December.

No mechanical work to be let at present.

EDWARD F. GAY, Chief Engineer, S. C.

Lancaster, Sept 13, 1836. 5t—38

1½ square $4 12

NOTICE TO CONTRACTORS.

HARTFORD AND NEW-HAVEN RAILROAD.

For the purpose, alone, of a more widely extended notice, the letting of the Northern Division of the HARTFORD AND NEW-HAVEN RAILROAD, will be deferred until the 15th of October next. Up to that day, inclusive, proposals will be received at the Engineer's Office (corner of East and Collis sts. New-Haven,) for the excavation, embankment, masonry and carpentry, necessary to prepare the road for the reception of the superstructure.

Maps, profiles, plans, and specifications, may be examined at the Engineer's office; and printed forms may be obtained by application at the same place, giving a general view of the nature and amount of the work of different kinds which is to be done.

ALEXANDER C. TWINING, Engineer.

New-Haven, Sept. 20, 1836. 39—3t

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—ytf

HUDSON AND DELAWARE RAILROAD. NOTICE TO CONTRACTORS.

SEALED PROPOSALS will be received at the Office of the Hudson and Delaware Railroad Company, in the village of Newburgh, until the 10th day of October next, at 2 o'clock, P. M., for the Grading, Masonry, Bridging, &c., of their road from the west side of Chamber's Creek to Washingtonville, a distance of ten miles.

Plans, Profiles, Specifications, &c., will be in preparation, and exhibited ten days previous to the letting.

JAS. B SARGENT, Engineer.

Newburgh, Aug 24, 1836. to10—35

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tt

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durfee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE

33—tf.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.

General Agent of Col. S. H Long.

Rochester, May 22d, 1836. 19y-tf.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens	Ames' superior	back-strap Shovels	
150 do	do	do plain	do
150 do	do	do caststeel Shovels & Spades	
150 do	do	Gold-mining Shovels	
100 do	do	plated Spades	
50 do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York.

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron. 4—ytf

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR

TO CANAL CONTRACTORS.

Office of the Sandy and Beaver Canal Co., July 25th, 1836.

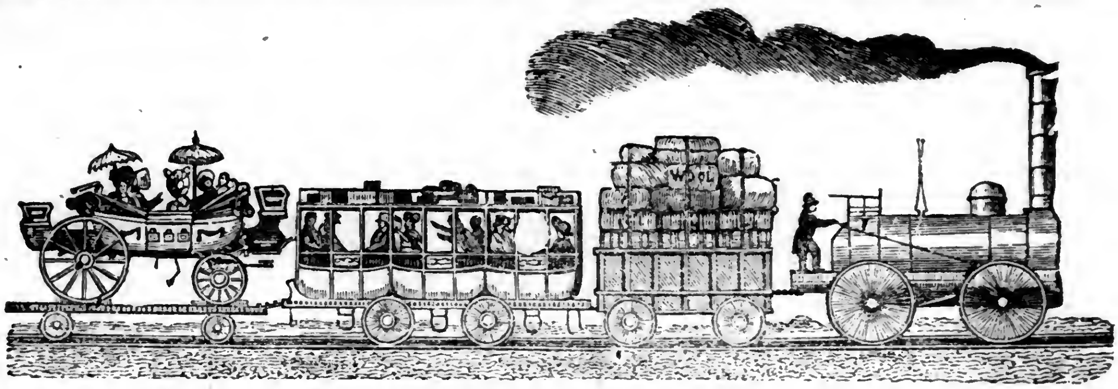
Proposals will be received at the office of the Sandy and Beaver canal company, in New Lisbon, Columbiana county, Ohio, until Monday the 10th day of October next, for the construction of about 50 cut stone locks, 17 dams, (varying from 5 to 20 feet in height) one aqueduct across the Tuscarawas River, several bridges, and about 10 or 15 miles of canal.

Plans and specifications of the work may be examined at the Engineers office, New Lisbon.

Persons unknown to the Engineer must accompany their proposals with good recommendations.

B. HANNA, President.

E. H. GILL, Chief Engineer. 30—to10



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] | SATURDAY, OCTOBER 15, 1836. | [VOLUME V.—No 41.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, OCTOBER 15, 1836.

TO RAILROAD CONTRACTORS.

PROPOSALS will be received at the town of Lindon, until the 20th day of December next, for the graduation of the Lindon Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Lindon, for ten days previous to the leting, and all other information given on application to the subscriber, or the Assistant Engineer.

PROPOSALS will also be received at the same time and place, for furnishing and delivering at Beckley's Landing, 95,000 feet (L. M.) of long leaf pine or cypress scantling, sawed 5 by 9 inches, to be free from sap, knots or wind shakes, and 20, 25 and 30 feet long. Also 60,000 feet. or more, (L. M.) of white, or post oak scantling, sawed 5 by 7 inches, length to be specified hereafter, and 60,000 feet (L. M.) of white or post oak plank, 2 inches thick, 1 foot wide and 15 feet long.

Also for furnishing and delivering on the line of the road 10,500 undressed post oak logs, 8 feet long, and 10 to 15 inches in diameter.

Also for furnishing and delivering 3,160 post oak caps, dressed 8 by 10 inches, 8 feet long, and 6,320 post oak posts, dressed 10 inches square and of lengths hereafter to be specified.

Recommendations will be expected in all cases, of persons not known to the officers of the Company, or to the Engineer. For the information of persons at a distance, I would state, that the Lindon Railroad commences at Beckley's Landing on the Tombeckby River, a stream navigated by Steamboats the greater portion of the year;—and having a direct communication with Mobile and New-Orleans will afford the facility of procuring supplies and implements necessary for the hands employed on the work, or their ready conveyance hither, if procured at a distance.

Persons having mills on the river and disposed to contract for furnishing timber, will have the facility of delivering it by water communication. The country through which the road passes, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season, renders the contract peculiarly desirable to those wanting winter employment

D. H. BINGHAM, C. E.

Lindon, Ala., Sept. 17, 1836. 41—3t

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Brav's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Dechertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at No 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is \$500,000 with liberty to increase to \$800,000, divided into shares of \$100 each.

The sum of \$5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I. BLAIR,
JOSEPH E. EDSALL,
COMMISSIONERS

Dated Oct. 3rd, 1836. 41—9t

NEWBURGH BOAT RACE.—On Saturday afternoon, of the 8th instant, came off at Newburgh, a beautifully contested Boat Race, between the "HIGHLAND WAVE," the "WHITE LADY," and the "BACHELOR." The point of starting was four miles above the steamboat dock at Newburgh, and the judges at the starting point were Captain Wiltsie and A. Noyes, Esq.; and Capt. Robinson, late of the Havre packets, was the judge of the result.

The distance rowed was four miles, and the time 21½ minutes.

The afternoon was pleasant, and a large number of spectators were assembled to witness the performance, which was, indeed, one of deep interest—affording at the same time ample evidence of the importance of such associations in the promotion of health and the most manly exercises among our young men.

The "*Highland Wave,*" a beautiful new boat, came in about two lengths ahead—the "*White Lady*" next, and then the "*Bachelor.*"

The length of the boats was as follows: the Highland Wave, 35 feet; the White Lady 26 feet; and the Bachelor 26 feet 6 inches—each having six oarsmen and a coxswain.

To the observers it was evident that the winning boat was as much indebted to its *bottom*, as to its manly crew—and also, that the sturdy crew of the White Lady, with equal *bottom*, would have been in a very different position at the termination of the race. It was also evident that the blue shirts of the Bachelor were equal to almost any task, except that of giving their craft, with its exceedingly unpopular *name*, (at least with the ladies,) a leading, or *winning* position. They should by all means call it the "*Beau,*" and we would warrant it to win—*admirers* at least.

VICKSBUROH, MISS.—MECHANICS AND LABORERS WANTED.—The following extract from a letter dated *Vicksburg, Miss.*, Sept. 16, will be found interesting to many who desire to go south this winter.

"Will you do us the favor to say that many men are wanted here on the Vicksburg, Jackson and other railroads. We pay *twenty-six dollars per month*, and board them. Carpenters are in great demand, to whom enormous wages are paid. The country is remarkably healthy this season.

Vicksburg, is more rapidly improving than any other place on the river above New-Orleans, and is destined to become at no distant day a place of importance. The packet ship Vicksburg arrived last week from New-York, and the Gazelle from Philadelphia, is expected to-morrow, and others are on their way, and nothing so much retards the growth of the place as a want of mechanics."

Yours truly."

The following letter from a distinguished officer offers ample testimony as to the value of railroads in a national point of view.

He has had frequent opportunities in his own experience as to the benefit and advantage of such a system of railroads.

HEAD QUARTERS, WESTERN DEPT.
Camp Sabine, Aug. 15, 1836.

SIR—Having recently looked into your Railroad Journal, and among others, one for the 59th anniversary of our Independence, a paper that had long lain in my desk without being noticed. I cannot deny myself the pleasure of tendering to you the slender tribute of this letter (with the enclosed ten dollar bill,) expressive of my approbation of your labors in the glorious cause of *internal improvement*, and my unfeigned desire that you will continue the publication of your excellent Journal; and that you may soon find in a quadruple subscription list the most irrefragable evidence of the near approach of that hallowed dawn of broad daylight which the virtuous and wise of every farm-house, and every cabin, of the central, western, and southern States of our beloved country, have long and ardently hoped would soon appear, with schools and Railroads to dispel the clouds with which the *spirit of party* has long threatened to annihilate our anxious and fond hopes that man is indeed capable of self-government.

Hitherto we have proven that we are capable of profiting, but partially profiting, by the noble examples and wise precepts of our Fathers of the Revolution. They gave us freedom and with it a charter for *self-government*, embracing every essential provision for *self-defence*, and *self-preservation*. These are to a great extent abandoned by the votaries of party spirit, and by those who disregard labor schools, and railroads and canals, and steam power, and sustained only by those who have labored in favor of these matchless means of national strength and national independence.

Occupying as we do a great extent of territory, wanting hands and increased labor-saving power for its improvement, a country embracing all the elements of national wealth, and national defence, most of them unwieldly without railroads, canals and steam power, but with them, by giving new and incalculable facilities to commerce, and enabling us to wield our disposable force and munitions of war, from our two central and other western States, to the sea board, and north-eastern and south-western frontiers; we may without exaggeration assert that the accomplishment of these works will render our whole country *invulnerable in war*, and afford an increasing revenue *in war, and in peace*, that will ensure to us in from *six to twelve years, an amount of money equal to the whole expenses of their construction*.

A revenue to be derived from our internal means of transportation *during a state of war!* my enemies say "no, this is not possible. Your calculation is incorrect—your theory is visionary. You can find no practical results to sustain you."

I answer that the northern and eastern States already abound in practical results sufficient to sustain me, that in the war of 1812, '13 and '14, some hogsheads of Louisiana, sugar and some bales of cotton and casks of rice, found their way from the south, up the Mississippi and Ohio rivers, and thence across the mountains to Pennsylvania, Maryland and New-York, without the aid of railroads or steam power; that many of the valuable products of these States found their way to the south: and that they were much needed throughout all the southern and western States, and that with a system of railroads leading from the central and western States to the sea board, such as I have proposed to be constructed by the army during periods of peace, every section of the United States would be supplied in war and in peace with domestic products and the fabrics of home manufacture to an extent quite sufficient to produce a respectable revenue. I add that we have nothing to fear from a war with any nation other than such as may be sustained by some new tripple or quadruple alliance of European powers, who may bring to our shores an overwhelming naval force sufficient to annihilate our commerce with foreign countries, and to cripple our navy, even though it should be made as great as our *fresh water* seamen with our *land Secretary* have proposed to make it. Our navy I am sure can never be beaten, and compelled to remain beaten, by that of any other nation without a series of conflicts that will cover it with imperishable fame. But the fame of the dead will not afford to the living, present *immediate protection*. Our navy may be destroyed by superior force The devouring hurricane and tornado which regularly pay a dashing visit to the seas or our southern border almost every spring and autumn, and which often carry to the bottom or to a dry beach the best of ships and the most skilful of seamen, might in one minute deprive us of the whole of our naval force upon our all important southern station. Whilst our railroads and canals costing not more for each hundred miles than a first rate ship of the line, would endure unhurt the pelting of a thousand storms, and would forever stand as a glorious monument of the wisdom, enterprise and industry of Oliver Evans, Robert Fulton, De Witt Clinton and their followers, as long as our mighty rivers and mountains retain their positions and majestic forms.

Our navy may be destroyed—suddenly annihilated and with it our foreign commerce. Then without railroads leading from the central States to the frontier, we should be left at the mercy of a merciless foe! whereas with the proposed system of railroads, we may in any event contemplate with proud satisfaction the obvious security, accommodation and comfort which they will afford us at our firesides and throughout our domestic relations.

The loss of a fleet at sea, or of several fleets in succession, added to the loss of our foreign commerce, whilst threatened by victorious foreign fleets and armies arrayed against us from *without;* having our railroads and land forces held ready for action *within*, we should find perfect security and retain the sure elements of prosperity throughout our national domain. Whereas if we give up the proposed system of railroads, *the loss of our fleets would in effect be nothing less than the loss of our national existence.*

Having the sure means which the proposed system of railroads will afford, of assembling at any one threatened vulnerable point upon the national frontier, within 60 to 70 hours a great part of the disposable force of the western States, amounting already to upwards of a million of men; this will make us *feel secure*—it will make us feel and see clearly that we shall occupy the *position, and maintain the attitude of proud defiance towards our enemies, numerous as they may be.*

We should then see the *sugar, cottan, rice, coffee, lead* and *iron* and other valuable products of the south and west, with thousands of passengers of the south and west, flying under the giant grasp of steam power with its thousand cars per day; and we shall see equal numbers daily returning richly laden with northern and eastern products, and northern and eastern manufactuted articles of merchandize, with northern and eastern merchants, engineers, scientific mechanics and other passengers of that delightful region of our country.

This process must and *will* create a revenue *in time of war sufficient to meet the prin-*

cipal expense of the war and expense be reduced as it will in the great item of *transportation* to a saving of nine dollars out of every ten, or nine hundred thousand dollars out of every million, whilst the same cars will be occasionally employed in wielding the disposable force of all the western States—but more especially of the two great central States of the west, *Kentucky and Tennessee (every young man of which States will be disposable, because these States unlike all the remaining 24 have no exposed frontier, and hence all their force is disposable,)* together with all the disposable munitions of war of all the western States. Hence it will be found that my system of railroads from the central States to the sea board and north-east and south-western frontiers will contribute to render the United States' *invulnerable in war* and enrich them in peace, inasmuch as it will save nine tenths of the expense *in money* and *in time*, in every movement to and from the theatre of the war; taking into view the unavoidable expense which the past and present character and condition of our railroads and means of land transportation in the central, western and southern States would require.

The proposed railroads after affording every desirable facility for the most vigorous and successful defence of the country in war, and affording also a revenue sufficient to pay much of the expense of the war, will, on the return of peace, when all other of the most expensive means of national defence known to this or any other nation, such as grand fortificatons, armories, arsenals, with cannon and most other military stores (however essential in war,) become useless or more than useless during a state of peace, because they require constant repairs and an expensive force to take care of them. When these become useless or unprofitable, railroads with steam power applied to vehicles of land transportation, taking, as they must take precisely the direction which the principal commerce of the country takes, viz: from the sea board to the central and western States, they will then afford a revenue that *will grow with the growth of our population, and as bonds of union and concord to the States and the people, will strengthen with our strength*, until every acre of our soil, and every valuable mineral of our mountains, and every moment of our time, and all our attainments, with every effort of our labor and industry will increase in value from one hundred to ten hundred per cent. We shall then *see and feel the value of practical science, and of increased civilization, with self government.*

We shall then have it in our power, speedily to put an end to every description of war near us, which tends to disturb the harmony of the civilized world, and we shall give civilization to our neighboring savages of all colors; and we shall give *freedom* to all who we find to be capable of its enjoyment, or in other words, capable of *self-government. No other ought to be free*—NO OTHER CAN BE FREE, WITHOUT BREAKING IN UPON, AND JEOPAEDIZING THE SUREST AND BEST ORDER OF UNIVERSAL CIVILIZATION.

Be assured dear Sir, of my best wishes for your health and entire success.

EDMUND PENDLETON GAINES.

Extract from a letter dated

AVOYELE FERRY, ON RED RIVER.
Sept. 8, 1836.

D. K. MINOR:

DEAR SIR—Enclosed you will receive the Meteorological Record for the months of July and August, 1836, regularly entered as stated.

I have received of the present year one number of the Mechanics Magazine for the months of February, and no other, until yesterday. I received the number for the month of June, Vol. 7. No. 6. whole number 42 at the same time. One month of June, 1835, Vol. 5, No. 6. whole number 30. Making a difference in their passage of precisely one year. The Railroad Journal has been received in about the same proportion. I also received by the same mail from Washington, a number of papers, documents, &c. of different dates from January 28th, up to July 6th. From this circumstance, I hope one Post Office on the route, is forwarding what they have had on hand more than twelve months back.

Most respectfully yours,
P. G. V.

P. S. *Our crops* of cotton in all this section is superior to any former crop; and owing to the continued additional improvement in extending former, and making new plantations on Red river, and tributaries, will be much larger, if the season should be favorable for picking. We have had a shower every day, for nine days past, which impedes the picking, and if they should continue long will be a disadvantage to the *crop.*

Our crop of corn has turned out generally good.

Your most ob't servant,
P. G. V.

☞In relation to the *irregularity* of the mails no one thinks of speaking now a days. The period *was* when it was not an *uncommon* thing to get letters and papers about the time when they were due, but at this time it is quite another affair. It may however be proper to say that they have *all* been forwarded.

ANNUAL REPORT OF THE PRESIDENT AND DIRECTORS TO THE STOCKHOLDERS OF THE LEXINGTON AND OHIO RAILROAD COMPANY, MAY, 1836.

The President and Directors of the Lexington and Ohio Railroad Company submit for the information of the Stockholders, the following statement of its affairs.

Since the organization of the Company in the year 1830, and the commencement of the work the year following, twenty-eight miles of the roadway only have been completed and put in use. Want of experience in the location and construction, and a deficiency of means arising from a difference of opinion among some of the stockholders as to its effects upon others interests, have retarded its completion; but these difficulties no longer exist, and it may be expected to progress more rapidly in future.

The original objects of those who projected this important work, have been kept steadily in view by the Board of Directors. Efforts to confine the operations of the Company to a few interior counties have been successfully resisted, by an appeal to the justice and liberality of the Legislature; [see appendix No. 1 and 2.] the co-operation of the City of Louisville has been obtained, and doubts no longer exist as to the certain extension of the whole line of Railroad to the Ohio river, at Louisville, by which the commerce of that flourishing emporium will be more closely united with the trade of Lexington and the interior, the charges of transportation will be greatly reduced to the producer and consumer, and new life and vigor imparted to the industry and enterprize of our community.

When the plan of construction was first adopted it was thought, that continuous stone sills for the superstructure, although not the cheapest, would be found to be better than wood. The whole line furnishing an abundance of limestone, of a quality deemed sufficiently solid and durable, that material was chosen in preference to the wood sleepers. It has been found however here as well as elsewhere, that this preference was erroneous.*

Besides the greater cost, it has been found that stone sills will not bear for any length of time the action of the machinery used for the transportation of freight; the surface in contact with the iron plate rail is so liable to wear and crumble, that constant attention is necessary to keep these sills in repair, and a great increase of the requisite motive power from the same cause has been found indispensable.

Twenty odd hands and two superintending engineers have been constantly employed on the repairs. The heavy expense thus necessarily incurred has been chiefly confined to the stone sills and embankments; the wood superstructure being found as sound and perfect as when first laid down.

The mode of repairing adopted to meet the emergency of the case, is to remove the broken particles of the stone and redress the surface of the sills, so as to admit a

*The President and Directors of the Baltimore and Ohio Railroad Company, in their last Annual Report, say—"The wooden string piece and sleepers, with a plate rail 2¼ by 5-8 inches were first laid down; then stone blocks were substituted in place of the wooden sleeper; then the log rail was used; and then the continuous stone string piece was devised, and considered the perfection of the system. Experience proved that of these four modes, the first was decidedly the best, and the last decidedly the worst." This is also our experience.

sill of oak two inches thick under the iron rail. This has been found to answer a good purpose, and the road has thus been improved; but a more permanent plan must sooner or later be resorted to. The embankments generally have been enlarged and are in good order. Every thing that could have been reasonably expected has been done during the past inclement winter to keep the road in repair, and to continue to accommodate the public.

In the construction of the remainder of the line from Louisville to Frankfort, wood string pieces will be used to the exclusion of stone sills. It has also been determined to grade that portion of the line for a double track, with a view to lay down a second line of rails as soon as practicable after the completion of the first.

An accident unfortunately happened in March last which caused the loss of lives—an occurrence, although unavoidable, deeply to be lamented. It had been the aim of the Board to employ none but competent agents. The utmost confidence was reposed in the judgment and discretion of the manager of the train of cars; the engineer in charge of the locomotive was known to be skillful and attentive, and for greater safety the speed has uniformly been less than on other Railroads. Notwithstanding these precautions, on the occasion alluded to, the flanches of the wheels of the engine while passing at the usual speed over an embankment, lost their hold upon the rails, and before the breaks could be used the engine and several cars, (one of them containing a large number of passengers,) were upset and broken. Two individuals were killed and several wounded. It is probably not within the scope of human invention to devise a mode of travelling entirely free from all hazard. Little subject as ours is to accidents of any kind, yet, greater security may be attained by longer experience; but a higher sense of responsibility or more zealous efforts to discharge all the duties of their respective stations, cannot be expected from agents. In consequence of the respectability of the sufferers and the novelty of the occurrence, public attention has been particularly directed to it, while Stage and Steamboat accidents, happening almost daily, are but little noticed and soon forgotten. The Board are perfectly satisfied, that this accident was not caused by carelessness or neglect.

Since the opening of the road to the head of the Inclined Plane at Frankfort, at the beginning of last year, a train of frieght cars propelled by a locomotive engine imported from England, and a line of horse cars for the conveyance of the mail and passengers, have been in use. There has been a gradual increase of business of every description, but no inconsiderable portion of the trade of this section is still carried on in the old way, and will continue to be, until the line shall be completed to Louisville, particularly at those seasons of the year when the Kentucky river ceases to be navigable. An arrangement is in progress to secure the transportation of the manufactures of this city during the summer, which it is believed will be successful.

In the course of last year a machine shop of considerable extent was established, at the head of which Mr. Charles B. Lewis, a skillful artizan, was placed. Under his direction our freight and passenger cars have been constructed on an improved plan. The business of transportation generally has recently been under the management of the same individual, to whom we are indebted for the introducrion of a system which has greatly facilitated the business. His practical knowledge has enabled him to adapt the machinery to the road, and to make from time to time such alterations as observation and experience might suggest.

Want of iron for the machine shop and delay in receiving a new locomotive purchased in January last, retarded the business of the shop, and rendered incomplete the system of organization which had been devised for the transportation.

From the causes mentioned the cost of machinery and the amount of motive power necessary for the business of the road, as well as the expense of repairs, have greatly exceeded the calculations.* To meet this unexpected increase of expenditure, an act was passed by the last Legislature in conformity with a memorial on the subject, authorising a small increase of the rates of transportation. The charges are still low, being about half the usual rates of wagonage on the Turnpike roads.

If we have miscalculated in some items as to the expenses of our work, we have assurances that the amount of business, both in freight and passengers, when the road shall be completed, will also greatly exceed the estimates; when that is accomplished the stockholders will derive full compensation for their investments. In the meantime they have the satisfaction to know, that the public have been greatly benefitted by their enterprize; that impulse has been given to the spirit of public improvement in all parts of the State, and that the products of the country will soon be relieved from all unnecessary burthens in reaching a market. Along the line of a railway between Lexington and Frankfort, the salutary influences of the work are felt and appreciated, and it will be rendered still more useful by the erection of one or two warehouses as depots for produce.

Additional turnouts have been recently constructed at convenient places, between the regular stations, with a view to facilitate the way transportation. An engine house at the head of the Inclined Plane, two wood houses, and buildings to inclose the water cisterns, are yet to be erected.

About one fifth of the entire cost of transporting freight on the line, is expended at the Inclined Plane. The propriety of re-locating part of the road at some future time, so as to avoid the expense and loss of time caused by this obstruction, is worthy of consideration.

The mode of using this Plane by extra horse power, is considered the most economical that can be adopted. A cheap and simple mcahine, invented and constructed by Mr. Lewis, which he calls *a slide break*, has rendered the operations on the Plane as safe as on any other part of the road. An experiment accidentally made when it was first used in January last, so fully established this fact, that it cannot be doubted.

A subscription for two thousand shares of the stock by the city of Louisville, and a like subscription by the Board of Internal Improvement on the part of the State, in pursuance of an act of the last session, have placed the company in a situation to prosecute the work to its termination at the Ohio River. A call of ten per cent. on the subscriptions of the city of Louisville has been paid, and the payment of ten per cent. of the subscription of the State satisfactorily arranged.

The Engineer corps having been re-organized and enlarged, is now under the direction of Capt. Thomas F. Purcell, a gentleman possessing the requisite science and experience to conduct this important department. Since he commenced his examinations of the route in April, with a view to the final location and lettings, several additional lines have been run, between Bear Grass Creek near Louisville, and the high ground in the vicinity of Middletown, all of which have been found eligible. The selection of the best route will be immediately made and twenty miles of the road placed under contract next month. It is intended at the same time to let the building of the bridge across the Kentucky river at Frankfort—the plan of which will be adopted to general purposes under the act of last session which authorises the erection of a toll bridge by the company.—(See Ap. 3.)

A thorough examination of that portion of the line on Benson creek, made by Professor Lutz last year, established the important fact, that an inclined plane on the south side of the Kentucky river could be avoided by a small increase of the original grade. The examinations made of the Louisville end of the line by Capt. Purcell show, that a like increase of the grade, say from 30 to 50 feet, in the neighborhood of Bear Grass Creek will enable him to enlarge the curves to any desirable extent, and to make the location nearly in a direct line.

One of the objects of the reconnoisance of Professor Lutz, was to find a practicable route leading through the town of Shelbyville. After devoting much time to this survey he was compelled to report unfavorably. The deep interest felt in this matter by the citizens of the town of Shelbyville, induced the Board to order this experimental line to be run, with a view to accommodate those friendly to the work. The same motive will prompt them to adopt any change in the location, that may not be detrimental to the interests of the company, which future examinations may point out.

The Board have carefully avoided the acquisition of real estate beyond the wants of the Company. Two farms purchased in Woodford to obviate difficulties as to the

*It has been a common error to underrate the cost of motive power and repairs of machinery. 'The annual expense of working a locomotive engine on the Liverpool and Manchester Railway is stated to be £2107 14s. instead of £270 12s. 10d as at first supposed it would have been.'

right of way, have been in part disposed of. One of them has been laid off into town lots; from the improvements already made it promises soon to become a village of importance to the neighborhood in which it is located.

The accompanying Tables marked A. B. C. D. E. show the sums received for the transportation and freight monthly, since June, 1835, the total amount of expenses during the same period, a general statement of the receipts and expenditures, and a description of the freight. The documents 1. 2. 3. 4. referred to in this report, are also annexed.

THOMAS SMITH,
President Lexington and Ohio Railroad Company.

May 14, 1836.

APPENDIX.

No. 1.

TO THE HONORABLE THE LEGISLATURE OF KENTUCKY. THE MEMORIAL OF THE PRESIDENT, DIRECTORS, &c., OF THE LEXINGTON AND OHIO RAILROAD, RESPECTFULLY SHOWETH:

That ever since the organization of the Company in the year 1830, under a charter of the Legislature, the best efforts of the stockholders and their officers have been faithfully and assiduously devoted to the execution of the work, and to the attainment of the great public benefits expected to result from its completion. But owing to several causes they have not been able to obtain the requisite funds to progress with the work as rapidly as the public interest required.

While doubts existed in the public mind as to the practicability of constructing a railroad on the line proposed from Lexington to Louisville, the stockholders resolved to persevere upon their own resources and at their own risk, relying upon their success to remove objections and secure to their enterprize a just share of public favor. They have at length accomplished their primary object. The capital and public spirit of the citizens of a single town, almost unaided, have not only proved the practicability and great value of railroad communication in this as well as other States, but by their example they have given an impulse to other works of the same character and to the great cause of internal improvement in every form—and they now behold with pride Kentucky marching forward to the highest rank among her sisters of the union.

A division of the work from Lexington to the seat of government, embracing nearly one third of the whole distance, and almost one half the whole cost, has been completed and is now in profitable use.—The business of that portion of the State through which it passes, is greatly benefitted by it; the prices of property of every description have been enhanced, and additional value has been given to labor.

The fullest demonstration of the utility of the work being thus presented, the President and Directors of the Company have resolved to resort to all the means attainable to finish the remainder of the line to the Ohio river in as short a period as practicable. With this view they now petition your honorable body for the patronage of the State. Recently a subscription to the stock of the company to the amount of two hundred thousand dollars has been made by the city of Louisville. According to the estimates of the engineers who have minutely examined the line, only four hundred thousand dollars, in addition to the Louisville subscription, will be required to finish the construction and furnish the necessary machinery. A State subscription will enable the Board of Directors to put the unfinished portion immediately under contract, and possibly, to complete it in the course of the ensuing year. An adequate investment on the part of the State will accomplish the noblest enterprize ever projected in this commonwealth, and realize all those public advantages which must flow from a speedy, certain and cheap intercourse between the fertile interior counties and our commercial emporium. The certainty of a dividend beyond what could be anticipated from a like investment in any other chartered company, can be easily shown. In the course of the past year, two semi-annual dividends have been declared by the Board of Directors of the nett profits resulting from the business of the road from Lexington to the head of the inclined plane near Frankfort, amounting to six and three-fourths per cent. on the capital paid in.—This being the result at the commencement, before well a adjusted system of economy and transportation had been devised, and while but an inconsiderable portion of the regular business of the section of country could, from the insufficiency of the machinery and motive power, be transacted, it is hazarding but little to assert, that no other work, when it shall be completed, promises to equal it in dividends.

The annexed statement from the Treasurer of the company will show the amount paid in by the stockholders, the cost of real estate, buildings and machinery, and the cost of the work as far as it has been completed.

The President and Directors would likewise respectfully petition your honorable body to pass a law amendatory of the charter in the following particulars, which experience has shown to be desirable and important to the interests of the company:

1. An additional charge of one and a half cents per 100 lbs. for transporting freight on the inclined plane at Frankfort—it being necessary to furnish extra power equal to this additional charge.

2. The exemption of baggage and small packages, conveyed with the passenger cars, and furniture and light bulky articles of freight from the rates specified in the charter—with authority to transport all such and other like articles, weighing less than 64 lbs. to the cubic foot, by special contract, as the charter now anthorizes to be transported, silver and gold bullion, money and mails.

Authority to charge tollage for the use of the bridge about to be erected across the Kentucky river at Frankfort.

And your petitioners will ever pray, &c.

THOMAS SMITH, President.
B. GRATZ,
J. BRAND,
E. WARFIELD,
B. W. DUDLEY,
W. H. RICHARDSON,
E. BAINBRIDGE,
C. HUNT,
L. STEPHENS,
R. HIGGINS,
J. GUTHRIE,
J BRUNE,
Directors.

EXHIBIT OF THE AFFAIRS OF THE LEXINGTON AND OHIO RAILROAD COMPANY.

	Dr.
To cost of road construction from Lexington to Frankfort,	$427,219 00
To engineering expenses, including preliminary surveys, and mathematical instruments,	30,733 61
To damages for right of way, &c.,	11,261 93
To real estate on the line,	16,116 83
To lots and buildings in Frankfort,	6,296 00
To lots and buildings in Lexington,	6,216 00
To bridges,	5,988 81
To office expenses, including salaries, printing, stationary, &c.,	11,110 77
To amount of interest paid on money borrowed, after deducting premium on bonds sold,	15,258 38
To balance of cash on hand, 9th January, 1836,	6,539 70
	$536,737 93

	Cr.
By this amount from stockholders,	$318,999 00
By this sum from passenger account, after deducting expenses,	9,200 00
By this amount from freight transportation, after deducting expenses,	2,669 08
By bills payable, money borrowed on notes of the company,	39,109 00
By this amount from bonds of the company, guaranteed by the State, sold in New-York,	108,000 00
Real estate,	16,116 83
Lots and buildings,	12,512 66
Machine shop,	14,600 00
Cars,	5,000 00
Locomotive engine,	7,000 00
Horses,	3,531 36
	$536,737 93

A. O. NEWTON, Treasurer.
Lexington, Ky., Jan.'y 9, 1836.

No. 2.

LEXINGTON, Jan. 1, 1836.

JAMES T. MOREHEAD, Esq., Governor of Kentucky.

SIR:—In your message to the General Assembly, at the opening of their session, I observe that you say you have not had any report of the progress of the Lexington and Ohio Railroad Company.

Although I am not now the official organ of that company, I will endeavor to afford you the requisite information.

At the opening of the session of last year, the main stem of the road was extended to the top of the hill near Frankfort, but it was not finished, although the cars passed on it. When a single track is made, there requires much to be done, to fit it for operative use. Since then the company have done much to finish the work, and it may now be said to be finished thus far,

During the current year they have extended the road down the inclined plane and along Broadway at Frankfort, to the market-house. The main stem of the road has been finished for use, by several double tracks and turn-outs. Warehouses have been erected at Lexington and Frankfort, of a capacity to meet all the business of transportation and storage. A manufactory of machinery has been established at Lexington, where is made and repaired all kinds of cars and coaches, suitable for the road, and an ample stock of materials is provided, consisting of wood, iron and steel

Surveys of exploration have been made from the Kentucky river to Louisville, reviewing the former ones and exploring new routes, in the hope of improvement. The valley of Benson has been explored, and a way by Shelbyville, but found to be very broken and expensive, and attempts have been made to secure the right of way, which has not been entirely successful, but it is believed the right can be secured of what remains on such terms as will justify the making of the road to Louisville, and the Board has resolved to progress with the work next spring, to begin at Louisville.

The difficulties which heretofore existed with the city of Louisville, have been overcome, and that city has subscribed for two thousand shares of the stock.

Of the bonds guaranteed by the State the Board have sold $108,000; the balance of $12,000 has not yet been sold—the interest upon the bonds sold, has been regularly paid in New-York.

Of the business on that part of the road in use, I am not able to give a detailed account. But the demonstrations made this year, justifies the anticipations of the company, that when the road is extended to the Ohio river, the advantages to the country will be very great, and will ensure to the enterprising stockholders a reasonable profit on the money expended.

One especial advantage to neighborhoods through which the road passes, is a uniform enhancement in the value of real estate. This has been found already along the road, as it has been in the other States of the Union, as also in Europe. When the inhabitants are made duly sensible of these certain advantages to them, one may reasonably expect, that the objections now made by them to the passage of the road through their lands, will give way, and instead of opposition, encouragement may be expected to enterprizes of the like kind.

Respectfully, your obedient servant,

F. L. TURNER.

To his Excellency, JAMES T. MOREHEAD:

SIR:—It is inferred from your Excellency's late annual message to the Legislature now in session, that a communication relative to the Lexington and Ohio Railroad, would not be unacceptable to you. I therefore submit the following report, touching the present condition and prospects of that work.

During the past year, the attention of the Board of Directors has been mainly directed—1st. To a further exploration and location of the line between Frankfort and Louisville—2d. To the completion of the Inclined Plane at Frankfort—3d. To the repairing and improving the road between Lexington and the Inclined Plane—4th. To the conveyance of the passengers and freight on the part of the work already in a state for use, and to the organization of a system of transportation—5th. To providing the requisite machinery and means of transportation on a scale suited to the wants of the public.

1st. With respect to the first object, I am happy to say that the differences of opinion which long existed between the Board of Directors and the municipal authorities of Louisville, and which have procrastinated the work, have been satisfactorily adjusted and that a subscription to the stock of the company on the part of that city, for two thousand shares, has been made. But oth other necessary preliminary arrangements could not be made in time to let any part of the work the present season on the south side of the Kentucky river. It is however confidently hoped that we shall be prepared early in the spring to contract for the grading, and in the course of the present year be able to complete no inconsiderable portion the work. With the cordial co-operation of the authorities and citizens of Louisville, deeply interested as they are in the enterprize, together with other aids which may be reasonably calculated upon, this company may now look forward to a speedy termination of their labors.

2d. The Inclined Plane descending the hill at Frankfort, from the peculiar character of the rock and earth through which the excavations have been made, has been found to be a work of more labor and expense than at first anticipated. Owing to unforeseen difficulties in the construction of this Plane, the extension of the road through the city of Frankfort, to the margin of the Kentucky river, could not be effected, much to the regret of the Board, in time to be used the present season. It was therefore thought best under the circumstances, to erect a suitable temporary depot at the foot of the Plane in the city. By the use of this depot, and the Plane which has been finished, a most vexatious interruption to business and travel will be avoided in future.

3d. The repairing of the road the past year required much labor. Experience has proved that stone sills are more liable than wood to be damaged by the action of the machinery used in transportation—and that when out of order the repairing is more expensive and tedious. Some of the embankments required enlarging, and the defects of one of the principal viaducts have been remedied. Business was consequently suspended in part for several weeks, but the daily trips of the passenger cars were regularly performed.

4th. Facilities to a considerable extent from the moment of opening the road to Frankfort, have been given to the trade and travel of this section of the State; yet the difficulties to be surmounted in organizing an entirely new and novel system of transportation, were found to be of no small magnitude. It was impossible to foresee at the commencement, the full extent of the various wants of the community. In the absence of experience, it could not be reasonably expected that a perfect system, adapted to every interest, should spring at once into existence. Time was necessary to test the plans adopted. Much improvement has been made and will continue to be made, with the view to render the work useful. But imperfect and unfinished as it is, I must be permitted to say, that great public accommodation has been afforded by it. The value and extent of that accommodation will be appreciated properly by those who enjoy the benefits of it at a season of the year when all unimproved highways are almost impassable. During the month of December, the number of passengers conveyed amounted to 1863, and the number of tons of freight to 272, exclusive of fuel and lumber. Our business enabled the Board of Directors in July last, to declare a dividend of 3½ per cent., and on the 7th instant a second semi-annual dividend of two per cent., reserving a surplus.

5th. For the purpose of supplying the machinery indispensable to the transportation on the road, a machine shop under the direction of Mr. Charles B. Lewis, a machinist of rare talents, has been established, and is now in operation. A full supply of freight and passenger cars, the workmanship of our own mechanics, will soon be at the disposal of the company; these with two additional Locomotive Engines, which have been ordered with a view to substitute steam for horse power, and are expected to arrive early in the spring, will enable the company to meet all demands for transportation, and to demonstrate more fully the superiority of this mode of Internal Improvement over all others.

I will not trouble your excellency with further details of the business of a private corporation. Nor need I remind you that it has thus far been sustained and prosecuted almost exclusively by the public spirited citizens of a single interior town, although when completed, its benefits will be felt by the whole community. Already new impulses have been given by it to almost every branch of business; and with respect to other works of Internal Improvement recently commenced, it stands in high relation of a *first cause.* Why then should it not participate with those other works in favor of the Legislature, and share with

them the bounty of the State? While the work was deemed to be a visioanry and impracticable project, the stockholders were content to rely upon their own resources to surmount prejudice, and opposition, and to prove its utility—looking forward to a season more auspicious to urge its claims to State patronage. The time has now arrived. One year's use of a portion of it, has demonstrated, that it will be productive of all the public good anticipated from it, and that the capital invested will give a good return of interest to the stockholders. In both respects the expectations of its original friends have been more than realized—for it was never imagined by them, that much profit could be derived from an interior division of a great work designed to subserve the general purposes of commerce in connection with navigation to all ports of the world; not that the local business of a neighborhood would be productive of as much public good relatively, as that which would flow from the use of the whole line.

In addition to the means in hand or available in the course of the year, it is estimated that the sum of four hundred thousand dollars will be required to complete the work to Louisville. Inasmuch as the Legislature seems to have adopted the policy of aiding with its subscriptions, as joint co partner, other chartered companies for the purposes of Internal Improvement, it is respectfully submitted whether any other work can present stronger claims to State patronage—whether the funds of the State can be more usefully or profitably invested than in the finishing of this road. In every point of view it is desirable that the connexion with the Ohio river at Louisville, as originally designed, should be accomplished speedily. With the aid of an adequate subscription on the part of the State, the work can be finished in the year 1837.—Without such aid it is apprehended that a much longer period must elapse before the accomplishment of that object. The question therefore, is simply this,—whether the public interest would not be better promoted by a State subscription to hasten the completion of the Lexington and Ohio Railroad, than by permitting it to linger along upon individual patronage, while other public works of no great merit, to say the least, enjoy a monopoly of the State resources.

Another subject of some importance to the interest of the company, I beg leave to mention. The highest rate allowed by the charter to be charged for transporting freight is 3½ mills per mile for a hundred pounds. It is obvious that so low a rate will not cover the expenses of the extra power necessarily required at the Inclined Plane—to say nothing of the extra cost of construction, and the extra expense to keep it in order. It will not, therefore, be thought unreasonable to ask the Legislature to authorize a small additional charge for transportation in this part of the line, and also an additional charge for transporting bulky articles of light weight. The charter authorizes special contracts for transporting specie and mails. An extension of that privilege, so as to include furniture, feathers, wool, rags, and such like articles, will surely be considered just.

Relying upon the good will of your Excellency in behalf of those who are engaged in the most laudable efforts to advance the power and wealth of the State, and your willingness to present the claims of our work to the consideration of the Legislature,

I have the honor to be,
Very respectfully your
Obedient servaut,
THOMAS SMITH,
President L & O. R. R. Co.
January 12, 1836.

No. 3.

AN ACT TO AMEND THE CHARTER OF THE LEXINGTON AND OHIO RAILROAD COMPANY. [PASSED 20TH FEBRUARY, 1836.]

SECTION 1. *Be it enacted by the General Assembly of the Commonwealth of Kentucky.* That the twentieth Section of an act to incorporate the Lexington and Ohio Railroad Company, approved January the twenty-seventh, one thousand eight hundred and thirty, be so amended as to authorize said Company to charge for transporting all single packages weighing less than one hundred pounds, twenty-five cents from Lexington to Frankfort, and all intermediate places, and at that rate if such packages weigh more than one hundred pounds, and when transported over any part of said road, the same rate may be charged according to the distance:—for transporting produce and merchandize, or property of any kind or description, at a rate not exceeding three and a half mills per mile; and for the transportation of passengers not exceeding five cents per mile for each passenger, with his baggage not exceeding forty pounds.

SEC. 2. That live stock, poultry, feathers, furniture, wood [wool] rags, and other light, bulky articles, also silver and gold bullion, money of all descriptions and mails be excepted from the rates of toll provided for in the first section of this act; and it may be lawful for said Company by their President and Directors, or a majority of them, or their agents, to contract especially for the transportation of such articles, and all others weighing less than sixty-five pounds to the square foot, upon such terms as the parties may agree upon.

SEC. 3. That the said Lexington and Ohio Railroad Company be, and they are hereby vested with all the rights and privileges, powers and liabilities, contained in an act of the General Assembly of this Commonwealth, entitled "an act to incorporate the Franklin Bridge Company."

SEC. 4. That it shall be lawful for the President and Directors of said Company to establish by their by-laws, rates of storage, and other fees or charges, for receiving, forwarding or storing such articles or packages as may be deposited in the warehouses, or with their agents for safe keeping.

SEC. 5. That it shall not be lawful for any person to ride on said Railroad or its embankments, or drive thereon any wagon, cart or other vehicle, or live stock, without the assent of said Company, their agents or servants; and any person offending herein shall be liable to be prosecuted before a Mayor of a city or a Justice of the Peace, and if a free person, fined any sum under five pounds, but not less than five dollars, and costs,—and if a slave, shall be punished by stripes not exceeding twenty, in the county where the offence shall be committed; but nothing herein contained shall prevent the offender from being prosecuted by indictment or presentment as provided for in the twenty-third section of the Charter of the Company, if they elect to do so.

SEC. 6 That the Legislature reserves to itself the right to repeal any amendment made by this act, to the Charter establishing the Lexington and Ohio Railroad Company.

JOHN L. HELM,
Speaker of the House of Representatives.
CYRUS WINGATE,
Speaker of the Senate.
Approved. February 20, 1836.

No 4.

EXTRACT FROM THE ACT "DEFINING THE POWERS AND DUTIES OF THE BOARD OF INTERNAL IMPROVEMENT, AND FOR OTHER PURPOSES."

APPROVED, February 29th, 1836.

"SECTION 28. That the said Board be, and are hereby authorized to subscribe for stock in the Lexington and Ohio Railroad Company, to the amount of two hundred thousand dollars.

The said two hundred thousand dollars in the Lexington and Ohio Railroad Company to be paid by the said Board in the same name and to the same amount, as the subscriptions by individuals or bodies corporate shall hereafter be paid."

TABLE A.

Statement of the Revenue received for the transportation of passengers on the Lexington and Ohio Railroad from the 22 June 1835, to 13 May, 1836, and also of the balance to the credit of that account on the 22 June, 1835.

1835.	June,	this amount,	$996 02
	July,	do.	2423 56
	August,	do.	2285 05
	September,	do.	1741 80
	October,	do.	1734 33
	November,	do.	1654 05
	December,	do.	2242 74
1836.	January,	do.	1815 22
	February,	do.	2556 57
	March,	do.	2199 85
	April,	do.	2255 91
	May,	do.	823 99
			$22,529 09
This amount to the credit of passenger account on the 22 June after deducting expenses,			$16,182 37
			$32,711 46

A. O. NEWTON, Treasurer.
Lexington, Ky., May 13, 1836.

TABLE B.

Statement of the Revenue received for the transportation of tonnage on the Lexington and Ohio Railroad, from the 22 June

1835 to the 13 May, 1836, and also of the balance to credit of that account on the 22 June, 1835.

1835.	June,	this amount,	$356 70
	July,	do.	886 20
	August,	do.	355 00
	September,	do.	141 97
	October,	do.	290 00
	November,	do.	325 00
	December,	do.	507 50
1836.	January,	do.	503 02
	February,	do.	243 89
	March,	do.	560 58
	April,	do.	432 20
	May,	do.	200 00
			$4,802 06

This amount to the credit of freight account on the 22 June, after deducting expenses,	$2,055 50
This amount due to be collected for freight,	$3,500 00
	$10,357 56

A. O. NEWTON, Treasurer.
Lexington, May 13, 1836.

TABLE C.

Statement of the expenses incurred in working the Lexington and Ohio Railroad since 22 June 1835, to the 13 May, 1836.

ITEM 1st. Expenses of Railway, including feed, shoeing and attendance on horses; also expense of Locomotive, salaries of agents and conductors, and the superintendant of transportation,	$16,551 47
ITEM 2d. This amount paid for the repairs of Railway including salary of the superintending Engineer,	$8 672 17
	$25,223 64

A. O. NEWTON, Treasurer.
Lexington, May 13, 1836.

TABLE D.

General Statement of the Receipts and expenses of the Lexington and Ohio Railroad, from the 22 June, 1835, to the 13 May, 1836, embracing the amounts disbursed for transportation, and for the maintenance and repairs of the Railway; also, the dividends paid to stockholders.

RECEIPTS.

From passengers per table A,	$32,711 46
From tonnage or transportation,	10,357 56
	$43,069 02

EXPENSES.

Of transportation item 1st, per table C,	$16,551 47
Repairs of Railway item 2d per table C,	8,672 17
	$25,223 64
Dividend paid 1st July, 1835,	12,711 00
Ditto paid 1st January, 1836,	2,893 52
	40,828 16
Nett Revenue,	$2,240 86

A. O. NEWTON, Treasurer.
Lexington, May 13, 1836.

SECOND ANNUAL REPORT OF THE PRESIDENT AND DIRECTORS OF THE SANDY AND BEAVER CANAL COMPANY.

AT a Meeting of the Stockholders of the Sandy and Beaver Canal Company, held at their office in New-Lisbon, Ohio, on the 10th day of August, 1836—

On motion of DAVID BEGGS, Esq.,

Resolved, That the Annual Reports of the Directors and Engineer be accepted and published, and that the thanks of the Stockholders be presented to the President and Directors for their strict attention to the interests of the Company.

Resolved, That the Stockholders, having the most entire confidence in the promptness, skill, and ability of the Chief Engineer, E. H. Gill, Esq., take this method of expressing their approbation of his course and direction of the work.

The following named gentlemen were elected Directors of the Company for the ensuing year:

BENJAMIN HANNA, *President*.

Directors.

Elderkin Potter,	William Christmas,
Jehu Brown,	Timothy Abbott,
James Hambleton,	Lindsey Nicholson.

Michael Arter, *Treasurer*.
Charles D. Hostetter, *Secretary*.

REPORT.

THE President and Directors of the Sandy and Beaver Canal Company, have the pleasure to present to the Stockholders their Second Annual Report.

In the last year, difficulties have been thrown in the path of the Board, with which they have had to contend, but which, happily, they have been enabled to surmount; and it is hoped that the Company is now placed in a situation, that nothing, other than physical obstacles, will impede their progress, until the final completion of the work.

An application was made at the last session of the Legislature of Ohio, for the power of borrowing money for the purpose of pressing onward more rapidly with the work on the Canal, as also to relieve the Stockholders from the rapid call made upon them by the Board to meet the demands of the Company; which application or request was deemed so reasonable in itself, that it was presumed no objection could or would be raised by an individual member; but to our great surprise, although every effort was made by the Senator from this district, as also the Senators from Stark and Tuscarawas counties, no amendment of the charter, in that particular, could be obtained.

At the last session of the Legislature, the office of Canal Commissioner was abolished, and a Board of Public Works created by law, and all the duties of those officers transferred to that Board: and we congratulate the stockholders of the Company, that the State has those agents to guard its public works who will dispense equal justice to all.

We now hope, and we have strong grounds to hope, that a bright day has dawned upon us. The loan of five hundred thousand dollars, which the Stockholders instructed the Board to obtain in March last, has been procured on terms, taking into consideration the money market, deemed favorable to the Company, by the Board, and by our Commissioners in Philadelphia. The transfer of stock, on the books of the Company, without the formality required in the transfer of real estate, by an act of the Legislature of Ohio, as also of Pennsylvania, has been obtained; and that provisions in our charter, requiring such formality, so objectionable to the holders of stock, has been repealed. And we would here remark, that for this amendment, as also for their other efforts in our favor, we owe much to those members of the Legislature residing in the immediate vicinity of the line of the Canal: to name individuals would be invidious—all used their best efforts in our favor, and all are entitled to the thanks of the Stockholders, for their exertions in behalf of the Company. Another important step has been taken for the interest of the Company: the Board of Public Works, in pursuance of a resolution of the Legislature of the State, have ordered a survey of a Canal or Railroad line, from the terminating point of the Sandy and Beaver Canal, on the Ohio Canal, at Boliver, to the mouth of the Auglaize, the connecting point of the Miami and Wabash and Erie Canals. An Engineer has been detailed for the service, and is now engaged in the survey. From the known character of the country, no doubt can be entertained that a favorable report will be made; and it is equally certain that, if the proper efforts are made by those immediately interested, this work must and will be accomplished, either by Legislative aid or individual enterprise.

The Michigan and Illinois Canal, destined to connect Lake Michigan with the Mississippi, by the Illinois river, is, or will be, placed under contract the present season, as also a canal from the Wabash and Erie Canal, to connect with the Michigan and Illinois Canal, at the outlet of Grass Lake.* Let, then, this contemplated im-

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* The authority for this statement is a Letter from a gentleman in the State of Illinois, to the Editor of the "Oneida Whig," dated May 16, 1836.

"We have information from sources, of the correctness of which no doubt can be entertained, that the State of Illinois has in contemplation and under contract 446 miles of canal and railroad: The State of Indiana has 1700 miles of canal and railroad in contemplation, and 200 miles of canal and railroad under contract, or to be placed under contract the present season; and that State at the last session of their Legislature, appropriated eight millions of dollars for internal improvements: The State of Kentucky has in contemplation or under contract, 300 miles of canal and railroad: Michigan has 300 miles of canal and railroad in contemplation or under contract; and the State of Ohio has 400 miles of canal completed, and 1200 miles of canal and railroad in contemplation or under contract. And from the character of the country and the importance of the works to the several States interested, no doubt can be entertained that the larger portion of those works will be *made*, and when *made*, will connect with each other."

We will state one other fact, showing the importance of the connection from Bolivar to the Wabash and Erie Canal, at the mouth of the Auglaize: a railroad is in contemplation or under contract, from the Wabash river, from the termination of the Wabash and Erie Canal, to LeGrange, on the Mississippi, 500 miles above the mouth of the Ohio. From that point, following the Mississippi and Ohio to Pittsburg, and from thence to Philadelphia, by the Pennsylvania Canal and Railroad, cannot be less than 1900 miles. From the same point, by railroad and canal and the contemplated improvement, from the mouth of the Auglaize river to Bolivar, from thence by the Sandy and Beaver Canal to Pittsburg, and from thence by the Pennsylvania Canal and Rail-

road to Philadelphia, the distance cannot provement, from Boliver to the mouth of the Auglaize, a distance not exceeding 150 miles be completed,-and you open, by works now made and making, a direct communication, by Canal and Railroad, of more than 1000 miles in extent, from the city of Philadelphia, through the interior of Ohio, Indiana, and Illinois, to the southern extremity of Lake Michigan, and to the Mississippi, at the mouth of the Illinois river. Can any one doubt that this remaining work, connecting the Sandy and Beaver Canal with the Miami and Wabash and Erie Canals, will remain long unaccomplished? If he doubts, he is unacquainted with the spirit of the times and the age in which he lives. Complete this work, and you open a direct communication, through a country unsurpassed in the richness of its soil, and which is now rapidly changing by the hands of the settler; a country destined to become the granary of the Atlantic States and of Europe. Complete this work, and Philadelphia can say, that, by *her enterprize* and *her wealth*, aided by the munificence of the States interested, a work has been accomplished, of far greater importance than any of the boasted canals of Europe, or the far-famed works of Asia; and that, seated on the borders of the Atlantic, her arms are extended for the purposes of commerce, the arts, and the wants of civilized life, to the base of the Rocky Mountains, on the one hand, and to the regions of frost and snow, at the head of the Mississippi, and the great Lakes of the "far West" on the other. We make no apology for dwelling thus long upon this subject—it is so vast and so important to the interests of our common country, as also of much vital importance to the interests of this Company, it needs none. And we cannot withhold the meed of praise to our principal Engineer, for lying broad and deep, upon the waters of the Sandy and Beaver Canal, the foundation of an extensive and extending commerce; believing, as we do, that the time will arrive, when that commerce will be only limited by the capacity of a work, affording the greatest facilities, and of enlarged dimensions.*

To estimate the value of this work or the value of the stock, we deem unnecessary: the value of the stock must be rated, at a day not distant, by the liberality of the charter alone.

The Report of the Engineer, which accompanies this paper, gives a clear and definite expose of the progress of the work for the year past; and any additional remarks from us would be superfluous; yet we cannot refrain from observing, that much credit is due to him and his assistants, for their attention to every part of the work: the greatest caution has been used to procure the most durable materials, as well as the best hydraulic cement, and so far as we are competent to form an opinion, the stone work, so important to works of this character, is of the most stable kind, and will favorably compare with any work, now completed or in progress, in the United States.

The completion of this work, we believe, will be protracted beyond the period first contemplated, owing to the difficulty of procuring laborers, occasioned by the multiplicity of public works now on hand in the United States, a part of which are in our immediate vicinity; to what extent we cannot now say, as the cause may operate more or less favorably in future.

The amount already expended and due by the Company on the work, as appears by the Report of the Engineer, is $481,723 09. The amount paid for real estate is $48,621 18. The money thus invested, including interest, it is confidently believed, will be more than refunded to the Company, after the Canal is completed, the Company retaining only those portions that are important to the Canal and the works connected therewith.

By order of the Board,

BENJAMIN HANNA, President.

CANAL OFFICE, NEW-LISBON, Ohio. }
August 10th, 1836. }

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exceed 1100 miles, making a difference in favor of the last named route of 800 miles.

*In a Buffalo paper it is stated, that in *one day* in the month of July last, 15 000 barrels of Ohio flour were landed on, the wharves of that city.

ENGINEER'S REPORT.

To the President and Directors of the Sandy and Beaver Canal Company.

GENTLEMEN,—I have the honor to lay before you the following Report, exhibiting the present condition of the work under my direction.

The construction of the canal during the interval which has elapsed since my last Report, has been steadily advancing, but not with as much activity and energy as I anticipated. Indeed, the unexampled demand for mechanics and laborers, and the very great increase in the price of provisions, owing to the large amount of public work in progress in various portions of the country, rendered it almost impossible for the contractors to place sufficient force on their jobs to complete them by the stipulated period, without paying prices far above what their contract prices would justify; and to have urged such a measure would have proved ruinous to them, and caused the Company to sustain a heavy loss, as the work under existing circumstances could not be re-let without an advance of at least twenty-five per cent. on the original prices. Notwithstanding these obstacles, a large amount of work has been done. But little more than a year has transpired since active operations were commenced on the line, and in that short period, as will be seen by the annexed tabular statements,* one dam and the masonry of 11 locks have been completed, in addition to which, 7000 perches of masonry for dams and locks have been laid, 15,843 perches of stone, 270,600 linear feet of timber, and 248,200 feet of plank delivered. Equal to 62 sections or 31 miles of canal and towing-path along the pools are finished, involving the excavation of 1,482,551 cubic yards of earth, 146,856 cubic yards of rock and slate, and the formation of 472,838 cubic yards of embankment, together with 35,002 cubic yards of rip rap wall, and 5303 perches of slope wall

Nearly all the heavy sections on the line, to complete which would require more than an ordinary period of time, are now under contract and in a state of forwardness.—The reservoir mound on Cold Run will be completed in a few days; the West fork reservoir mound, early next season. The deep cut at the western end of the tunnel, a work of some magnitude, comprising sections number $5\frac{1}{2}$, 6, $6\frac{1}{2}$, 7, $7\frac{1}{2}$ and 8, of the Middle Division, has been prosecuted with energy by the contractors, Messrs. Stewart & Mears, 330,000 cubic yards of excavation having been removed by them during the last twelve months; those sections will be completed next season.

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* In possession of the Agent at the Bank of Pennsylvania.

The tunnel and eastern deep cut were re-let in February last, to Messrs. Young & Carmichael, contractors of known energy and perseverance. They have obligated themselves to have the work finished by the 15th of October, 1837. Two large working shafts have been sunk, and openings formed in the drift; the material to be excavated, is a sandstone of remarkably fine texture, easily removed, and sufficiently permanent to stand without arching. The excavation of sections number 15 and 16, Middle Division, (heavy sections,) has progressed with spirit. About ten feet above the level of canal bottom, a horizontal vein of very excellent bituminous coal twenty inches in thickness has been discovered, and immediately under it is a strata of hydraulic limestone, two feet in thickness; the latter is now being used in the construction of masonry on the line.

The embankment across the Tuscarawas valley, on the Western Division, commenced in November last by James Giddings, contractor, is now nearly completed. The various locks and dams under contract, are all in a state of forwardness, and I am fully of opinion that by the close of the present season, upwards of 30 locks, 9 dams, and 72 sections, or 36 miles of canal and towing path will be completed. The force at present employed on the line, is equal to 2000 men, and at no period during the last twelve months has it been less than 1500.

The masonry of the locks thus far constructed, is generally of a superior character. Locks number 28, 29, 30, 31, 32 and 33, erected by Messrs. Rankin, Chamers & Co., are well and faithfully built; likewise 41 and 42 by Loring, Lush & Co.; and 49 by Kinnimont & Stewart, all are fine specimens of hydraulic masonry.

In the vicinity of the summit, where an economical use of water is desirable, I have adopted a new plan for the upper gates of the locks. The gate is similar to those used in the weigh locks, and is intended, when open, to rest or lie flat on the lock floor, and to be raised for the purpose of closing by means of a chain and ratchet wheel. This gate I am of opinion, will prove more durable, and less expensive, than the ordinary one.

The Eastern Division of the line is now under the superintendence of Charles A. Olmsted, assistant engineer, aided by James Bradley, sub-assistant, and Augustus Howe, target bearer. The Middle Division, and the first fifteen sections of the Western, are under the direction of Joshua Malin, assisted by Roger Morrledge and Washington Gill, as sub-assistants, and John M. Hamilton and Lot Dixon, target bearers; and the western fifteen miles of Western Division, are under the charge of J. B. Conard, aided by W. R. Harrison, sub-assistant, and Pliny Hoagland, target bearer. The mason work is under the superintendence of William Huntsman and Walter Scott, and the carpenter work under the charge of Daniel Smith. The various duties assigned these gentlemen, have been performed with promptness and fidelity, and much to my satisfaction.

Recent examinations along the West fork of Little Beaver Creek on the Middle Division, between sections numbers 18 and 22, have induced me to make an alteration in the location of the line there. The banks of the streams are high and precipitous.—The line was formerly traced along the western bank; the bottom of the canal being elevated from ten to thirty feet above the base of the bluff or valley of the stream, thereby causing a very heavy, expensive, insecure and leaky embankment; and as

these bluffs in most instances are formed of a material unfit for the formation of a canal embankment, it became absolutely necessary for the safety of the work that a change in the plan should be made; but one alternative presented itself, and that has been adopted; the erection of a high but short dam or mound across the valley of the stream, near the upper extremity of section No. 18, at the Hanover Road, and substitute "slack water" for canal from that to a point at or near section No. 22, where a second mound of much less magnitude is to be erected to prevent the pond from inundating the town of Gillford, and the low ground in its vicinity; the water that may collect between the latter mound and Gillford, is to be conducted into Cold Run by means of a ditch or drain terminating at Bowman's mill pond. This change in the location it is believed, will render permanent and secure the only portion of the Middle Division that was not before so, save the Company fifteen thousand dollars, and add largely to the supply of water on the summit.—The ground that will be inundated, amounts to 140 acres, nearly all of which is now in possession of the Company. It is contemplated to use one foot in depth of that surface for a reservoir which will contain 6,098,400 cubic feet of water. The inhabitants of Gillford, are somewhat dissatisfied with the alteration; they are fearful it will subject them to sickness; their fears are presumed to be perfectly groundless inasmuch as the pond will be one half mile distant from them; its banks or shores nearly vertical; the water from eight to forty feet in depth, and its surface narrow.

A reconnoisance for a continuation of the line to Beavertown, under the provisions of the amended charter granted by the Legislature of Pennsylvania, has recently been made; but other duties of a more important nature have prevented my making a detailed report and estimate of the probable cost of the route; sufficient has been done, however, to warrant me in stating, that no obstacles of a serious nature will be encountered, and that the canal can be constructed at an expense not exceeding one hundred and ninety thousand dollars more than it would cost to terminate it at the debouch of Little Beaver Creek. It may not be improper here to remark, that the amended charter from the State of Pennsylvania, is not of as liberal a character as the importance of the work should have dictated, nor such a one as might have been anticipated from that enlightened State.

The Sandy and Beaver Canal, by all conversant with the internal improvements of our country, must be viewed as a continuation of the great chain of improvements already completed in Pennsylvania, or as a link connecting it with the various improvements of the far West, extending to the rich and fertile Valley of the Mississippi River, which must ultimately tend to enrich the coffers of that State, and add immensely to the business and prosperity of its metropolis. Viewed in this light, the work is one that well deserves the fostering care of the State of Pennsylvania.

All which is respectfully submitted.

E. H. GILL, C. Engineer.

New-Lisbon, Ohio, August 8, 1836.

From the Petersburg Intelligencer.

RAILROAD MEETING.

At a meeting of the citizens of Petersburg, convened at the Court House on the 1st October, 1836.

James Macfarland Jr. was appointed Chairman, and Samuel Mordecai, Secretary.

The Chairman stated to the meeting that the object for which it was convened, was to consider the policy of constructing a railroad from Petersburg in a south-westerly direction, and if approved, to recommend it to our fellow citizens generally.

After a few remarks from several members of the meeting John D. Townes, Esq., offered the following resolutions, which were unanimously adopted.

1. *Resolved*, That this meeting approve the general plan and objects of the proposed railway from Petersburg to the south-western part of Virginia, between the waters of the Roanoke and Appomattox, and deem the work likely to promote the general interests of a large portion of Virginia, and to prove a profitable investment of capital.

2. *Resolved*, That feeling assured of the superior advantages of a route south of the Appomattox, for the transportation of commodities to and from both Richmond and ship navigation on James river, as well as to and from Petersburg—and thus offering a choice of markets and of channels of trade;—we invite the attention of the people of the producing region of country to this, and to other routes which have been proposed—and ask merely that they will aid in constructing a railway on that route which may promise upon full examination to be the most useful and profitable.

3. *Resolved*, That, in testimony of our confidence in the value of the proposed work, we recommend to the Common Hall of Petersburg, the consideration of the propriety of making a liberal subscription on the part of the town.

4. *Resolved*, As the best means of securing confidence in the proposed work, and of obtaining its speedy accomplishment, it is expedient to commence forthwith a preliminary and conditional individual subscription, to be made certain if the report of the survey of the route shall be favorable, and a charter be obtained at the next session of the Legislature, and its provisions be approved by as many persons as shall have subscribed for a majority of the shares of stock thus taken.

5. *Resolved*, That a committee of five be appointed to solicit and receive the signatures of individual subscribers in this town, and to correspond with any other committees, or individuals, in the counties and towns on and near the line of the proposed improvement, for the purpose of furthering the general objects in view.

6. *Resolved*, That the Mayor be requested to lay these proceedings before the Common Hall of Petersburg, and to ask, in the name of this meeting, the early consideration and action of that body.

7. *Resolved*, That the proposed improvements of the Roanoke, and those of the Upper Appomattox now in progress, will be highly important to the trade and prosperity of Petersburg, and will deserve all the support and aid that the influence of this town can give.

8. *Resolved*, That we fully approve of so much of the recomendationn of the Comvention lately held in Charlotte, as proposes a railway from Danville to Farmville.

The chairman appointed the following gentlemen the committee, under the 5th resolution, viz. J. D. Townes, C. F. Osborne, Edmund Ruffin, J. Y. Stockdell, and P. C. Spencer.

Resolved That the Editors of the newspapers in Petersburg, Richmond, Lynchburg, Danville and Farmville, be requeste to publish these proceedings.

JAMES MACFARLAND, JR., Chairman.
SAMUEL MORDECAI, Secretary.

CENTRAL RAILROAD.—The Macon Messenger of Thursday last, says: "The Survey for this route commenced at this place on Thursday last, by Mr. Reynolds the Assistant Engineer, and our fellow citizen Richard W. Ellis. From the knowledge Mr. E possesses of the country his services will be valuable.

Mr. Reynolds has been from infancy a resident of this State, and ranks among the first Engineers in the country.

The route from this city is by a very direct course to Harden's Mills on Stone Creek—thence up that creek a short distance to the lowest point in the dividing ridge of the waters of the Ocmulgee and Oconee, thence down Big Sandy Creek to the Oconee at or near the month of Buck Eye, in Washington county.

The principal Engineer, Judge Randall will commence a survey in a few days at Savannah and meet Mr. Reynolds about the middle of the route."

THE RAILROAD.—We have the satisfaction to announce that on Wednesday last, the brig Algerine, Capt. Gorham, arrived here from New-York with one hundred and thirty laborers for the Railroad. This important work has proceeded as rapidly as could be expected. Its progress towards completion would, however, have been much more rapid but for the difficulty of procuring hands. This difficulty is not yet removed. We understand that three or four hundred laborers are still wanted.

Contracts have been made for the excavation and embankments required on the first fifty miles of the road, and the contractors are now at work upon it.

The Brigade of Engineers under Major Graham, after having, as we understand, completed the final survey and location of the road to Brooklyn, or to some point near that place, suspended their labors for a few weeks, about the 25th of August. Towards the close of this month they will resume their examination of the route, and locate the road to Columbus.

It was the very anxious desire of the President and Directors of the Company to employ slave labor upon this work, but such is the present demand for slaves for plantation purposes, that it has been found impossible to hire blacks in any sufficient number.

It will be gratifying to the public to know that the order of the Company for the iron railing, sent to Liverpool, as mentioned in a former number of our paper, arrived just before the extraordinary rise in the price of that article had taken place. The contract was made without loss of time, and a vast saving will thus accrue to the Company.

RAILROADS IN CATTARAUGUS.—A facetious Buckeye, Ohioite says, that the system of travel through the cattaraugus woods is for every passenger to go on foot near the stage, to be ready to relieve the vehicle from any accident, on account of the deep holes and ruts in the road. This was borne quite

cheerfully, no alternative being nigh. At last, emboldened by success, the agent insisted that each passenger should carry a rail, to pry the coach out of the mud. Some good natured persons consented ; but one man declined. 'Look here,' said he to the agent, 'I have paid for a passage in your stage, and I'll go on foot to oblige you, but I won't carry a rail.'

LONG ISLAND RAILROAD.—We understand that the Directors of the Company have expressed the unanimous opinion that it is desirable to complete the branch to Hempstead this fall. They have lately imported a quantity of railroad iron, and intend to lay the rails upon the portion of the road already graded till they come to a point opposite Hempstead, when the road will be made at the same time toward Hempstead and Jericho.

The company and the people of Long Island feel it to be equally desirable to have a portion of the road put in use as soon as possible.—[L. I. Starr.]

In this day of improvement, it is shameful that so dreadful an accident as the one detailed below, should occur on a road having the benefit at least of the experience of some years.

We have seen cars and plans of cars designed to prevent any such accident. A short-sighted economy should not retard their introduction to general use.

SHOCKING RAILROAD ACCIDENT.

The following account of a most painful accident on the Columbia Railroad was left at our office by a friend, who it will be seen was a witness of the painful scene which he describes:

FAIRVIEW, Sunday, about 3 o'clock.

This afternoon, as the train for Lancaster was approaching Fairview, the axle of the forward car, or car next to the baggage, broke, which immediately precipitated the body of the car upon the railway, the fragments of the axle ripping up the bottom of the car in which was a Mr. Gibson of Philadelphia, bound to Cincinnati with his wife and children. His wife and child fell through, and nearly the whole train passed over her body.

I cannot picture to you the heart-rending scene that ensued when Mr. Gibson was called to the spot where his wife lay a mangled corpse, with the child, about 18 months old, by her side, covered with the blood of its dead mother. The top of her head was cut off, and the brains lay on both sides of the rail ; the body, feet, arms and legs broken to atoms Heavens! what a sight! the distracted man tenderly dragging from the spot the remains of his 'Julia,' calling upon her in frantic exclamations ; but she could only answer by an expiring look of agony. He next picked up his babe, and believing it too was dead. ran around among the crowd imploring assistance, when it was impossible to afford him the least consolation. The child was miraculously preserved. I was next called to witness another scene which beggars description.

A black man, who had vainly attempted to leap from the car when the accident took place, fell upon the ground, and the car running off the track upon the side he jumped, the wheels passed over both his legs and cut them off in the most shocking manner, grinding the dirt and clothing into the mangled flesh. He lay writhing in the most excruciating agony, under the body of one of the cars, until enough of assistance could be rendered to raise the car off him. He will not, it is believed, survive.

A gentleman in the forward car had his left arm broken, and breast much injured, but it is possible he will recover.

The train was propelled at the rate of 15 to 18 miles per hour at the time of the accident, and ran not more than the length of the train or 50 yards, ere it brought up.

I was with my family in the next car to the one which Mr. Gibson was in, and the fragments over which we passed, tore up the bottom without injury to any of its passengers. It was a miracle that we escaped —one of our wheels was spokeless, nothing but the naked rim left to give assurance it ever was a railroad wheel. Even the rails, for a considerable distance, were torn from their fastenings, and some broken.

This seems to be one of those accidents against which it is difficult to guard unless by some new arrangement of the wheels and axles of the cars, or perhaps by a thicker flooring to the cars.

It is mentioned that the engine and one car was immediately dispatched for Lancaster city for medical or surgical aid for the sufferers, and that before it returned the cars were set in motion.

In the hope of conveying the wounded towards medical aid, they had gone to a short turn, when the locomotive came sweeping round, and was not checked until it came in contact with the cars, and did considerable injury.—[United States Gazette]

From the Journal of the Franklin Institute.

NOTE ON THE OCCURRENCE OF BITUMINOUS COAL NEAR THE CITY OF HAVANA, IN CUBA ; BY R. C. TAYLOR, MINING ENGINEER.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN—I observe with much interest the notice of your correspondent, in the last number of the Journal of the Franklin Institute (p. 375.) of a plan for extensively working the beds of bituminous coal in Illinois. There is little doubt but that an abundant supply of coal, of the quality he describes, will be of great public utility in the South—will supersede, for many purposes, the employment of other fuel ;—and will have a widely extended market, even down to New-Orleans, to the great private advantage also, I trust, of those who are preparing to put this undertaking in execution.

I do not think, however, that the Illinois coal will form a large article of export, to the Havana for instance, as your correspondent suggest. *The existence of extensive veins of coal within the tropics is now established.* Probably it is not yet generally known, that there have been recent discoveries of coal, of very extraordinary quality, at least two points on the coast of Cuba, near the Havana. One of these is only three leagues from that city, and two miles from the sea at a place of embarkation. This mine has very recently been investigated by Mr. Clemson and myself, and forms the subject of a joint report to the proprietors, on the quality, quantity, and mode of working it efficiently.

I do not enter into a description of this singular coal, because we are preparing a separate communication for a scientific institution.

It is extremely probable that this coal which contains so remarkable a proportion of bitumen, will be exported from the Havana to most of the ports of the southern extremity of this continent.

I may add that coal occurs near the north-east end of Jamaica. Mr. De la Beche informs me, however, that these coal seams are very thin, and that none of sufficient magnitude to render them worth working have been discovered.

I am, gentlemen, respectfully,

RICHARD O. TAYLOR.

Philadelphia, July 13, 1836.

After the most costly and prolonged contest in the two Houses, upwards of 80 days in Committees, Stephenson's line of railway between London and Brighton has followed the fate of Rennie's, Cundy's, and Gibbs's, and was thrown out yesterday afternoon in the Lords' Committee, by a majority of 17 to 8 Peers. The resolution which disposed of it was as follows :—"That it is inexpedient to proceed further with this Bill during the present Session." The minority was —Richmond, Ducie, Portland, Strafford, Queensberry, Glengall, Beaufort, and Westmoreland. The majority—Verulam, Cumberland, Warwick, Bayning, Monson, Mountford, Wynford, Redesdale, Lake, Strangford, De Lisle, Abingdon, Gage, Clanricarde, Teynham, Exmouth, and Berwick. Two only of the minority and four of the majority voted without hearing the discussion or evidence. The decision there, so far as regards attendance, was *bond fide*. The principal reasons for rejecton were the decided objection of the great majority of the inhabitants of Brighton to Stephenson's line, and appearance in the Lords' Committee of the Brighton Junction Railway, a line uniting Brighton with the London and Dover (south-eastern) at Hoxted, a cutting of not more than thirty miles. The announcement of the result at the Stock Exchange was received with three loud cheers. Brighton will have to wait another year for railway connection with the metropolis.—The contest is reputed to have cost upwards of £100,000, and to have been remarkably profitable to the legal profession. —[Chronicle.]

POISONOUS PRINCIPLE OF HEMLOCK.—The principle of the Hemlock plant, which is fatal to life is, according to Professor Geiger of Heidelburg, a kind of alkali, in the shape, however, of an oily fluid. It is easily obtained by distillation. At a moderate temperature it neutralises acids without forming crystalizable salts : it contains a considerable quantity of azote, and when exposed to the air is rapidly decomposed, giving out ammonia. Professor Christison, of Edinburg, has repeated the experiment of the German chemist, and found them alike in their results. In activity this new poison hardly yields to prussic acid.—Two drops applied to a wound, or the eye of a dog, hare, or cat, bringing death in nine seconds, and the same quantity injected in the form of muriate in the formal vein of a dog kills him in three seconds at the utmost.

From the Journal of the Franklin Institute

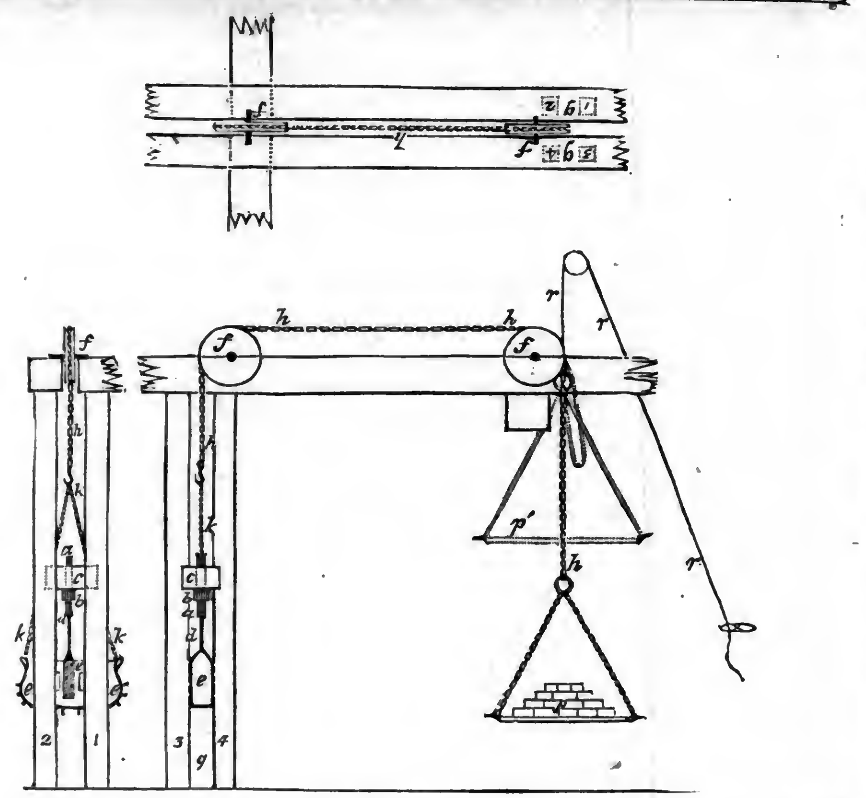
EXPERIMENTS ON THE RESISTANCE OF SAND TO MOTION THROUGH TUBES, WITH ESPECIAL REFRENCE TO ITS USE IN THE BLASTING OF ROCKS, MADE AT FORT ADAMS, NEWPORT HARBOR, UNDER THE DIRECTION OF COL. TOTTEN.—BY LIEUT. T. S. BROWN, OF THE CORPS OF ENGINEERS.

For the purpose of examining further the degree and nature of the resistance offered by sand when it is attempted to force it through a tube by direct pressure. the following apparatus was arranged, after a few preliminary trials, which had given some idea of the power it would be necessary to apply. A side and end view, and a plan of the apparatus are given in the cut on the next page.

The strong cast composition tube, *a*, about fifteen inches in length, which contained the sand, was held in a vertical position by being passed through the block, *c*.—The pressure was always applied to the bottom, and the collar, *b*, cast upon the tube, prevented its being forced upwards. The block *c*, was secured in its place by being let into the four posts, 1, 2, 3, 4, passing from the floor to the ceiling. These four posts formed a very stable frame work, and between each pair, the space, *g*, permitted the sliding board, *e*, to move freely up and down, and secured the proper direction to the pressing force. For the sake of distinctness, this space, *g*, has been represented wider on the sketch, and the sliding board, *e*, thicker, than they actually were. The pressure was applied by means of a moveable piston within the tube, connected by means of the iron rod, *d*, with the sliding board, *e*. This sliding board was attached, by means of the chains, *k*, *k*, *h*, *h*, *h*, passing over the cast iron pullies, *f*, *f*, to the platform, *p*. Of course any weight placed on this platform communicated a corresponding pressure upwards to the piston within the tube. The chain *h*, *h*, was of the best Peru iron;* the wire was about ½ an inch in diameter, and the chain had been proved with 9 tons dead weight. The pulleys, *f*, *f*, were about a foot in diameter; and their axles were of wrought iron an inch and a half in diameter. When a dead weight was to be applied, the platform was loaded in the position, *p*, but if a violent shock was to be produced, the platform was held in the position, *p'*, by means of the cord, *r*, *r*, *r*, until it had received the proposed load; the cord, *r*, *r*, *r*, being then suddenly cast loose, permitted the loaded platform to fall freely by its gravity, until it had straightened the chain, when it was either entirely arrested by the resistance of the sand in the tube, or it forced its way to the floor in consequence of the yielding of the sand, or of the fracture of some part of the apparatus.

There were other minor details which it is not necessary to particularize. The fixtures were not brought to the degree of strength just stated until after many trials, and the repeated failure of nearly every part of the apparatus; and, as will be seen, a limit was soon attained, beyond which the experiments, even with this degree of strength, could not be carried. The weights used were bricks. The piston was so arranged as to move without friction when the tube was empty, and at the same time to prevent the escape of the sand when the tube was charged. Trials were made with sand poured loosely into the tube, and with

* Peru, Clinton county, New-York. The iron from this locality possesses a remarkable degree of tenacity.



sand carefully packed. The packing was performed by means of a sharp stick which was worked up and down in the sand as it was slowly poured in. This method was found to be the best, and is the one always used at Fort Adams, in charging drill holes for sand blasting. The sand used was dry and free from dust, and from all particles which would not pass through a hole $\frac{1}{14}$th of an inch in diameter.

A preliminary series of experiments was tried, the results of which will not be given, as they were all subsequently repeated in a more careful and accurate manner.

In the second series, a tube of tin, fifteen inches long, having an interior diameter of 1¼ inches was used instead of the cast composition tube, *a*, above described, and a 3½ inch bolt-rope instead of the chain, *h*, *h*, *h*. The following table indicates a portion of the results obtained.

TABLE I.

No. of the experiment.	Number inches of sand in the tube — Packed.	Number inches of sand in the tube. — Unpacked	Weight which it was necessary to place on the platform in order to force the sand from the tube.	REMARKS.
	Inches	Inches.	Pounds.	
36		2	310	
37	2		350	
38		3	260	
39	3		360	
40	3		760	
41		4	2166	
42	4		2540	
43	4			Experiment lost.
44	4		2150	
45	5			With 2100 lbs. the piston was not moved.
46	9			With 1900 lbs. the piston was not moved.

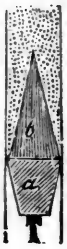
Observations on Table I.—The tube was of the kind called double tin, 15 inches long, and 1¼ inches in diameter, folded at the seam, and strongly soldered. The piston was just inserted into the bottom of the tube, and the weights given in the fourth column, were those which were necessary to force it quite through the tube, with the sand before it. In the experiment No. 46, where 9 inches of packed sand were tried, after a weight of 1900 pounds had been placed on the platform, without producing any effect, an effort was made to drive the sand from the tube by forcing up the sliding board, *e*, with a lever. In this operation the tube was bent, and split at the soldering, but the sand was not forced out. It was soon ascertained that very great weights would have to be used when the depth of the sand was equal to, or greater than four times the diameter of the tube, and that the process would be tedious; it was accordingly resolved to abandon the use of dead weights, and employ the momentum of falling bodies. Previously to making these trials, a glass tube ⅜ths of an inch in diameter, was procured and experimented upon. It admitted six inches of sand to be forced out of it, but with 8 inches of sand well packed, it burst when the dead weight of 550 pounds was applied.

Observations on Table II—The tube and rope were the same as described in observations on table I. The experiment No. 61, the top of the sand was made even with the top of the tube before the experiment was begun, by pushing up the piston until only so much space was left above it, as it was intended the sand should occupy. This rule was observed in all the subsequent experiments. This table shows that it required a weight of 1320 pounds, falling 3 feet, to force 5 inches of dry sand out of a tube 1¼ inches in diameter, and 1630 pounds, falling 3 feet 5 inches, to force out 6 inches of sand. Experiments, 60, 61, 62, and 63, showed that the apparatus in its then state could not sustain the force necessary to expel 7 inches of sand, and accordingly these experiments were suspended until a cast brass tube could be procured, and an iron chain be

TABLE II.

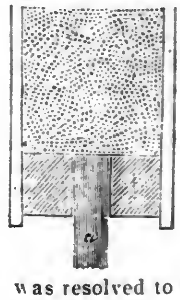
No. of the experiment.	No. of inches of sand in the tube. Packed.	Weight with which the platform was loaded.	Distance through which the platform fell with the foregoing weight.		Distance through which the piston was forced by the foregoing power.	REMARKS.
	inches.	pounds.	feet.	inches.		
47	5	920		10	none.	In these experiments the rope stretched so as to permit the platform to touch the floor before producing the full effect.
48	"	1120	2	0	do.	
49	"	1320	2	"	do.	
50	"	1320	3	"	thro' the tube	
51	6	1320	3	"	none.	Trial defective.
52	"	1630	3	"	none.	The rope was broken, trial defective.
53	"	1630	3	5	thro' the tube	
54	7	1630	3	0	none.	The tube was split.
55	"	1630	3	"	$\frac{1}{4}$ of an inch.	
56	"	2030	3	"	$\frac{1}{4}$ of an inch.	The apparatus was broken, and the tube split.
57	"	1630	3	5	none.	Apparatus broken.
58	"	1630	3	4	$\frac{1}{8}$ of an inch	
59	"	1930	2	6	$\frac{1}{8}$ of an inch.	
60	"	2030	3	0	$\frac{1}{8}$ of an inch.	Broke one of the beams supporting the pullies, *f, f,* and parted a $3\frac{1}{2}$ inch bolt rope.
61	"	2030	3	4	$\frac{1}{4}$ of an inch.	The rope was broken and the tube split at the soldering.
62	"	2030	4	0		Split the tube and forced out the sand in consequence.
63	"	2030	4	0	$\frac{1}{2}$ of an inch.	Parted a $3\frac{7}{8}$ inch white hemp rope.

fitted instead of the rope. Other measures were also adopted for strengthening the apparatus.—While these arrangements were making, a series of experiments were tried with a conical plug above the piston, as in the annexed sketch. The height of the cone was three inches, and its base equal to the area of the top of the piston. The details of these experiments



it is deemed unnecessary to give. Their general result was, that within the limits tried, greater resistances were obtained when the cone was used than when it was omitted.

Observations on Table III. The tube was of brass, cast about one-fourth of an inch thick, the interior diameter being one and one-fourth inches as far as experiment No. 111, after which it was increased to one and seven-sixteenth inches. A chain, capable of supporting nine tons, was substituted for the rope, *h, h, h,* and after experiment No. 90, a strong chain was employed in lieu of the rope, *k, k.* The apparatus was strengthened in a variety of ways to enable it to resist the great shocks it was subjected to. It appears from this table, that to expel seven inches of dry packed sand from a tube one and one-fourth inches in diameter, it was necessary to employ a weight of 2286 pounds falling through a space of three feet eleven inches. A weight of 2644 pounds falling three feet, was insufficient to force from the same tube eight inches of sand. Sand poured loosely into the tube, without being packed, offered much less resistance. Seven inches of loose sand was expelled by a weight of 361 pounds falling three feet eight inches; nine inches by a weight of 615 pounds, falling three feet nine inches; and ten inches by a weight of 870 pounds falling three feet ten inches. Eleven inches in a tube of one and seven-sixteenth inches bore, was expelled by 1630 pounds, falling three feet ten inches; twelve inches, by 2136 pounds, falling three feet six inches; and 2136 pounds, falling three feet nine inches, did not drive out thirteen inches of loose sand. The strength of the apparatus did not admit of carrying these trials further in this



way, and it was resolved to use gun pow

TABLE III.

No of the experiment	No of inches of sand in the tube Packed	No of inches in sand in the tube Unpacked	Weight with which the platform was loaded	Space through which the loaded platform was allowed to fall		Distance through which the piston was forced by the foregoing power	REMARKS.
	in	in	lbs	feet	in		
87	7		1375	3	10	$\frac{1}{8}$ of an inch	
88	7		1670	3	11	$\frac{1}{4}$ of an inch	Broke a beam over head; and on taking up the floor for the purpose of putting up new props, it was found that three of the floor joists were ruined by the severity of the previous shocks. An iron axletree, $1\frac{1}{4}$ inches in diameter, of one of the pillars, f, over head, was broken off.
89	7		1880	3	10	[illegible] of an inch	Broke the axle of one of the pulleys over head. The beams supporting these pulleys were brought nearer together, and iron trunnion plates were placed under each axle to prevent its being forced into the wood.
90	7		2030	3		$\frac{1}{4}$ of an inch	Broke the rope k, k, connecting the chain with the sliding board e, under the piston. A chain was substituted in the place of this rope, and the apparatus thus made to conform in all respects, with the description which has been given of it..
91	7		2030	3	6	$\frac{1}{2}$ of an inch	
92	7		2286	3	11	Piston forced thro' the tube.	* In this and all other cases where the piston was forced through the tube, a quantity of fine dust, apparently arising from the pulverization of a part of the sand, collected on the sides of the tube and at the top of the piston.
93	8		2286	3	9	$\frac{1}{4}$ of an inch	
94	"		2490	3		$\frac{1}{4}$ of an inch	Broke a large iron hook* at the tube end of the large chain.
95	"		2490	3		1-16 "	Broke the large chain in four pieces.
96	"		2490	3	9	$\frac{1}{4}$ of an inch	
97	"		2644	3		$\frac{1}{3}$ of an inch	Broke one of the hooks connecting the chain k, k, with the sliding piece, e.
98	"		2644	3		none	Broke the large chain. The apparatus could not, without considerable trouble and expense, be made to sustain the force necessary to expel 8 inche of packed sand, and the further pursuit of this inquiry was therefore abandoned.
104		7	361	3	8	Piston forced thro'	
105		8	361	3	3	$2\frac{5}{8}$ inches.	
106		9	615	3	10	Pn. forced through	
107		10	615	3	9	none	
108		10	870	3	10	Pn. forced through.	
109		11	870	3	8	$\frac{5}{8}$ of an inch	
110		11	1122	3	3	1 inch.	
111		11	1375	3	4	2 inches.	The interior diameter of the tube was now increased to 1 7-16 in inches, with which all the remaining experiments were made.
113		11	1630	3	10	Pn. forced through.	
115		12	1880	3	3	$\frac{1}{8}$ of an in.	Broke the chain.
118		12	2136	2	3	$\frac{1}{2}$ of an in.	Broke the chain.
120		12	2136	3	3	$\frac{1}{2}$ of an in.	Broke the chain. This chain being much strained and worn by previous shocks a new one was procured.
121		12	2136	3		$\frac{3}{4}$ of an inch	Broke the chain.
122		12	2136	3		Pn. forced through	
124		13	2126	3	9	$1\frac{3}{4}$ inches.	

der; but in the meantime to determine the resistance which would be offered by the sand to the entrance of iron rods of much less diameter than the bore of the tube, the following experiments were made. Rods of one-fourth, one-half, and three-fourths of an inch diameter were used. The tube being one and seven-sixteenths inches in diameter, a wooden piston having a hole in its centre, just large enough to admit the rod *a*, in the manner indicated by the annexed sketch, was placed in it, and the rod being entered into the piston, the sand was placed above it as usual. With this apparatus, the experiments contained in table IV., were, among others, tried.

Observations on Table IV. The resistance opposed by the sand to the entrance of a rod of smaller diameter than the tube, was very great, and increased with the size of the rod. A weight of 2033 pounds was required to force a $\frac{1}{4}$ inch rod through 8 inches of sand. With 12 inches of sand, a weight of 3150 pounds was required to force the same rod, sharpened, $2\frac{1}{2}$ inches into the tube. Sharpening the $\frac{1}{4}$ inch rod, seemed rather to increase than to diminish the resistance. A half inch rod was forced through 8 inches of sand, by 870 pounds falling 4 feet. With 13 inches of sand, a $\frac{1}{2}$ inch rod was forced only $1\frac{3}{4}$ inches, by a weight of 1880 ponnds falling 3 feet 4 inches. A rod $\frac{3}{4}$ of an inch in diameter, was forced through 8 inches of sand by 1120 pounds, falling 3 feet 10 inches; and the same rod was forced through 13 inches of sand by 2136 pounds, falling 3 feet 3 inches. In all cases the sand immediately before and around the rods, was crushed to a fine powder.

TABLE IV.

No of the experiment.	No of inches of sand. Packed.	Dead weight applied.	Falling weight.	Distance through which the loaded platform was allowed to fall.		Distance which the iron rod was forced into the sand, by the foregoing power.	REMARKS.
	in.	lbs.	lbs.	feet.	in.	inches.	
	Iron rod $\frac{1}{4}$ of an inch in diameter.						
133	8	615				$\frac{1}{4}$ of an inch.	
134	"	1150				1 inch	
135	"	1630				$1\frac{1}{2}$ "	
136	"	2033				through the sand	
137	12	615				3-16 of an inch	
138	"	1150				$\frac{1}{2}$ "	
139	"	1630				1 inch	
140	"	2136				$1\frac{1}{2}$ inches	
141	"	2480				?	Rod bent and broken.
142	"	615				3-16 of an inch	In these trials the end of the rod was sharpened.
144	"	1630				7-8ths "	
146	"	2390				$1\frac{3}{4}$ inches	
148	"	3000				$2\frac{1}{4}$ "	
149	"	3150				$2\frac{1}{2}$ "	
150	8		360	3	4	2 "	
151	"		615	3	4	through the sand	
	Rod $\frac{1}{2}$ an inch in diameter.						
152	8		360	3	6	$1\frac{1}{2}$ inches	
153	"		490	4		$1\frac{3}{4}$ inches	
154	"		615	4		$1\frac{3}{4}$ inches	
155	"		870	4		through the sand	In this, and every other instance, a mass of finely pulverized sand was found at the head of the rod.
157	13		1120	3	3	1 7-8th inches	The sand around the rod was pulverised to a fine powder.
158	"		1375	3	3	$\frac{1}{2}$ an inch	The rod was bent below the tube.
159	"		1880	3	6	$1\frac{3}{4}$ inches	Bent the rod double in two places below the tube.
	Rod $\frac{3}{4}$ of an inch in diameter.						
160	8		870	3	10	$\frac{3}{4}$ of an inch	
161	"		1120	3	10	through the tube	The sand around the rod crushed to a fine powder.
162	13		1120	3	9	7-8th of an inch	The pulverized sand at the head of the rod as usual.
163	"		1375	3	6	1 inch	The chain was broken.
164	"		1880	3	6	$1\frac{1}{4}$ inches	
165	"		2136	3	3	thro' the sand	

TRIALS WITH GUN POWDER.

166. A musket barrel, of three-fourths of an inch bore, was charged with two inches of powder and thirteen inches of packed sand, there being neither wad nor plug between the sand and the powder. On firing, the barrel was burst, but the sand was not driven out.

167 & 168. A brass blunderbuss barrel of three-fourths of an inch bore, was charged with one inch of powder, and ten inches of packed sand, a wooden plug being placed between the powder and sand. On firing the plug was split, and all the sand driven out, but the pieces of the plug remained in the barrel, which was apparently uninjured. The same barrel burst with one inch of powder, and ten inches of packed sand, with a conical wooden plug between the sand and the powder.

169. A pistol barrel of nine-sixteenths of an inch bore, burst with one inch of powder and eight inches of packed sand, without wad or plug.

170. An old musket barrel of three-fourths of an inch bore, was loaded with three-fourths of an inch of powder, and five inches of packed sand, without wad or plug.—On firing, the barrel was burst, but the sand was not driven out.

172. A piece of musket barrel, taken from near the muzzle, and open at both ends, was charged at one end, with five and a half inches of brick dust, hard rammed; and at the other with five and a half inches of sand, well packed, with one inch of powder between them, a priming hole being bored to communicate the fire. The explosion of the powder burst the barrel, but neither the sand nor the brick dust was driven out.

177 to 184. A pistol barrel made of twisted iron, and of great strength, the bore being eleven-sixteenths of an inch, was fired with three-fourths of an inch of powder, and the following loads of sand, each one, with and without a wad, viz: three inches, four inches, five inches, and six inches. In all these trials the sand was driven out without causing the barrel to burst.

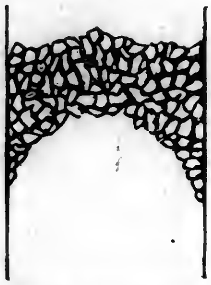
185. The same pistol barrel was loaded with one inch of powder, and eight and one-fourth inches of sand, with a conical plug between the sand and the powder. On firing, the sand was forced out.

186. The same barrel was charged with one inch of powder, and eight and one-fourth inches of sand, without wad or plug. On firing, the sand was driven out, and the barrel was burst.

In order, if possible, to determine a limit to the resistance opposed by sand, it was resolved to make use of a twenty four pound cannon. It was thought not improbable, that by the use of clean dry sand, which is generally obtained in the vicinity of the sea coast batteries, a ready method would be discovered of effectually destroying heavy guns, an object which is occasionally of great importance. Application was therefore made to the ordnance department for permission to experiment with an old pattern twenty-four pounder, laying at Fort Adams, which permission was very liberally and readily granted. The length of the bore of this piece was about nine feet, and the diameter of the bore $5\frac{82}{100}$ inches It was first fired in a horizontal position with eight pounds of powder, and one foot of sand, afterwards with the same quantity of powder, and two feet of sand, again with the same quantity of powder, and three feet of sand, and so on, the depth of the sand constantly increasing by one foot, until the bore was full. The gun was then placed in a vertical position, and loaded with the same quantity of powder, and filled up to the muzzle with sand, well packed, without wad or plug. It was afterwards charged in a similar manner, a cone of wood being interposed between the powder and the sand. In these two cases the fire was communicated to the charge by means of a priming tube, passing down through the sand from the muzzle of the gun. Afterwards the gun was charged in the same manner, and fired by means of the vent. A better quality of powder was then used, and the quantity was increased to sixteen pounds. The gun was several times fired with this charge, the bore being filled up to the muzzle with sand well packed.—In every instance the sand was forced out

without apparent injury to the gun. It appeared, therefore, that the resistance of the sand, though very great, was not sufficient to burst a twenty-four pound cannon.

The most probable explanation of the foregoing phenomena, appears to be, that whenever direct pressure is applied, the angular and irregular shaped fragments composing the sand, immediately form themselves into a natural arch, supported against the sides of the tube. The annexed sketch indicates the manner in which this may take place. In every instance where the



sand was violently forced from the tube, the sides of it were found to be lined with a quantity of fine dust, and a mass of pulverized sand was generally found at the head of the piston A. The inside of the tube was abraded or scratched, particularly at that part, a short distance above the piston, against which the *arch*, or more strictly the *inverted dome* of sand, may be supposed to have abutted. The dust found on the sides of the tube was always of a blueish color, which was attributed to the intermixture of a small portion of metallic oxide derived from the brass. Some experiments which were made went to show that it was very important that the sand should be perfectly dry. The injurious effect of moisture may be explained by supposing that it impedes the free motion of the particles among themselves, and prevents their promptly assuming the arch form; it cements the sand into a mass, which is expelled from the tube as a solid body would be. In the case of the twenty-four pounder, it appears that the force necessary to burst the gun, was greater than that required to reduce sand to an impalpable powder, that is, to crush and destroy the materials of which the arch of sand was composed. It is probable that coarse emery, from its extreme hardness, would oppose a resistance sufficient to burst a cannon, but an opportunity has not offered to make the trial.

The experience of Fort Adams, proves that the resistance offered by sand is quite sufficient for blasting rocks, and the advantages attending it use, are, that it is much less troublesome than the usual mode, and that it is perfectly safe. To ensure success, the space left above the powder should have a length of ten or twelve times as great as the diameter of the hole. To communicate fire to the powder, a slip of paper is rolled into a tube about three-sixteenths of an inch in diameter. This priming tube is secured by being tied round in two places with thread, and one end is made a little larger than the other, so that any required length may be obtained by joining several together. The charge of powder being in its place, the priming tube is inserted and filled, it is then pressed against one side of the hole, and the sand is slowly poured in. A slender stick of hard-wood is rapidly worked up and down in the sand as it falls to the bottom, and thus every part becomes well packed. By this mode of operating there is, of course, no danger of communicating fire to the powder in the act of loading, an accident very liable to happen in blasting in the common way. The safest and most convenient method of firing the blast, is by means of a small slip of paper which has been dipped in a solution of saltpetre, and dried.

It was intended to make examinations on other points connected with the phenomena observed by M. Burnand, but the requisite leisure has not been at command. The subject merits further investigation with a view to making useful practical applications of some of the remarkable properties which sand is found to possess.

MINERAL MANURES.

Application of Marl.

Many farmers either lay marl upon land sown with tares, thus making a bastard fallow; or they apply it to grass land, or to a clover ley, to be broken up in the following year. The latter is certainly the preferable, as well as the most general practice. for it not alone produces an abundance o good pasture, but affords time for the season to operate in bringing the marl into a fit state for future tillage crops, which cannot be done in the common course of cropping, because it becomes buried by the plough before it is properly mixed with the soil, especially if turned in deep the first earth. It should, therefore, be allowed sufficient time to sink, and eat itself into the surface, before it is ploughed up. This, however, is by some persons carried to an absurd length, as they occasionally spread a coat of marl upon the green sward, and leave it there unploughed for many years, in which case the grass receives considerable detriment, for the marl then sinks downwards in a body, without incorporating with the soil; though, when it has lain a long time in this state, the subsequent crops of corn have been found to be enormous.* If laid upon grass, it may be carried out during all periods of the year in which the crop is not in a forward state of growth; but if applied to arable land intended for immediate cultivation, the months of June and July, or soon after the autumn seed-time, are considered the best for its application. If laid on a short time previous to winter, its effect is also generally prompt, because, except it be of a very tenacious kind, the action of the cold and rain commonly divide it in time, to be thoroughly amalgamated with the soil by the tillage of a summer fallow. If, however, it be only applied during the spring months, this cannot be so properly carried into execution, for it requires the winter's rain and frost to crumble it, and it consequently has but little power upon the year's crop. A complete summer fallow is, undoubtedly, the best mode of bringing it into perfect operation: but not only is the expense often objected to, but there is also a strong prejudice entertained by many persons against fallowing—into which it is not our present object to inquire, although we necessarily shall have occasion to notice it hereafter.

It is almost superfluous to add, that, in whatever manner it be applied, it must be equally spread over the land; and if there should be any larger lumps remaining, these should be broken with mallets, or clotting-beetles, in the same manner as chalk, before it is ploughed in. This, however, is not usually done until the marl has partaken of both one summer's sun and one winter's frost; and should the previous season have proved unfavorable to the reduction of marl to small particles, the process, in some cases, costs so much, that, when laid upon grass or clover, it is often found more advisable to leave the ground unbroken during another year. Then, when well crumbled, dry weather should be chosen for rolling and harrowing it—a first time with heavy rollers and drags, and a second, after it has been exposed to rain, and has been again dried:- in short, until it has been rendered as small as possible; after which it should be lightly ploughed in, again harrowed, and receive from two to four ploughings, according to the condition of the soil. The intermixture of the marl with the earth cannot, in fact, be too complete; for whatever proportion remains uncombined with the soil, will not alone fail of producing the intended effect, but will have one of an opposite and prejudicial tendency.

The quantity of marl which it may be prudent to apply to the land depends entirely on the nature of the soil, and the prpoerties of the marl: the more calcareous is the latter, the greater is the effect which it will produce, as a stimulant; and shell marl possesses, besides, the additional power of nourishing the soil by the vegetable and animal mould with which it is combined. This species was formerly profusely used on every sort of ground, but at present the average amount applied to land of the medium kind is from 30 to 40, or if it be very light, only 25 cartloads, of 16 cubic feet per acre. Land of the latter quality may, indeed, be readily overmarled; as by repeated marling, in large quantities, the surface of poor ground may be rendered so loose that, in some cases, it has not afforded a sufficient hold to the roots of corn and grass.* Double the quantity may, however, be laid upon strong cohesive soils, for it is not so easy to give them too large a dose; but if cold, wet, or moorish, great circumspection is requisite in the application of this marl, for if the land be not previously well drained, it will only increase its tenacity.

*Dickson's Original Report of Lancashire, Stevenson's edit., p. 409.

* Perth Report; and Appendix to that of Cheshire, No. 3.

[To be continued.]

It has been discovered that some of the Indian timber is singularly durable. The wood called the *jarrool* has the property of resisting the marine worms which commonly attack ships where they are not defended by copper. On a recent occasion they were found to have fastened on every description of wood forming the bottom of an unsheathed vessel save the jarrool, not even sparing the teak. The day is consequently not distant when jarrool will make a more important article of commerce than it hitherto has been.--(Observer.)

LABORERS WANTED.—The following no- notice for laborers is worthy of notice by those who desire to be employed during the winter. It is now an easy matter to reach *Augusta.*

ONE THOUSAND LABORERS WANTED TO WORK ON THE GEORGIA RAILROAD.—The above number of men can find immediate employment on the *Georgia Railroad*, at $20 per month, and found.

The work passes through an elevated dry country, which is as healthy as any part of the United States. The winter is remarkably mild and pleasant, being seldom colder than the latter part of October is in New York.

The road extends from Augusta to Athens. Passage for the first named place, can be obtained in vessels going to Charleston or Savannah, whence there is daily communication to Augusta. Cost of passage to Augusta, including fare, about $15.

J. EDGAR THOMSON, Agent.

Augusta, Oct. 3. 1836.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N H. Across the Connecticut river at Haverlill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.

General Agent of Col. S. H Long.

Rochester, May 22d, 1836. 19y-tf.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300	dozens	Ames'	superior	back-strap Shovels
150	do	do	do	plain do
150	do	do	do	cast steel Shovels & Spades
150	do	do	Gold-mining Shovels	
100	do	do	plated Spades	
50	do	do	socket Shovels and Spades.	

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York.

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron. 4—ytf

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

									lbs.	
350	tons	2½	by	⅝,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280	"	2	"	⅝,	"	"		"	$3\frac{50}{100}$	"
70	"	1½	"	⅜,	"	"		"	2½	"
80	"	1½	"	¼,	"	"		"	$1\frac{25}{100}$	"
90	"	1	"	¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage, for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28-tf Philadelphia, No. 4, South Front st.

NOTICE TO CONTRACTORS.

PROPOSALS for excavating and embanking the Georgia Railroad from the upper end of the work, now under contract, to Greensboro', a distance of 34 miles, will be received at the Engineer's Office, at Crawfordville, on the 21st and 22d days of October next.

—ALSO—

At the same time, for the Branch to Warrenton, 4 miles. And if prepared in season, the Branch to Athens, length 37 miles.

J. EDGAR THOMSON,

33—t22o Civil Engineer.

NOTICE TO CONTRACTORS.

PROPOSALS will be received at the Engineer's Office. in the city of Lancaster, on Wednesday, the 19th day of October next, for the Excavation, Embankment, Wall, &c , required on twenty-five miles of the Susquehanna Canal, commencing at Kline's run, (three miles below the Columbia Bridge,) and extending along the West side of the Susquehanna river, to the "Maryland State Line."

The work will be ready for examination by Contractors, at any time after the 25th inst., and the Map, Profile and Specification, may be seen at the office, one week previous to the letting.

The unusually heavy character of the work, (which affords excellent winter jobs,) offers great inducements for the attendance of Contractors possessing energy and enterprise.

It is expected that the extension of the Canal to "Tide Water," will be ready for letting about the 1st of December.

No mechanical work to be let at present.

EDWARD F. GAY,

Chief Engineer, S. C.

Lancaster, Sept. 13, 1836. 5t—38

1½ square $4 12

NOTICE TO CONTRACTORS.

HARTFORD AND NEW-HAVEN RAILROAD.

For the purpose, alone, of a more widely extended notice, the letting of the Northern Division of the HARTFORD AND NEW-HAVEN RAILROAD, will be deferred until the 15th of October next. Up to that day, inclusive, proposals will be received at the Engineer's Office (corner of East and Collis sts. New-Haven,) for the excavation, embankment, masonry and carpentry, necessary to prepare the road for the reception of the superstructure.

Maps, profiles, plans, and specifications, may be examined at the Engineer's office; and printed forms may be obtained by application at the same place, giving a general view of the nature and amount of the work of different kinds which is to be done.

ALEXANDER C. TWINING,

Engineer.

New-Haven, Sept. 20, 1836. 39—3t

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—ytf

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

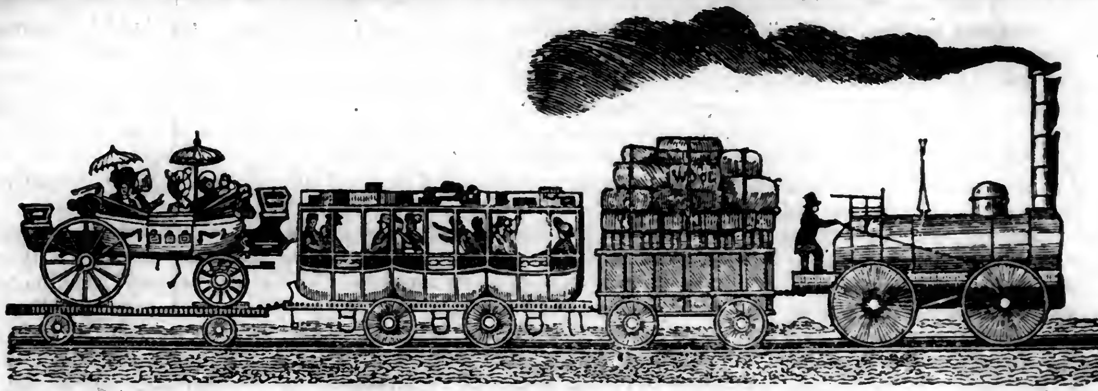
ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND,	GEORGE COLEMAN,
ROBT. C. FOLGER,	SYDNEY S. DURFEE

33—tf.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, OCTOBER 22, 1836. [VOLUME V.—No. 42.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, OCTOBER 22, 1836.

TO RAILROAD CONTRACTORS.

PROPOSALS will be received until the 8th day of December next, for the graduation and masonry of the first ten miles of the Gainsville and Narkeeta Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Gainsville, for ten days previous to the time of letting and all other information given, on application to the subscriber or to the Assistant Engineer. Recommendations will be expected in all cases, of persons not known to the officers of the company or to the Engineer.

For the information of persons at a distance, it may be remarked, that this road commences at the town of Gainsville, on the Tombeckby river, and extends twenty-two miles south-west to Narkeeta in the State of Mississippi. The Tombeckby is navigable for Steamboats the greater portion of the year and having a direct communication with Mobile and New-Orleans, will afford facilities for procuring the supplies necessary for the hands employed on the work, or for their ready conveyance hither, if procured from a distance. The country through which the road is located, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season renders the contract peculiarly desirable to those wanting winter employment. To an enterprizing and energetic contractor the construction of this road offers the prospect of a profitable job.

D. H. BINGHAM, C. E.

Gainsville, Ala. Sept. 21, 1836. [42—tDec1

NOTICE TO CONTRACTORS.

WASHINGTON AND RALEIGH RAILROAD

PROPOSALS will be received at the office of his Company in Wilmington (N. C.) until the 15th of November for the graduation and bridging of 56 miles of the above Railroad, commencing at the north-east branch of the Cape Fear river, ten miles from Wilmington.

Any information which may be desired, can be obtained of Mr. T. H. Williamson, who will at all times be found on the line, or from the subscriber at Wilmington.

Contractors unknown to the undersigned must accompany these proposals with recommendations,

WALTER GWYNN

October 15, 1836. 42—3t

A FARM TO BE SOLD AT AUCTION,

AT the Orange Hotel, in the Village of Newburgh, on Tuesday, 25th October, at 2 o'clock P. M. A Farm three miles north of Newburgh, Orange county, now occupied by Robert Anderson, containing about

FIFTY-ONE AND A HALF ACRES,

including five or six acres of a handsome grove of wood land, house, barn, orchard, &c. This Farm is well watered and beautifully situated on high ground, on the banks of the Hudson river, and commands a most extensive view of the surrounding country, not surpassed by any on the river; overlooks Newburgh and the surrounding villages, from West Point to New-Hamburgh, a river view of about twelve to fourteen miles, and joins the road which leads from Newburgh to Marlborough, Milton, &c., and would be a most desirable site for a country seat. It is excellent grain land, with a good proportion of natural meadow, a loam soil over limestone, and has abundance of every material of wood and stone for building and fencing, sufficient to put the whole in complete order.

Reference for particulars may be had by calling on George Mather, No. 111. Prince st. New-York.

Terms liberal and made known at the sale

SAMUEL PARMENTER, Auctioneer.

Newburgh, Oct. 10, 1836. 42

Joseph W. Patterson, Esq., has been unanimously elected President of the Baltimore and Ohio Railroad Company. The Baltimore Gazette says this vote of the stockholders of that Company, will meet the general approbation of the citizens.

REAL ESTATE AT NEWBURGH.—We would ask the attention of our readers to the notice in our columns to day, of the sale of a small farm near *Newburgh*. It is, we are informed, a delightful situation on the banks of the Hudson river, and a very desirable residence for a gentleman who is fond of country life, and at the same time, an extensive water prospect. The sale is to take place on the 25th inst in the village of Newburgh.

REAL ESTATE AT POUGHKEEPSIE.—On Tuesday next, 25th, will be sold at Poughkeepsie 200 of the most pleasantly situated lots in that flourishing village. They are situated in the vicinity of the Dutchess Whaling Company's Dock, and the extensive Locomotive Engine Manufactory, and command a beautiful view of the River.—These lots are elligibly situated for residences and must become highly valuable in consequence of the extensive Manufactories now building and soon to be commenced in front of them. We ask the attention of our readers in New-York to the sale.

SOMERVILLE ROAD.—The Somerset whig informs us, that laborers have commenced operations on the road on the east side of Somerville; and that in two or three weeks 2 or 300 hands will be employed on the whole line.

WILLIAMSPORT AND ELMIRA RAILROAD.—The final survey and location of this important public work were completed a few days ago, except the point of termination in this village, four different points being surveyed and under consideration, viz: below the bridge, at the bridge, near the canal, and near the house of T. North, Esq. We are told by the company that 25 miles, from Williamsport to the coal beds, and 14 miles, from Elmira south, will probably be put under contract this fall. The survey has resulted in an extremely favorable impression as to the expense and the few difficulties to be overcome.—[Elmira Republican.]

TENTH ANNUAL REPORT OF THE PRESIDENT AND DIRECTORS TO THE STOCKHOLDERS OF THE BALTIMORE AND OHIO RAILROAD COMPANY.

In obedience to the requisitions of the charter, the President and Directors propose to lay before the Stockholders a statement of the affairs of the Baltimore and Ohio Railroad Company, for the official year, ending on the 1st of October, 1836.

In the ninth annual report, the board announced the completion of the main stem to Harper's Ferry, and of the branch road to Washington. Since then the Winchester and Potomac Railroad, which is virtually a prolongation of the Baltimore and Ohio Railroad up the valley of the Shennadoah, has been opened for general use. At present, some delay and difficulty take place in transporting goods and passengers from one road to the other. This, however, will be obviated, when the viaduct across the Potomac is finished. The stone piers of this structure have been completed for some time, and the wood work will be ready for the passage of cars during the present year. The passenger and burden trains of the two companies will then stop, side by side, in the same depot, and the transit from one to the other will be effected promptly and with great convenience.

Surveys are now in progress for the extension of a Railroad from Winchester to Staunton, and there is reason to believe that this work will be undertaken. It is of great importance to Baltimore, and when completed will furnish a continuous railroad of two hundred and fifteen miles in length, from this city into the heart of Virginia.

In the last annual report, the results of the reconnoissance of the chief engineer of the route for a railroad from Cumberland westward, were laid before the Stockholders; and the general satisfaction that they afford, and the sentiment universally expressed, that the time had arrived for the adoption of vigorous measures in the prosecution of the road to the points of its original destination, caused the board, early in the spring, to organize an engineer force, for the purpose of making detailed surveys and examinations between Harper's Ferry and the summit of the Allegany, with a view of continuing them, afterwards, to Pittsburg and Wheeling. Four brigades, under the charge of competent officers, were accordingly employed, and have since, without interruption, been diligently at work. A continuous line has been surveyed from Harper's Ferry to the top of the dividing ridge between the eastern and western waters; and the engineers are now engaged in making the surveys on either side of the first line, necessary to determine the best route for the location of the road. The rough and mountainous country, over which the surveys have to be carried, and the importance of leaving no practicable route, of the many that present themselves, unexamined, render the labors of the engineers, necessarily, very tedious; and it will be some time yet before the exact route to be adopted, can be ascertained. The board have considered these surveys as one of the most important subjects claiming their attention, and have urged them forward with all diligence; in doing which they have been fully seconded by the officers in charge of them. So far as they have gone, they have been very satisfactory, and fully corroborate the fact, stated in the last annual report, upon the reconnoissance of the chief engineer, "that the mountains between Cumberland and the western waters can be passed, without the use of stationary power by locomotive engines and their trains." For a full account of surveys, up to the end of the current official year, reference is made to the reports of chief engineer, and the engineer of location in the appendix A.

In the month of August last, the brigade employed on the Potomac above Harper's Ferry was broken up by the severe illness of nearly every one of its members, owing to the unhealthiness of the region in which they were at work. Protracted indisposition ensued; and it is only recently that the brigade has been recognized. The country upon the Potomac will not be sufficiently healthy for the brigade to resume its labors there, before the 1st of November. In the mean time, it has been directed to institute—survey's at Parr's spring ridge—with a view to the re-location of the road there, so as to dispense with the inclined planes, that have so long been a source of heavy expense and injurious delay. When originally located, the then state of knowledge, on the subjects of railroads, and their machinery, and the character of the country for a long distance on either side of the point of crossing the ridge, left no alternative but to adopt them. Since then, however, the astonishing developement, that has taken place of the capacities of locomotive engines, makes it certain that the ridge where the planes occur can be surmounted by a uniform grade, adapted to the economical and efficient use of locomotive power. When this is accomplished, the interests of the stockholders and the public will be mutually and most materially advanced.

At the December session of the Legislature of Maryland, eighteen hundred and thirty-five, the board of directors memorialized that body, praying for aid to complete the road to Pittsburg and Wheeling; and at the same time, a similar application was made to the Mayor and City Council of Baltimore. The latter, at once, and with great liberality, and responding to the universal sentiment pervading this community, resolved to subscribe three millions of dollars to the capital stock of the Company, whenever the existing legal difficulties were removed, which prevented, at that time, the extension of the work in an unbroken line, eastward, from Harper's Ferry. The bill, before the Legislature, however, for subscribing to the stock of this Company, and also in aid of other works of internal improvement in which the State was interested, met with determined and strong opposition; and, at the end of a protracted session, the subject was postponed to an adjourned meeting of the Legislature in May ensuing. In the interval a numerous and highly respectable convention, the interest of which attracted delegates from Pittsburg and Wheeling, was held in Baltimore, and the various subjects connected with the internal improvements of the State were fully discussed. When the Legislature re-assembled in May, the subject was again brought before it; and a law was finally passed by a large majority, containing, among other subscriptions, one of three millions of dollars of the capital stock of the Baltimore and Ohio Railroad Campany. This law released the Company from the restrictions, that prevented the extension of the railroad westward from Harper's Ferry, and in so doing, enabled it to comply with the condition annexed to the subscription by the Mayor and City Council. Before the law could take effect, however, it was necessary that it should receive the assent of both the Baltimore and Ohio Railroad and the Chesapeake and Ohio Canal Companies. The assent of the first was, as the stockholders are already aware, given at the general meeting held on the 18th July last. The assent of the latter was delayed, in consequence of apprehensions entertained by some of its stockholders, that the provisions of the law, in regard to the joint construction of the railroad and canal, along the Potomac, would, if carried into operation, materially impair the permanency and usefulness of the canal. To obviate this difficulty, the stockholders of the Railroad Company, at their meeting of the 26th July last, authorized the board of directors to enter into stipulations with the canal company, touching the matters in question; and the apprehensions of the canal company being thereby removed, its assent was given to the law, which, in consequence, went into immediate operation. A copy of the stipulation with the canal company, entered into by the board, in conformity with the directions of the stockholders, will be found in the appendix.

The subscription to the stock of this Company, authorized by the law of the extra session, was made to depend upon a guarantee being given to pay six *per cent. per annum*, to the State on the amount subscribed by it, at the end of three years from the payment of each of the State's Instalments; with the provision, that should the profits of the road exceed six per cent. the State was to receive no greater dividend in consequence, but the excess was to be divided among the other stockholders. In consideration of the interest, so to be secure to the State, the Company was authorized to charge one cent per mile, in addition to its present charge, for each person transported upon the road. At their general meeting on the 18th of July, the stockholders directed the preparation of the guarantee in question, which was accordingly prepared and transmitted, as required by the law, to the treasurer of the western shore. A copy of it will be found in the appendix. The right of the Company to make the additional charge is now perfected. Had it been made during the last official year, the nett revenue of the main stem would have been doubtless much greater than it has been.

Another important provision, contained in the law of the extra session, is that

which releases the company from the obligation to erect "a close fence of boards" between the railroad and canal, at the narrow passes from the point of rocks to Harper's Ferry, as a condition precedent to the use of steam between the two places; provided the Railroad Company shall first tender to the canal company the price of a post and rail fence, for the corresponding portions of the river edge of the towing path. The objections to building the board fence were such, that they prevented (and but for the law of the extra session would have continued to prevent) the use of steam above the Point of Rocks, and obliged the Railroad Company to maintain an expensive horse power to do the transportation from thence to the Ferry, a distance of twelve miles, which the engines, that crossed the valley of the Monocacy, could have done with but little additional cost. As soon as the commissioners appointed under the act shall have ascertained the cost of the post and rail fence, it will be tendered to the canal company, and the locomotives, that are now obliged to stop at the Point of rocks, will supersede the horse power beyond that place, and continue their route to Harper's Ferry.

With regard to the other provisions of the law of the extra session, it is not the intention of the board to enter into detail. The act itself was before the stockholders for their acceptance, and they must be sufficiently familiar with its provisions. Those parts of it only, requiirng the present action of the stockholders or the board have been particularly referred to. The board are gratified in being able to announce to the stockholders, that the various conditions precedent to subscription, which it contains, having been complied with, the subscription of the treasurer of the western shore for thirty thousand shares of the capital stock of the company, (3,000,000) was made on the 23d of September last; and also, that on the 27th of the same month, the same amount of stock was subscribed, under the ordinance to that effect, by the Mayor of Baltimore.

Six millions of dollars have thus been added to the effective means of the company for the prosecution of the railroad to the western waters. What the amount that will be necessary, to finish the work to Pittsburg and Wheeling, may be, it is impossible, at this time, to say, with any approximation to accuracy. Every effort is being made to complete the surveys to ascertain it. Some time must elapse before it is known. Cost what the road may, however, it will be a cheap road to Baltimore; as, restoring to her the trade of which the great works of rival cities have deprived her, it will place her in possession once more, and forever, of all the advantages to be derived from her geographical proximity to the west.

The time limited in the charter for the completion of the main stem within the State of Maryland, extending only to the 4th July, 1838, an act, prolonging the period for five years from that date, was applied for and obtained at the last session of the Legislature.

In the year 1835, the Legislature of Pennsylvania incorporated a company to construct a canal from the great Pennsylvania Canal, at Columbia, to the Maryland line, along the eastern shore of the Susquehanna. At the following session, this company applied for permission to change the location of the proposed canal, with a view of constructing it on the western side of the river, and prolonging it, under authority from Maryland, to a *terminus* in the neighborhood of Havre de Grace. The Legislature of Pennsylvania gave the desired permission; but upon condition, that the Baltimore and Ohio Railroad Company should first assent to the junction, with the main stem of their work, of a railroad from Pennsylvania, entering Maryland on the dividing line between the former State and Washington county, and striking the Baltimore and Ohio Railroad at or near Hagerstownr o Williamsport. To have assented to this, unconditionally, would have put it in the power of the connecting Railroad Companies of Pennsylvania, by lowering their rates of toll, to abstract the travel and transportation from the Baltimore and Ohio Railroad, east of the point of junction, diverting it along their respective roads to the rival city of Philadelphia—and so enabling the latter, notwithstanding its greater distance from the western waters. to receive or forward goods as cheaply as could be done at or from Baltimore; thus making a work, constructed with the means of Maryland, ensure to the benefit of the commercial emporium of a rival State, that had contributed nothing to the undertaking. Pledged as the Baltimore and Ohio Railroad Company now is, to pay to the State six per cent. on its late subscription, it would have been impossible, with any regard to the interests of the stockholders, to reduce the toll, in competition with works, many of which were the property of the State of Pennsylvania, and the policy of all of which would have been to attract the business from the Baltimore and Ohio Railroad, east of the point of junction, to themselves. With a view of obviating this difficulty, a condition was inserted in the act, that in case of a reduction of the tolls on the Pennsylvania works in connection, mediately or immediately, with the Baltimore and Ohio Railroad, the tolls on that road, west of the point of junction, might be increased in proportion; so as to keep the charges on persons, goods or produce, going to or coming from Pennsylvania, uniform throughout the distance they were to be transported; thus putting it in the power of the Baltimore and Ohio Railroad Company to countervail, at all times, the effects of a reduction of tolls on the Pennsylvania roads in connection with their own work. The law of Pennsylvania, with this provision, has been assented to by the board of directors, and has gone into operation. To have refused the assent, would have been illiberal towards Pennsylvania, which had already permitted a connection by Maryland with her works, in the cases of the railroad to York and the canal along the Susquehanna, as well as inconsistant with the spirit of the age, which is to multiply all means of inte communication, and increase the number of markets accessible to the producer; and it would, besides, have deprived the citizens of Baltimore, deeply interested in the Susquehanna improvement, of what was deemed of great value to them and to the community. The road from Pennsylvania, whose junction with the main stem, is to comply with the provisions of the above law, has not yet been designated.

In several of their preceding reports, the board of directors have adverted to the efforts made by them to perfect a locomotive engine, adapted to the curved character of their road, and cable of using anthracite coal as fuel; and the very satisfactory results obtained have been, from time to time, detailed. The further experience of the board fully justifies the steps heretofore taken by them in this particular. There are now eleven first rate locomotive engines in use npon the main stem and Washington branch, all of which have been manufactured at the company's shops; and six more are being built, which, it is expected, will, when the road over Parr's ridge is re-located, and re-constructed without inclined planes, enable the company to dispense entirely with the use of horse power, except in the city of Baltimore. A very considerable diminution in the cost of working the road will thus be effected.

Since the death of Phineas Davis, mentioned in the last annual report, Messrs. Gillingham and Winans have taken the company's shops, at the Mount Clare depot, and continue there the manufacture of locomotive engines and railroad machinery, commenced by Mr. Davis. Within the last year, the force employed by them has been considerably increased; a circumstance much to the interest of the company, as it furnishes the means of a prompt compliance with the wants of the road, and, when this is extended westward, will insure a supply of locomotive power and the various necessary machinery, as fast as it is wanted. It may be observed here, that the work-shops at the Mount Clare depot are carried on by Messrs. Gillingham and Winans, independent of the company. They are bound to contract to supply the company with locomotive engines, and all other railroad machinery, at a stipulated price, and, at all times, to give precedence to the company's demands for work. They have the use of the ground and buildings occupied by them, with the fixed machinery left by Mr. Davis, without rent, being bound to keep the same in repair, and return them as they received them. In consideration of this, they manufacture the company's engines, so much below the market price for them elsewhere, that the interest on the cost of buildings and fixed machinery, above mentioned, is fully paid; and, indeed, it would take but a little while, when the extension of the road westward required a larger number of engines, to reimburse to the company the entire outlay for the shops at the Mount Clare depot.

Recent experiments, made with the two last engines built by Messrs. Gillingham and Winans, show a power of traction ex-

erted by them, when the weight of the engine was but eight tons—much exceeding the greatest power that has yet been exerted on the Liverpool and Manchester Railroad by a twelve ton engine. When the necessity of having powerful engines to overcome the heavy grades and sharp curves, that must be encountered in the mountain region, is considered, the results here mentioned cannot be too highly appreciated.—They make that easy, which, but a few years since, would have been deemed impossible; and the practicability of passing the Alleghanies with locomotive engines and their trains is owing, not more to the topographical advantages of the particular route, than to the powerful machines that have been invented and perfected in the work shops of the company. For particulars of the experiments with the locomotive engines, reference is made to the report of the chief engineer on the subject.—Appendix B.

The gross receipts from the main stem during the year ending on the 1st inst., have been $281,966 87, exceeding the gross receipts the preceding year by $18,598 77. The expenses of transportation during the same period have been $128,177 41, exceeding those of the preceding year by $14,210 23. The repairs of the road for the year just ended have been $53,101 32, while the repairs of the year ending Oct. 1st, 1835, amounted to but $25,103 63, making a difference of $27,997 69. The repairs of machinery and cars have also exceeded the repairs of the preceding year by $9,380.

It will be at once observed, that the expenses of transportation have increased in a much greater proportion than the gross revenue. This is to be accounted for by the extraordianry inclemency of the winter of 1835–36. The frequent falls of snow, lying for a long time upon the ground, alternating with rain, and cold freezing weather, so coated the rails, as to prevent, very frequently, the use of steam for transportation, and made it necessary to employ a number of horses to prevent the business of the road from being interrupted. The snow was often so deep, and the ice on the rails so thick, as to defy the ordinary modes of removing them, and the employment of gangs of laborers became necessary for the purpose.

It is gratifying to the board to be able to state that, while many of the railroads to the north of the Potomac were either obliged to suspend operations altogether, or were interrupted for days together, by the inclemency of the season, not a single trip was lost either on the main stem of the Baltimore and Ohio Railroad, or on the lateral road to Washington.

It will also be observed, that the repairs of the road, which, in the year ending October 1st, 1835, amounted to but $25.103 63, have this year been increased to $53,101 32, which is to be attributed to the decay of the wooden string piece, upon which the iron rail has been laid on a considerable part of the line of the road. This it was expected, when it was adopted, would last from eight to ten years; on the contrary, during the last year after it had been in use but six years, and some of it not so long, the wooden string piece very generally required replacing. The graduation and masonry of the road continue in good order along the entire line; the repairs, which from so large an item among the charges against the income, occur in the superstructure,—thus corroborating the opinion, which is now generally entertained, that where the means can be obtained with which to procure it, a heavy iron rail is the best and most economical in the end.

The repairs of machinery, engines and cars, have, also, as is seen above, considerably exceed those of the year ending October 1st, 1835. This is owing chiefly to the increased number of locomotive engines now in use upon the road.

On the Washington road, the gross receipts, since it was opened, including a part of the year ending October 1st, 1835, have been $178,333 95, of which the State tax, amounting to $40,564 26, is a part. The expenses of transportation upon this road have been but $26,540 47, or nearly fifteen per cent. of the gross receipts, while, the expenses of transportation upon the main stem are forty-five and a half per cent. of the gross receipts. The difference is to be chiefly attributed to the more ample charge allowed for the transportation of passengers on the branch road, and to the fact of steam being employed exclusively as the moving power throughout. When the planes at Parr's ridge are done away with, and horse power on the main stem superseded entirely by steam, the result with the increased toll authorized by the act of May session, will be in proportion favorable on this road also. The expenses of repairs of the Washington road have been $15,423 17, of which the sum of $10,000 is properly chargeable to construction—having been spent in the removal of slides and the adjustment of embankments, and forming a part of the construction as justly as the original excavation and graduation of the road bed.

The nett earnings of this road, since it was opened, and which constitute a fund for dividends, amount to $88,772 03. Besides the dividend that the main stem is entitled to receive as a stockholder in the Washington branch, it must be borne in mind, that a considerable sum is annually received by the former for the use of that part of the road which is common to both works. The board have little doubt, therefore, that the receipts from the Washington branch will be more than sufficient to meet the interest on the money borrowed by the main stem to construct it; and indeed the increase of travel and transportation between Baltimore and Washington has been such, since this means of intercommunication has been opened, that there is every reason to believe, that the nett profits of the branch, exceeding six per cent. per annum, will become a source of income to the main stem, fully justifying the company in undertaking to construct it.

In the last annual report, the board expressed the belief that they would, thereafter, be enabled to make regular semi-annual dividends among the Stockholders. In making this assertion the board believed that they would be borne out by the increasing business of the road. Not only did they anticipate the increase, which past experience had led them to expect, but they were under the impression, that, upon the opening of a continuous railroad communication with Winchester, the additional trade and travel would so add to the income of the company, as to ensure the payment of regular dividends to the stockholders.—They were under the impression too, that the receipts from the Washington Branch would be sufficient to meet the interests due on the money borrowed by the company to pay for its stock in that work. In these anticipations the board of directors found themselves, when the time for declaring the expected dividend arrived, disappointed. And they have found it necessary, to call for an instalment of five dollars per share on the stock.

On the first of October, 1835, at the date of the last annual report, the receipts of the company for the preceding six months had amounted to $148,541 63. Instead of this amount being received for the ensuing six months, ending on the first of April, 1836, when the dividend should have been made, the receipts were but $124,614 23, making a difference of $23,927 40.—Again, the board had no reason to believe, that the general expenses of the company for the six months ending on the 1st of April, 1836, would exceed the expenses of the six months immediately preceding.—The expenses of the latter exceeded, however, the expenses of the former period, by $26,320 70, making, in these two items alone, a deficiency, not anticipated on the 1st of October, 1835, of $50,248 10.—The causes of this diminution of receipts and increases of expenses have been already stated in a previous part of this report.

The board had expected too, that the $30,000, interest due on the money borrowed to make the Washington branch, on the 1st of April, 1836, would have been met by the dividends received from that work. Instead of this, however, it became a charge upon the main stem, making, with the items already enumerated, the sum of $80,240 10, by which the disposable revenue of the company was reduced below what had been anticipated, when the belief that regular dividends could be declared, was expressed in the report of October, 1835. These matters are stated at length, to explain why it was, that, with the confident belief entertained by them at the date of their annual report, the board of directors still found themselves unable to continue the payment of semi-annual dividends.

During the current year, the construction of the Potomac viaduct—additional sidelings and turnouts—right of way and damages—surveys—real estate and construction of depots and water stations—locomotive steam power and machinery have caused expenditures properly chargeable to the capital stock, but which have had to be met, in anticipation of instalments, by the revenue as it accrued. The amount of the

capital in the main stem is $3,311,250, while the money actually expended is $3,474,600 08. On the Washington branch, the capital paid in $1,500,000, and the capital expended is $1,588,899 61, making on the main stem, an over expenditure of capital $163,350 08, and on the Washington branch an over expenditure of $88,899 61; in all an over expenditure of capital of $252,249 69. To meet this, the company has borrowed money, and has appropriated the nett revenue of the main stem and also the nett revenue from the Washington branch.

To discharge the debt for borrowed money due, as aforesaid, the instalment above mentioned has been called for.—The amount that has been appropriated out of the revenue of the main stem and applied to purposes connected with the construction thereof, and not to general expenses, other than construction, it is proposed, shall be divided by the number of shares of stock, in the main stem, and each share credited with its proportion, as so much paid on it. In the Washington branch, where the stock has been paid in full, this means of giving to the stochholders the benefit of the revenue, which has been appropriated to construction, cannot be adopted. A new stock to the desired amount, may therefore be created, sold, and the proceeds divided among the stockholders. For an amount of the receipts, expenditures and condition of the company, on the 1st instant, reference is madee to the accompanying statement C.

Of the ultimate profit of the Baltimore and Ohio Railroad to the stockholders, the board of directors can only here reiterate the favorable opinion, that they have so often heretofore expressed. To doubt its making a return on the outlay, when it shall be completed to the western waters, is impossible, when the probable travel and transportation upon it then, are considered. There is hardly a railroad in the country, that has been completed, that is not now realizing a handsome return on the cost of its construction; and the chief reason why this is not done by the Baltimore and Ohio railroad, is, that it is not completed. If it were, at this day proposed to make a railroad to Fredericksown or Harpers' Ferry—(supposing the Baltimore and Ohio railroad to the west not to be projected even,) no one would be willing to undertake such a work through so difficult a region;—for every one would, at once, doubt its affording an interest on its cost. To expect, therefore, that the Baltimore and Ohio railroad, which now is not a road to the west, but a road to Frederickstown and Harpers' Ferry only should make the dividends declared by the finished railroads of the country, were vain indeed. The full extent of its profit can only be realized on its completion.

It is to be remarked here also, that when the charter of the Baltimore and Ohio railroad was granted, in 1826, by the Legislature of Maryland, it was the first railroad for general purposes that had been projected in the country—and so sanguine of profit were its friends, that the charge for passengers was deemed ample at three cents per mile, and for merchaudize and produce, four cents eastward and six cents westward, making an average as experience shows, of about four and an half cents. Experience has since shewn, that upon a costly road, through a difficult country, these rates are too low, upon the limited amount of business that has heretofore been done by this company: and there are but few railroads in the union on which the charges are not higher.* Combined with the low rate of charge, to which this company is limited, may be mentioned those causes of expense—the working of inclined planes, and the maintenance of an expensive horse power to be used in the city—from which other railroad companies, whose stocks give large dividends, are exempt.

These matters are mentioned here, by way of showing the difference between the companies that are often cited as examples of productive institutions, and the Baltimore and Ohio Railroad Company—and to show that the cases are by no means parallel. The Portsmouth and Roanoke railroad, for instance, is allowed to charge six cents per mile for the transportation of passengers, and eight cents per ton for freight. The Washington branch makes the same charge for passengers—but only four cents for freight—and has to pay a bonus of one fifth of its receipts from passengers to the State. Were this bonus not paid, and the Portsmouth and Roanoke rates charged, it would be able to declare out of the earnings of last year alone, a dividend of eight and three-fourths per cent. to its stockholders—and at the same rates, for the same time, the main stem could have declared a dividend of eight and a half per cent. When this road is finished to the west, there can be no doabt of its productiveness—and even in the meantime. what, with the increase of toll already authorized, the avoidance of the planes at Parr's Ridge, it is believed that a return may be made to the stockholders.

It is the desire of the board to see the great work finished, that is to unite Baltimore indissolubly with the west. They believe that the prosperity of Baltimore depends upon it. The liberality of Maryland—the munificence of the city most interested, have contributed nobly to the enterprize; and the board cannot doubt, that when the surveys shall have ascertained, beyond cavil, the expense of construction, any deficit which may exist, will forthwith be furnished.

By order of the Board,

J. W. Patterson, *President.*

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*On the Petersburg railroad, for persons per mile,	5 cts. for goods per t. per mile,	10 cts.
Winchester and Potomac,	6 cts.	7 cts.
Portsmouth and Roanoke,	6 cts.	8 cts.
Boston and Providence,	5 cts.	10 cts.
Boston and Lowell,	5½ cts.	7 cts.
Mohawk and Hudson,	5 cts.	8 cts.

We insert the following report entire as we consider the Albany and West Stockbridge road a most importaat link in our chain of improvements.

It is highly gratifying to us, and redounds greatly to the credit of the Engineer, that so very favorable a line should be obtained in a country hitherto considered as irreproachable.

The books for subscription are opened this week if we remember correctly.

REPORT OF THE SUPERINTENDENT OF THE ALBANY AND WEST-STOCKBRIDGE RAILROAD.

REPORT.

To the President and Directors of the Albany and West-Stockbridge Railroad Company.

I submit to you the following report, showing what has been done upon your road since my appointment as superintendent, together with some remarks in relation to the road.

There has been expended upon the road for contingencies, besides amount paid to Engineer,	$177 22
For a lot of standing chesnut timber,	200 00
To Mr. Talcott, Engineer, for his own services and those of his assistants and laborers, and for instruments and other expenses attending the survey,	4,194 52
	$4,571 74

Nothing is charged in the above for services of superintendent, and part of the expenses of the last month are not included.

The surveys were commenced on the first day of September last, and continued until the deep snows prevented their further prosecution, and more than one hundred miles of line run, The results of which were reported to your board by W. H. Talcott, Esq. the Engineer, on the first of March last, which results were, generally, that a road could be made from the river at Greenbush, to the Kinderhook creek near Malden bridge, upon a grade, not exceeding in a place, forty feet the mile, or one foot in 132. From that creek, to a summit near Dr. Culver's, a distance of about seven miles, it became necessary to ascend at the rate of from forty-two to fifty-four feet per mile. From the summit to the State line at West-Stockbridge, the ascent did not exceed forty feet in the mile; making the whole distance upon this route, which I shall call the Culver route, 36$\frac{28}{100}$ miles. The estimated cost of which, excluding the branch to Castleton, (which is now unnecessary by an act of the legislature) with single track and suitable turn-outs, laid upon chesnut sub-sills, red ceder cross ties and iron rails, together with depots, machine shops, engines, cars and other appurtenances, was put at $664,280 73

From a very careful examination made by Mr. Talcott, into the business to be done upon the road, and which was reported in detail, he showed the annual receipts, from passengers and freight, to be

$179,304. In this estimate he put the freight at half the present cost of transportation. From the above receipts, he deducted the annual expense of operating the road and of repairs $63,515 69, leaving a balance of $115,788 31, which is an interest of 18 per cent upon cost.

This company was organized under the act entitled "An act to incorporate the Castleton and West-Stockbridge Railroad Company," which authorized the construction of a road from Castleton, eight miles below Albany, to West-Stockbridge, and it was contemplated to bring the road to Albany by a private association.

It was found on examination that a line could be run, leaving the river directly at Greenbush, as well or better than at any point below, and about three miles distance saved.

The capital stock of the Company was $300,000, which was found not to be sufficient to build the road.

Application was made to the legislature, at the last session, and the charter so amended, that the title is changed to that of "The Albany and West-Stockbridge Railroad Company." The capital stock increased $350,000. The time for commencing the road extended to two years from the passage of the act, and the time for completing it to five years, and the company authorized to construct a railroad from the river at Greenbush to West-Stockbridge, by any route they may see fit, and the charter is otherwise liberal in its details.

It having been represented that a route could be found from Albany, and also from Troy, by or near Sand Lake, to Lebanon Springs, and thence to West Stockbridge, I directed the Engineer under my charge to run a line over that country to a point in the Lebanon valley near Brainard's Bridge; and also one from the line run last fall near Malden bridge up the valley of the Kinderhook creek, to the same point, about two miles east of Brainard's Bridge and then a line which would be common to both routes from that point, by way of Lebanon Springs and Whiting's pond, to West-Stockbridge. The result is, that the point in the valley near Brainard's Bridge, is 605 feet above tide water at Greenbush, and can be approached by following the line run last fall to Malden bridge, and thence to Brainard's Bridge, in 23½ miles, ascending in no place over forty feet in the mile. The same point can be approached by the line run near Sand Lake, in twenty-five miles, but over a summit about 200 feet higher than the point itself, and making the ascents and descents by this route 400 feet more than that by Malden bridge. A grade of more than 50 feet in the mile must be submitted to on this line, and the expense of grading, per mile, will be considerable more than on the other route.

The line from near Brainard's Bridge, run on the north side of the Lebanon valley, and passing within ten rods of the Spring itself, and thence to West-Stockbridge, need not exceed in ascent in any place over forty feet in the mile, and can be made within that grade the whole distance from Greenbush, by the way of Malden bridge and the Springs, to West-Stockbridge, in 41¾ miles, descending on the whole line going eastward, only thirty-eight feet, until the summit is reached at Whiting's pond, near the State line, and no curves less than 1,000 feet radius.

A line has also been run, commencing on the line run last fall at a point fourteen miles from Greenbush, and thence to intersect the Hudson and Berkshire railroad at Groat's. This shows that a road can be made from Greenbush to Groat's, in twenty-three and a fraction miles, and at ascents in no place over forty feet in the mile, and making the whole distance from Greenbush to Stockbridge, by Groat's $37\frac{67}{100}$ miles. This line descends in going eastward to the Kinderhook creek, 117 feet, being seventy-nine feet more than on the line by Malden bridge and the Springs. The ascents from Groat's to West-Stockbridge, upon the Hudson and Berkshire road, and which must be submitted to by this company, if that route is adopted, are much steeper than on either of the other routes, being for three miles together, about seventy-two feet in the mile, and five-eighths of a mile at eighty feet. These are the objectionable points in this route.

It may not be improper here to remark, that there are 5 miles together upon the Boston and Providence road, 37½ feet per mile. This is within two and a half feet of the steepest ascents necessary upon the route by the Lebanon Springs. This ascent upon the Boston and Providence road is found to be no objection to the successful use of steam locomotive power, and at almost any speed desired.

The expense of operating a road, however, depends very much upon its grades. The result of experience shows that the same engine that will draw a load of forty tons, exclusive of engine and tender, upon a plane of forty feet in the mile, will draw but $22\frac{80}{100}$ tons on a plane of seventy-two feet, and so in proportion between these points, and unless an extra locomotive is used to pass the steep grades, the engine must be loaded for the whole distance with no more than can be drawn up the steepest ascents.

These are important considerations in deciding between the route by Groat's, where the grades will be heavy, and that by the springs, where they are much lighter; and more especially so, in reference to a road coming to the mouth of the canal, which will carry, of flour and other productions of the west, into the interior of New-England, an amount of tonnage nearly equal to that coming from Stockbridge to the river.

In connexion with this point, I call the attention of the directors to the report of Mr. Talcott, herewith submitted, in relation to the business to be secured to the road, if the route by the Springs should be adopted. At page 3 of his report, he remarks that "The northern route by the Springs, would add to the general business of the road nearly all the pleasure travel to and from the Springs, which during the visiting season of 1835, amounted to 14,000 passages, and would no doubt be twice that number, or 28,000, immediately on opening a railroad from Albany to the Springs. This travel comes at a season of the year when but little freight is offered, and consequently can be done without much additional expense to the company. In fact the more advantageous grade upon this route will of itself compensate for doing the increased business, so that no extra allowance need be made for doing it."

In the report of Mr. Talcott, submitted on the first of March last, only $4,668 were allowed for travel to and from these Springs, expecting that as the route then reported upon would leave the valley of the Kinderhook eleven miles from the Springs, the ordinary stage coaches would retain most of that business. Hence it will appear that about $23,000 annual receipts will be added to the road by the adoption of this route.

This road is to form part of the great line of railroad from Boston to Buffalo, for the construction of which charters have been granted by Massachusetts and this State, and the works are going forward already upon almost the entire distance. And since making the report on the first of March, the "Act to incorporate the New-York and Albany Railroad Company," has been so amended that the road will probably be made, coming up through the east part of Dutchess county, and thence through the valley of Housatonic river to West-Stockbridge. Should that be done, it will bring the entire winter travel, and much of the summer travel between the cities of New-York and Albany, over your road.

There is no canal to compete with this road, either for freight or passengers. It will have no competition for the public travel from five of the New-England States, westward and back, nor for the freight destined for Albany and the West, nor for the flour and other productions of the west, going eastward, as that freight can be delivered directly from the canal boats to the cars on the road, without river charges, which cannot be done at any point below Albany. The Hudson and Berkshire road will compete with this for the eastern freight destined for New-York and back; but when it was recollected that freights are and have for a long time been as low upon the river from Albany to New-York, as any point above Poughkeepsie, with daily lines of tow-boats; and this company having freight from the canal to load their cars going east, so that they can use their power both ways, it is believed that freight can be carried on this road by way of Albany to New-York, as cheap or cheaper, and as quick as by any road below. It may therefore be fairly calculated that this business will be divided between this and the Hudson road.

The expense and distance upon each route reported upon by Mr. Talcott, are as follows:

By way of Malden bridge and Lebanon Springs, distance 41¾ miles, cost, $647,529

By way of Groat's, adding half

the expense of double track from Groat's to Stockbridge, to be used by this and the Hudson company, distance $37\frac{1}{2}$ miles, 560,376

By way of Malden bridge and Culver's summit, distance $36\frac{1}{2}$ miles, 586,280

These amounts are exclusive of depots, machine shops, engines, cars, &c., and are all made for a superstructure of chesnut sub-sills, red cedar cross ties and entire iron rails.

The experimental surveys have been extended much further than was supposed necessary when the work was commenced. They embrace in the whole about 200 miles of line. A summit of about 1,000 feet at the Canaan Gap, so called, about two miles this side of Massachusetts line, has to be overcome by any road running from the Hudson river in that direction. To reach that summit through a mountainous country, upon a grade so low as not to exceed 40 feet in the mile in any place, has required much examination. The measurements upon one line have suggested the propriety of making others, until they have been extended to the aggregate above stated. From my knowledge of the country, and from the opinion of the Engineer, I do not believe any further examinations will be necessary to enable the directors to decide generally upon the route to be adopted.

From the report of the Engineer made to you on the first of March, showing the business to be done upon the road, and regarding the accession of business within the reach of the company, by bringing the Lebanon Springs into their line, and the probable construction of the New-York and Albany road, bringing that travel also over the whole line, it cannot be doubted that this road will present some of the best railroad stock in the State.

S. Cheever, *Superintendent.*

July 9, 1836.

ENGINEER'S REPORT.

To the President and Directors of the Albany and West-Stockbridge Railroad Company.

Gentlemen: In compliance with the instruction received from the company's superintendent, I have prepared the following statements, estimates, &c. for the purpose of exhibiting to the board, at their meeting on the 4th instant, the present state of the surveys, as well as the different lines which have been run, their comparative cost, length, &c. so far as can be done with the information already obtained.

Experimental lines have been run over about 90 miles this season: commencing with a line from Greenbush to Bath, and thence towards New-Lebanon Springs, passing about two miles south of Sand-Lake: designated on the map accompanying this report, *Sand-Lake Route.*

The next line is one leaving the line run last fall at Malden bridge, and running up the valley of the Kinderhook creek; and thence on the south side of the Lebanon creek valley to Whiting's pond, which is the summit of all the routes passing through Lebanon. This route is called the *Lebanon Route.*

The next line run, follows the course of the one last mentioned, as far as the Lebanon creek valley, and then runs on the north side of his valley by the way of New-Lebanon springs, reaching Whiting's pond at the same point with the other. This, on the map, is called *Lebanon Springs Route.*

A line has also been run from the Hudson and Berkshire Railroad at Groat's tavern, intersecting the Greenbush line run last fall, (called Route A, in my report of March 1st, 1836,) at a point about 14 miles from Greenbush. This too is laid down upon the map, and called *Route to Groat's.*

The line of the Hudson and Berkshire Railroad, is also laid down upon the map, as a continuation of this route from Groat's to the State line; and likewise the entire line run during last season. These routes, it is believed, embrace all that may be considered worthy, on examination with the instruments. The lines run this season are, as above stated, experimental lines, run with a view to test the practicability of the routes, and not with such care as is necessary in locating a line; and of course the estimates based upon them, must be subject to the same imperfections; but since all the lines have been run in the like manner, it will not much affect their relative value; and it is believed that the final location will not very essentially alter the present estimate.

Profiles of all the routes have been prepared, to accompany this report; and estimates for two routes, viz: *Lebanon Springs Route,* and *Route to Groat's.* The profiles will show the gradients required on the different routes. It may be well to state, that in the Lebanon Springs Route the gradients may all be arranged, so that the gravity, and the increased friction on the curves, will in no case be greater than the gravity on a straight road, ascending at the rate of 40 feet per mile. The same may be said of the Route to Groat's with the exception of the first $2\frac{1}{2}$ miles from Groat's towards Greenbush, where the grade must be 40 feet per mile without reference to the curvature of the road.

The *Sand-Lake Route* will require steeper gradients, say 50 feet per mile for four miles in leaving the river, and the same in many other places on the route. The *Lebanon Route* may all be so arranged as not to exceed 40 feet per mile, without reference to the curves.

In the following table prepared from the surveys and estimates, the *first* column shows the name of the route; the *second,* the length from Greenbush to the State line at West-Stockbridge; the *third,* the total amount of ascent in going from Greenbush; the *fourth,* the descent in the same direction; the *fifth,* an equivalent (going east,) in miles of level road; the *sixth,* the same for the opposite direction, allowing for half the amount of power on the descending portions of the road, that is required on a level road.

TITLE OF ROUTE.	Length in miles.	Ascent in feet.	Descent in feet.	East Miles.	West Miles.
Route A, of 1835,	36. $\frac{28}{100}$	1.011	112	86. $\frac{83}{100}$	29. $\frac{5}{100}$
" by way of Leb. Springs,	41. $\frac{87}{100}$	1.049	150	94. $\frac{32}{100}$	34. $\frac{80}{100}$
" to Groat's,	37. $\frac{67}{100}$	1.084	185	91. $\frac{87}{100}$	33. $\frac{53}{100}$
Lebanon Route,	38. $\frac{87}{100}$				
Sand-Lake Route,	43. $\frac{25}{100}$				

The cost of all kinds of work, as well as materials wanted in the construction of Railroads, is much greater now than at the time the estimates for the routes run last season, were submitted. The prices, however, in the present estimates, are put down the same as then, in order to make the comparison of the cost of the different routes more perfect.

It is proper to remark, that the present estimates are for one track only, with turnouts every three miles; and I would take this occasion to say, that in all cases where the amount of business warrants a belief that two tracks will soon be needed, economy requires that the road should be graded sufficiently wide in the first instance for two tracks; and if wanted even remotely, to construct the bridges and culverts, and even the rock cuttings, with a view to the construction of a second track. I would add, that the plan proposed for the Western railroad, of which this is to be a continuation, is to grade for two tracks, and lay down one with turnouts to be used for the present—and then would recommend the same plan, as the one most economical in the end, and therefore best for this company to adopt. In the estimates, however, I have followed the letter of my instructions, and embraced nothing but what is necessary for the construction and convenient operation of a single track.

With regard to the amount of business for the road when completed, I would barely say, that this spring's observation has confirmed my opinion that the business was not over-estimated in the report of March last.

It may be well to remark, that the amount of business will be materially affected by the route adopted. It is well understood that if the southern route is taken, it will give the Hudson and Berkshire Railroad an opportunity to compete more successfully for that part of the business destined for Albany, and will add an inducement to the stockholders of the Troy and West-Stockbridge Railroad to submit to such grades as will allow them to go by way of New-Lebanon Springs. The northern route, by the way of the Springs, would add to the general business of the road, the sum of nearly all the pleasure travel to and from the Springs, which during the year 1835, amounted to 14,000 passages, and would no doubt be twice that number, or 28,000 passages immediately on the

opening of a railroad communication from Albany to the Springs. This travel always occurs at a time in the year when but little freight is offered, and consequently can be done without much additional expense to the company. In fact, the more advantageous grdae upon this route will compensate for the increased business, so that no allowance ought to be made on this account.

On the other hand, the aggregate cost of constructing the road by the northern route, is much greater than by the southern route, as will be seen by the estimates and comparisons given below. These are questions justly commending themselves to the attention, and to be desided by the action, of your honorable body.

ESTIMATES.

LEBANON SPRINGS ROUTE.

Sections No. 1, 2 *and* 3—17$\frac{16}{100}$ *miles.*

From Greenbush to near the Kinderhook creek, as per estimate of 1st March last. $166,448 80

Average cost per mile is $9,699.81.

Section No. 4—6$\frac{36}{100}$ *miles.*

For excavation and embankment,	$39,435 15
" bridges, culverts, land and fence,	17,860 00
" contingencies and superintendence, 10 per cent.	5,729 51
	$63,024 64

Average cost per mile is $9,909.53.

Section No. 5—13$\frac{35}{100}$ *miles*

For excavation and embankment,	$84,894 35
" bridges, culverts, land and fence,	37,014 00
" contingencies and superintendence, 10 per cent	12,190 83
	$134,099 18

Average cost per mile is $10,044 88

Section No. 6—5 *miles.*

For excavation and embankment,	$20,186 89
" bridges, culverts, land and fence,	11,740 00
" contingencies and superintendence, 10 per cent.	3,192 69
	$35,119 58

Average cost per mile is $7,023.92.

Agregate sum for the whole route is $398,692 20

And the average cost per mile for the same is $9,522.14

ROUTE TO GROAT'S.

Section No. 1 *and* 2—13$\frac{18}{100}$ *miles.*

Total cost as per estimate of March last, is $146,993 80

And the average cost per mile is $11,152.79.

Section No. 3—9$\frac{60}{100}$ *miles.*

For excavation and embankment,	$49,516 86
" bridges, culverts, land and fence,	23,919 70
" contingencies and superintendence, 10 per cent.	7,343 58
	$80,771 44

Average cost per mile is $8,413.69.

Aggregate sum for grading to Groat's is $227,765 24

And the average cost per mile is $9,998.47.

If we allow the same average cost per mile for the remaining distance to the State-line, which is 14$\frac{89}{100}$ miles, and take half that amount for the proportion of the expense to be paid by this company, we have 74,438 61

Making $302,203 85

to be paid on account of grading the whole distance for one track.

For grading route by way of New-Lebanon Springs, we have, as per estimate above,	$398,692 20
" 41$\frac{87}{100}$ miles of single track, at $5,100 per mile,	213,537 00
" 14 turnouts, $950 each,	13,300 00
" 44 miles of horse path $500 per mile,	22,000 00
Total cost of route by the Springs,	$647,529 20

For grading route by way of Groat's, as per estimate above,	$302,203 85
" 30$\frac{23}{100}$ miles of single track, at $5,100 per mile,	154,173 00
" 10 turnouts, $950 each,	9,500 00
" 33 miles of horse path, $500 per mile,	16,500 00
Total cost of route by Groat's is	$482,376 85

And the total cost of route A, as per estimate of March last, is $586,280 78

The following table will show, at first sight, the length of each route, the cost of grading, the additional cost of superstructure, and the total cost of each route.

Route.	Miles.	Grading.	Superstructure.	Total cost.
By the way of the Springs,	41.87	$398,692 20	$248,837 00	$647,529 20
By the way of Groat's,	37.67	302,203 85	180,173 00	482,376 85
By the way of Calver Hill,	36.28	367,802 73	218,478 00	586,280 73

It will be seen that the balance in favor of the southern route is $165,152.35; but it should be observed that in case the two companies determine to grade for, and construct two tracks in the first instance for that portion of the road to be used in common, which certainly ought to be done, then he first cost on that route will be increased by the sum of about $78,000, making the total cost of the southern route $560,376 85, and leaving a balance in the first cost of $87,152 35 in favor of the same.

That portion of the line common to both routes, viz. the first 13 miles from Greenbush, can be located and put in order for contracting by about the middle of August, if required; and I would add, that the present seems to be a favorable time for letting work, on account of the recent indefinite postponement of the proposed letting of 112 miles of the New-York and Erie Railroad.

The prices remain high as yet, say about sixteen per cent. above what they were last year; and should they continue the same, it will add in the same proportion to the cost of the road.

All which is respectfully submitted,

WM. H. TALCOTT, Engineer.

Albany, July 2d, 1835.

From the Portland Advertiser.

THE GREAT EASTERN RAILROAD.

Regarding it as a time for the people of this neighborhood to wake up on the subject of *Internal Improvements*, as a matter of *self-preservation*, all advantages being comparative—the writer wishes to put his fellow-citizens upon immediate inquiry.—The following letter, which was not intended for publication, is from Col. Long, himself, one of the ablest Engineers now living, and a man upon whose judgment the most cautious may rely with safety. It will speak for itself. The limits of a daily paper not allowing a full examination of the subject at once, the writer would hope that he may be allowed to recur to it *briefly*, again and again, before the meeting of the next Legislature, with a view to have the public mind thoroughly prepared for deciding the most momentous question likely to be presented for years. Perhaps it would be advisable to have a *public meeting* on the subject within a few days at furthest.

A NEW-ENGLANDER.

"I have just completed the reconnoisance of the Portland and Bangor Railroad, and am happy to assure you that its feasibility is far greater than I expected to find it at the time of our last interview. The steepness of its gradations, on several portions of the route between Portland and the Kennebec river, were somewhat discouraging, especially in the neighborhood of the Androscoggin. But on further examination I find difficulties of this nature far less numerous and formidable, on a route, which may be distinguished from all others by the designation of the "Foreside Route," which will cross Royal's and Cozins' River below their juncture, on a bridge perhaps half a mile long,—a branch of the Harriseckit river, at Porter's landing, by means of a bridge 300 yards long, and another branch of the same river by a bridge, of about the same length. These are by far the most expensive parts of the route between North Yarmouth and Brunswick;—added to the bridges across Back cove and Presumpscot River, the extent of bridging between Portland and Brunswick, will be about 1½ miles. The route, to all appearance is free from ledges, on the entire distance;—its curvatures may readily be limited to 1000, perhaps 1500 feet, and its inclinations to 35, perhaps 30 feet per mile. From Brunswick to Gardiner I have discovered another route, far more favorable with respect to its gradations than that which I have examined previously to the date of our last interview. Instead of declivities of 60 feet per mile, we shall now be able to limit the gradations on the entire route from Portland to Bangor, to 35 feet per mile.

A more favorable route could not reasonably be expected; nor indeed a route more worthy of public patronage.

In advocating works of the character here contemplated, it should be borne in mind that at least $\frac{3}{4}$ of the money expended in the construction, will remain in the State, while less than $\frac{1}{5}$ probably will be raised in the State. The State will no doubt realize many fold, the prime cost of the road, in the increased value of real estate, consequent on its construction. The *hue and cry* should never be raised against monopolies, when the community is ten dollars better, for every dollar that is put into the pocket of the monopolist.

But I will hazard no more of my speculations at present. With an ardent hope that New-England will retrieve her character for enterprise, by embarking zealously in the cause of Railroads; I remain, dear sir,

Very respectfully, your ob't. servant,

S. H. Long.

AN ADDRESS TO THE CITIZENS OF HARTFORD, ON THE BIRTHDAY OF LINNÆUS: MAY 24TH, 1836. IN BEHALF OF THE OBJECTS OF THE NATURAL HISTORY SOCIETY; FORMED OCTOBER 8, 1835. BY SAMUEL FARMER JARVIS, D. D., PRESIDENT OF THE SOCIETY, &C , &C.

LINNÆUS.

In 1732, a poor and friendless stranger from a little town in Dalecarlia, presented himself at Leyden to the illustrious Boerhaave. His indigence was so great, that when in college he had been obliged to wear the cast-off shoes of his fellow-students; and though after he had left Upsal, he gained a little money by the practice of medicine, yet by the time he arrived at Hamburg all his resources were exhausted. He persevered, however, in making his way to Holland; and the great physician whom I have named recommended him to a rich proprietor of the name of Clifford, who had a taste of natural history, and possessed at Hatecamp, between Leyden and Hærlem, a magnificent garden, cabinet, and library. In this hospitable abode he remained for three years, enjoying abundantly all the assistance necessary for his favorite studies. Need I tell you that this poor stranger, thus indebted to the munificence and love of science of one rich individual, was the great Linnæus!

In 1735 was published at Leyden, the first sketch of his System of Nature, or the three kingdoms of nature systematically set forth, by classes, orders, genera, and species. It consisted of three tables, each contained in a single sheet; and this, with another treatise of twenty-six pages published the following year, contained the germ of all that he afterward wrote. This work of twenty-six pages, contained, in the form of aphorisms, the theory of botany; and it was the result, as the author informs us, of seven years' study, and the examination of eight thousand plants. It was followed in successive years by three other works, which laid the foundation of the great revolution in botany; and fifteen years afterward, the whole was condensed in an octavo volume, containing proofs in every page of the most subtle intellect, and a most astonishing depth of observation. This single volume has become the fundamental law, the constitution, as it were, of the science; a constitution acknowledged and reverenced by botanists of every nation; and notwithstanding the immense quantity of plants since accumulated, and the innumerable facts which skilful observers have since added, principally on vegetable anatomy and the internal structure of fruits and seeds, his system of Linnæus is even now in full vigor.

It has become, indeed, in some sense, a universal language; and in every country, however remote, where a scientific botanist or even a skilful gardener is to be found, it is sufficient, in order to be understood, to designate a plant by its Linnæan name.—It was not, as we have seen, the discovery of the sexual system which gave Linnæus his fame and his sovereignty. That discovery is claimed by England; and it preceded the time of Linnæus half a century—It was rather the distinctness, the regularity, the energetic precision of his system, and especially the convenience of what he called the *trivial*, or as it is now termed, the *specific* name, which gave him this authority. This last simple contrivance alone by which the overburthened memory of the botanist was relieved from the constant accumulation of long descriptive phrases, was found so useful, that, dating from that epoch, he reigned over the botanic world without a rival.

LINNÆUS, BUFFON, AND DAUBENTON.

For nearly a hundred years, the royal garden of plants at Paris, the establishment of which was coeval with that of our city, was greatly neglected, and its revenues were appropriated to other objects.—But in 1732, the superintendence of it was separated from the office of the first physician to the king, and confided to Charles Francois Du Fay, who soon rendered it the finest garden in Europe. He died in 1739, and on his deathbed recommended Buffon as the only man who seemed to him capable of following out his plans. Buffon was a few months younger than Linnæus, and survived him about ten years. Their characters were essentially different. Linnæus was methodical, patient, concentrating, and concise; Buffon despised system, was brilliant and imaginative, diffuse and fond of ornament. Eminently fitted to render a subject popular when the materials were collected and laid before him, he was utterly incapable of that minute, and accurate, and unwearied observation, which are so essential to the science of the naturalist.—Happily he had for his associate Daubenton, whose qualities were precisely those in which Buffon was defective. The collection of facts with which he enriched the history of animals is immense; and the care with which he observed them was so great, that Cuvier has given him a praise, which from any other mouth would have seemed extravagant: *in vain do we look for an error.* He described only what he had seen himself. He did not even draw those general conclusions which most naturally arise from established facts; and his timidity in this respect was so cautious, that Camper said of him, he did not himself know how many discoveries he had made.

It was unfortunate for the interests of science, that Buffon appears to have treated him unkindly in permitting an edition of the History of Quadrupeds to be published, in which the description and anatomy of Daubenton were suppressed. In consequence of this, he refused any further cooperation in the work; and in the history of birds his place was poorly supplied by Guineau de Montbelliard and the Abbe Bexon.

After what has been said of Buffon, it will no longer excite surprise that, in the popular estimation, his fame should so entirely have eclipsed that of Linnæus.—Another cause of his celebrity was, the advantage he possessed in the superintendence of the garden of plants, and the facilities afforded him for forming collections in a city which had become the capital of the scientific world.

Two schools of natural science were now formed; the one pursuing the system of the Swedish naturalist, the other following the more popular course of the brilliant Frenchman.

Time would not permit me to do more than name the individuals who formed these respective schools; and I therefore purposely omit them, lest among so many I should commit injustice by selection.—From 1735 to 1798, when Cuvier published his first work, twenty-eight authors are enumerated on Entomology alone;* each of whom have contributed, more or less, by their observations, to enrich the history of insects. Of these, there were, one Italian, two Danes, three English, three French, three Swedes, three Swiss, four Dutch, and nine Germans. In the other departments, authors have not been so numerous, but the whole science has been carried forward with an impetus truly astonishing. The French, the Germans, and the English have vied with each other in this generous and noble rivalry.

If the French have surpassed all other nations, it must be attributed to the possession of such a treasure as their cabinet of natural history. It may be said to have been created by Daubenton, and has ever since been continually augmented by the zeal of individuals and the patronage of government. Even in the stormy times of the Revolution, when a political frenzy seemed to have seized the whole nation, this splendid monument of science, though for a time neglected, and deprived of its support, was spared, and finally patronized. It was in the spring of 1795 that Cuvier first visited the French capital, and in July of the same year was appointed assistant lecturer of comparative anatomy in the garden of plants. Here, in a lumber-room of the museum of natural history, he found four or five old skeletons, collected by Daubenton, and cast aside by Buffon.

It is interesting to trace from their commencement the history of noble institutions, and to see how much can often be done by the persevering industry of a single individual These skeletons Cuvier made the basis of his museum, and, encouraged by some professors, though opposed by others, went on in the formation of it with untiring effort. In less than forty years, and within the compass of his own invaluable life, that museum has become one of the

* See Dumeril.

wonders of the age, and, together with its immortal author, has created a new epoch in the history of natural science.

GEOLOGY.

The practical knowledge of this branch has been as old as the attempts of man to explore the hidden treasure of the earth; and the regular formation and succession of strata, together with the disturbances occasioned by earthquakes, volcanoes, and inundations, have been remarked at a very early period. The existence, also, of organized bodies in a fossil form, embedded in several of these strata, has been for centuries the occasion of wonder and perplexity. I should weary my readers were I to tell them of all the crude conceptions, and absurd fantasies invented to account for these phenomena. They were such as absolutely to bring geology into contempt; and it was by many regarded as a visionary employment of the human intellect, till the work of Cuvier on fossil organic remains gave it a new character, and produced throughout the world the sensation of a surprising discovery.

The method of considering each separate organ, and tracing it through the whole series of animals, had led him to certain general and invariable laws of combination, by which the possession of one series of bones would indicate the necessary connexion of another series. A beast of prey, for instance, would always have teeth fitted to devour that prey, and claws fitted to seize it. A ruminating animal, on the contrary, would have hoofs instead of claws, and teeth fitted only to grind its vegetable diet. In this way, the possession of even the fragments of an animal would enable him to complete its whole structure, and determine to what genera or species it belonged.

Aided by M. Brogniart, an eminent geologist, Cuvier commenced his researches at Montmartre, and in the quarries of gypsum in the environs of Paris. These had, for many centuries, furnished the building stone of that metropolis, and had been sunk to the distance of two hundred and 43 Paris feet. About fourteen or fifteen feet below the surface, there are strata of marine formations, attesting the presence of salt water, which have altogether a thickness of nearly seventy-seven French feet. Below these incontestible proofs exist of a soil anciently inhabited by quadrupeds of different species, reptiles, birds, and fresh-water fish.—Below these are still deeper strata, containing productions of the sea. By collecting the scattered bones of these animals and reproducing their forms, according to the unerring rules of anatomical science, Cuvier discovered one hundred and sixty-eight vertebrated animals, forming fifty genera, of which fifteen are no longer in existence. Many of the individuals, even of existing genera, are of enormous size; and what increases the wonder, they are such as are now found only in other regions and other climates. No trace was found of human skeletons, or of the order quadrumana.—Almost the entire skeleton was discovered of a species of opossum, an animal which now exists only in America; and this single fact at once overturned the theory, that the American genera had come from their own soil, and had never extended themselves to the other portions of the globe.*

I shall add no more on this subject, excepting to state, that all the subsequent researches of geologists, of every nation, have confirmed the truth and the importance of this great discovery. The natural evidences of a sudden and universal deluge, and the probability of the Mosaic chronology, have been set forth with a force of truth which has borne down all opposition; and although there are still great and very embarrassing difficulties to check the pride of human knowledge, the Christian philosopher is encouraged to wait with patience, till some other bright discovery shall

"Vindicate the ways of GOD to man."

INFLUENCE OF SCIENCE ON RELIGION.

Finally, let me address you as Christians, and ask, what occupation can produce nobler views of the divine nature and providence than the contemplation of His works? The pages of inspiration tell us that the invisible things of GOD, namely his eternal power and godhead, have been clearly seen, since the creation of the world, being understood by the things that are made. It has been objected, I know, that many who have been warmly engaged in pursuits like ours, have, while surrounded by the wonders of creation, been unmindful of the great Creator. That such has been the fact, though to an extent far less than the objection assumes, we are not disposed to deny. We object, however, to the inference which some have thence drawn. We atttribute this result rather to the influence of a little knowledge on the corrupt heart of man, than to the extension of knowledge. We believe that "the knowledge which puffeth up" is eminently superficial; and in examining the progress of all sciences, we find, that proud presumption may accompany incipid discovery, but that more perfect investigations are invariably followed by profound humillity. Alphonso, of Castile, when the light of astronomical science first dawned, through his instrumentality, on the darkness of his age, could exclaim, that if he had been admitted to the counsels of the Creator, he would have arranged the universe better. He saw that the movements of the heavenly bodies could not be reconciled with what was then supposed to be the planetary system; and instead of doubting the correctness of his own knowledge, he dared to question the wisdom of the Almighty. How different on the mind of Newton was the effect of his sublime discoveries! With what awe do we behold that profound intellect, covering its face with its own wings, like the burning seraphim before the throne of God!* As

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* See the memoir of Cuvier, "Sur le Squelette presque entier d'un petit quadrupede du genre des SARIOUES trouve dans la pierre a platre des environs de Paris," in the third volume of his "Ossemens fossiles." "This rich collection," observes the distinguished discoverer, "of the fragments and skeletons of the animals of a former world is doubtless a wonderful circumstance. It has been amassed by nature in the quarries which environ our city, as it reserved by her for the researches and instruction of the present age. Each day we discover some new relic; each day adds to our astonishment, by demonstrating more and more, that nothing which then peopled this part of the globe has been preserved on its present surface. There is scarcely a block of gypsum in certain strata which does not contain bones. How many millions of these bones have been already destroyed since these quarries have been dug, and this gypsum has been employed in building! How many are, even now, destroyed by mere carelessness! How many, by their minuteness, escape the observation of the most attentive workmen! One may judge of this by the fragment I am about to describe. The lineaments there imprinted are so slight, that to detect them we must view them closely.—Yet how precious are these lineaments!—They are the impress of an animal of which we find no other traces; an animal buried perhaps for thousand of ages, now reappearing, for the first time, to the eyes of the naturalist." He then proceeds, according to his method of induction, to show, in a very clear and satisfactory manner, that it can be no other than the American opossum; after which he concludes as follows: "I will not dilate upon the geological consequences of this memoir. It is evident to all who are even slightly conversant with the systems relative to the theory of the earth, that it overthrows nearly all of them, in what relates to fossil animals. Hitherto it has been thought that our northern fossils were only of Asiatic animals. It was admitted that the animals of Asia had passed into America, and had been buried there; but it seemed that the American genera had issued from their own soil, and had never passed into the countries which now form the old continent. This is the second proof" (the Tapir was the first) "which I have discovered to the contrary. And persuaded as I am, of the futility of all these systems, I am happy every time that one of them is destroyed by a well established fact. The greatest service which can be rendered to science, is to clear the ground before we proceed to build; to begin by demolishing those fantastic structures by which its avenues are choked, and which deter from such occupations those who have happily become habituated, in the exact sciences, to yield only to evidence, or at least to class propositions according to their degrees of probability. With this last precaution there is scarcely any science which may not become almost geometrical. The chemists have lately proved this with regard to their science; and I hope the time is not far distant when the same may be said of anatomists." If an apology be required for this long note, I hope it may be found in the interest which every American must feel, in a fact so eventful and extraordinary as that which has given rise to it.

* How sublime is the thought with which Newton closes his treatise on optics! The whole universe, all material things, from comets and planets down to the bodies of animals, the organs of sense and motion, and the instinct of brutes and insects, "can be the effect of nothing else than the wisdom and skill of a powerful everliving Agent, who, being in all places, is *more able by his will to move the bodies within his boundless, uniform censorium, and thereby to form and reform the parts of the universe, than we are by our will to move the parts of our own bodies.*" So in his Principia; "Deum summum necessario existere in confesso est. Et eadem necessitate *semper*

the occasion of man's fall was an irregular desire of knowledge; so is it a part of that wisdom by which the Almighty seeks to lead us back to our paradise and to his presence, to surround us with wonders which give us constant and inexhaustable subjects of inquiry, and, at the same time, humble us by the perception of how little we can know without his aid.

It is thus with the science of natural history. The farther we advance in knowledge, the better do we perceive how much we do not know, and this perception must forever abase the most profound naturalists. "The minute philosophers," to borrow an epithet of the great Berkley, "may think, for a time, that their boasted discoveries are irreconcileable with revelation. They may raise the sand hills of their systems, and think from them to demolish the fortress of the divine word. Vain and impotent the attempt! Some fortunate discovery, as science advances, demolishes the whole by a single roll of its mighty waters, and the next wave washes it into eternal oblivion. Let us not fear, then, that revelation can ever be seriously assailed, or injured, by philosophy. It may sometimes be wounded in the house of its friends, by too great a degree of sensitiveness, which may prompt them to embrace untenable theories, and distort the language of the bible, to make it accord with what they consider as the result of experiment."*

INFLUENCE OF REPUBLICAN INSTITUTIONS ON SCIENCE.

We boast, and I for one am not disposed as yet to allow that we boast in vain, of exhibiting to the world the grand experiment, such as the world had never before seen, of a people governing themselves. We govern, and are governed, in a manner wholly inexplicable to the theorist of the old world. Not a soldier is to be seen in the wide extent of this immense republic, excepting on our frontiers. We govern, and are governed, by the will of the majority. Order is preserved, because it is the instinct of self-preservation; and every man knows, or ought to know, that his life, and liberty, and property is bound up in the life, and liberty, and property of the community.

In Europe, the interest of the whole is made subservient to the interest of individuals. In America, that of individuals is subservient to the good of the community. The interest of society is oftentimes sacrificed in Europe, to promote the interest of the individual; the interest of the individual, on the contrary, may be, and often is, sacrificed in America, to promote the interest of the public.

No doubt these are evils; and they are the evils of opposite systems. In this checquered state of being, where good and evil are the web and woof of the moral texture, the mixture cannot be avoided. It would be out of place for me to say, which system has the most evil or the most good; but let us take our system as it is, and ask whether it excludes scientific improvement? I answer, No. The monarchist of Europe asserts it, but we are not disheartened by the assertion. Our mighty experiment of self-government is far from being exhausted. We have not, it is true, the energy of despotic power which can command schools and colleges to spring into existence, can at once turn the stream of a nation's resources to the formation of cabinets of science, or the fine arts. But we have a nation, every individual of which feels that he is bounded only by the extent of those powers which God has given him; and the very basis of our institutions is, that every member of the republic is under a moral tie, that through him it should receive no detriment. We cannot by decree, transport from distant lands the granite rock, to serve as a pedestal for the statue of an emperor, but we can, by the subscription of a dollar, through the millions of our nation, erect a prouder monument to the memory of our Washington.

To this power, then, we appeal in behalf of natural science; and we ask our fellow-citizens to aid us in the establishment and maintenance of an institution the object of which is to promote the common good, by affording to all the means and opportunities of knowledge.

In our state of society, union is eminently strength; but as it would be vain to talk of colors to one who was born and continues blind, so will it be impossible to produce that union by which society may be exalted and refined, unless we extend the boundaries of intelligence. To dwell on the importance of diffusing a more perfect system of education might seem foreign from the present purpose; yet I may be permitted to quote the farewell advice of him who was first in the hearts of his countrymen, as a maxim of political and moral wisdom. "Promote, as an object of primary importance, institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinion it should be enlightened."*

I hope that the day may come when, by private munificence, our public institutions shall be so well endowed as to render all instruction gratuitous; when the means of acquiring knowledge shall be as common and as free as the air we breathe; when the poorest member of our community may feel that he has an undivided share in the privileges which ennoble his nature; and when, by the equalizing power of Christian charity, "he that hath gathered much shall have nothing over, and he that hath gathered little shall have no lack."

CONTRIBUTIONS OF MISSIONARIES TO NATURAL SCIENCE.

The missionaries sent by the various religious denominations, either into our own territories, or into foreign countries, are, in general, educated men, and may do much to promote the cause of natural science, without any interruption to the duties of their profession. The example of the Roman Catholic missionaries is before our eyes; and the value of their labors in the cause of science is universally admitted. Little is known of China but what has been furnished by them. The French Jesuits, especially, have added greatly to the store of natural knowledge; yet no one can accuse them of neglecting their official duties.† Why, then, may not our

est et *ubiqu*:. Unde etiam totus est sui similis, totus oculus, totus auris, totus cerebrum, totus brachium, totus vis sentiendi, intelligendi et agendi; sed more minime humana more minime corporeo, more nobis prorsus incognito. Ut cæcus ideam non habet colorum, sic nos ideam non habemus modorum quibus Deus sapientissimus sentit et intelligit omnia. Corpore omni et figura carporea prorsus destituitur, ideoque videri non potest, nec audiri, nec tangi, nec sub specie rei alicujus corporea coli debet. Ideas habemus attributorum ejus, sed quid sit rei alicujus substantia minime cognoscimus." Lib. iii. De mundi systemate.

* It is refreshing to see that such a mind as that of Cuvier, in a country over which infidelity has swept like the pestilential wind of the desert, could be profoundly philosophical without loseing the sense of its own weakness in the sight of God. Cuvier was a believer, and openly professed his belief. While he sought as a philosopher to pursue the researches of natural science, and to establish results from experiment and observation, independently of the authority of Scripture, it would be vain to seek in his writings any evidence that his experiments or observations shock his faith. If, then, any fact which he has established should seem in any wise inconsistant with the Scripture history, let us wait, and not draw conclusions, till some further accession of knowledge may enable us to see the difficulties removed, and thus convince us that they were formed solely by our own ignorance.

* Washington's Farewell Address.

† No better example can be given of the acuteness exhibited by the Jesuits in their scientific researches, than the manner in which the Panax Quinquefolium or Ginseng was discovered in America. This plant it is well known, is very highly esteemed for its medical virtues in China, and when prepared by clarification, is worth its weight in silver. As it is in their opinion a panacea, Linnæus gave it the name of Panax. The Jesuits, having been employed by the emperor to draw a map of Tartary from actual survey, arrived in July, 1709, at a village within ten or twelve miles of the kingdom of Corea, and near the mountains where the Gin-seng is found. Father Jartox received four roots from a Tartar, and taking one of them at random, he made an accurate drawing of it, which he sent to his superior in France, together with a map of the country where it grows, between N. lat 39° and 47° and E. lon. from Pekin 10° and 20°. He stated that it grows not in valleys, nor in marshes, nor in the bottom of ravines, nor in very open places, but on the sides of mountains covered with thick forests, around rocks, on the borders of ravines, at the foot of trees, and in the midst of every variety of herbage. If the forest should be consumed by fire, this plant does not reappear till three or four years afterward, which proves that it is an enemy of heat. In fact it conceals itself from the sun as much as possible. "All this," adds Father Jartoux, "makes me believe that *if it can be found in any other part of the world, it must be principally in Canada.*" In consequence of this suggestion, Father Lafiteau, a J suit missionary in Canada, was directed to search for it, and with the assistance of the drawings and descriptions of Jartoux, and the aid of

missionaries, as a useful relaxation from their arduous labors, furnish us with collections, and with much curious information, respecting the natural history of the country in which they sojourn?

INTEREST OF EUROPEANS IN AMERICAN RESEARCHES.

That there are many in Europe who are eagar to form a correspondence with Americans, in the hope of exchanging the productions of the old world for those of the new, I can bear personal testimony. In Italy, several distinguished men spoke to me with ardor, and even with anxiety, on this subject. At Turin, the distinguished ornothologist, Bonelli, told me that he could furnish us with all the European birds enumerated by Temmick, if we would send him an equal number of American birds. Bonelli, alas! is no more; but he has left pupils who are following in his steps, and who, no doubt, would be glad to revive his offer. Dr. Grottanelli, of Sienna, offered to furnish us with minerals and plants on the same conditions. The younger Bartelone, of Bologna, would, I have no doubt, undertake the same pledge with regard to insects. In this manner we may, by our own labors, and by this scientific commerce, gradually form a collection the influence of which on the future character of our community, may be more extensive than we have now capacity to calculate. It is only during the feeble period of infancy, that such institutions require to be fostered with peculiar care. That period past, their existence can hardly be called precarious.

Silk Cocoons have been left at our office from the House of Industry, at South Boston. They are from eggs this year, a second crop. The worms came out August 26th, were kept in an even temperature of about 70° and spun in thirty days.—[New England Farmer.]

INDIANA IMPROVEMENTS.—A grand festival took place at Brookville, Ind., on the 1?th ult., to mark the commencement of the White Water Canal. Upwards of 4,000 persons, it is estimated, were present, among whom were the most distinguished citizens of the State. The work, or a great portion of it, was put under contract the next day at Lawrenceburgh.

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the natives, he actually found it. He published an account of his discovery in 1718. and the American root became for a time, till the market was overstocked, an article of great commerce with China, and the source of much wealth. The word *Ginseng*, Jartoux adds, signifies in Chinese, "the representation of a man;" for what reason he cannot tell. The Tartars call it *orhota*, which means "*the first of plants.*" See the original letter in the Lettres Edifiantes et Curieuses, vol. xviii. p. 127, of the new edition, and in the old edition, Tom. x. p 159. See also Du Halde Hist. de la Chine, where it is copied word for word, vol. ii. p. 150, &c. A good abstract of the whole is to be found in Bigelow's Medical Botany, vol. ii. p. 82–96, and Barton's Medical Botany vol. ii. p. 191–202. My attention was first directed to this fact by Dr. Barratt,

AGRICULTURE, &c.

MINERAL MANURES.

Application of Marl.

(Continued from our last.)

In the earliest stages of improvement in the Norfolk husbandry, some farmers, from experiencing the evils of a want of firmness in their poor sands, marled at the rate of 120 to 150 cubical yards per acre; the consequence of which was what they call *setting:* the firmness was produced, but at the expense of the friability of the soil, which was thus rendered too tenacious, so that it is at present found preferable to give a moderate dose at first, and to repeat it at a future period. This prejudicial effect, arising from marl, is very remarkable; for the clay, sand, and lime of which it is composed would not, if thrown promiscuously over a field, produce the same effects; and when laid upon the land, they indicate no improper proportions, nor any which are not found in very rich soils. It may, therefore, contain other ingredients which have not been detected by chemists; and, as has been imagined—perhaps not unjustly—by Arthur Young, "it arises from the addition not being so well assimilated with the sand, as in soils of a natural texture it is rather a mixture than an incorporation."* There is, indeed, reason to suppose that marl derives much of its beneficial qualities, as a manure, rather from the complete amalgamation of the various substances of which it is composed, than from any other cause.

Mr. Marshall, in his Rural Economy of Norfolk, enters into a chemical investigation of the nature of the marls, which, though too long for insertion here, is well worthy of attention; in which he describes that of the white, or rather yellow kind, as one of the best and most lasting species of fossil manures. Twelve cart-loads—according to his account—change the nature of the land in the second year after it is laid on; and most of the exhausting weeds which impoverish the soil, and choke the corn in its infancy, being effectually destroyed, it consequently has a great tendency to keep the land clean; also bracing the pores of the earth, and increasing its fertility to a surprising degree. Its benefits, he says, are felt throughout full thirty years; when a second marling of about half the original quantity may with propriety be used; but it has been found, by experience, that it does better the secone time, if applied as a compost with earth of a sort different from that of the soil on which it is laid; or with mud, and more especially with dung. To this it may also be observed, that lime is not unfrequently added; though, as lime and marl both partake of the same properties, the mixture of the former only has the effect of strengthening the compound.

It thus appears that not only do the species of marl vary in several parts of the kingdom, but in some parts there are kinds which, though seemingly quite distinct from each other, have yet been found, on trials to possess precisely similar qualities; for we learn that experiments on a considerable scale have been tried in the New Forest, in Hampshire, on three different sorts, dug out of the same pit, namely,—yellow, at about four feet below the surface, blue in the middle, and shelly-marl underneath; and yet, although from all the accounts which have been received of the latter, its properties are superior to those of the two former, still, in these instances, no other difference was observable in the crops during many years, except that the shell-marl rendered the land rather the most friable.*

That marl materially benefits land on which it is judiciously used, admits of no kind of doubt. Much difference of opinion is, however, entertained respecting the manner in which it operates—most farmers conceiving that its only value consists in the calcareous matter with which it is combined; others, that its principal advantage arises from the bulk and consistency which it imparts to the ground; and some, that the improvement which it occasions is chiefly owing to its mechanical action on the texture of the soil. Upon an attentive consideration of the subject, it will, however, appear, that a certain portion of its utility as a manure is derived from each of the three sources which have been assigned. With regard to calcareous earth of which it is partly composed, it clearly possesses, in extent equal to the proportion which it contains of that substance, the same power that would be produced by the direct application of a similar quantity of lime. It is, however, apparent that some descriptions of marl, though advantageously employed on most soils, do not contain any, or only a very small portion of the carbonate of lime; its efficacy therefore cannot be solely attributable to that cause,† and it must possess some other property from which its influence upon the land is partly derived.—This may consist either in the change which its application produces in the texture of the ground through the mere increase of its bulk, which by its dense and unctuous quality, also adds to the consistence and value of all light soils; or, by the more perfect combination of the particles of which it is formed, by which its powers are brought into full action, and lime, sand, and clay are each made to bear against each other, and thus aid its mechanical operations on the land. All marl, except those species which are combined with large portions of iron, sulphur, or deleterous mineral substances, also of itself affords nourishment to

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* Papers of the Bath Agricultural Society, vol. x. p. 103.

* Communications to the Board of Agriculture, vol. vi. art. 3.

† Out of twelve specimens of marl submitted to the inspection of Sir Humphrey Davy, eleven were found to contain calcareous earth in various proportions; but the result of many other trials of marls, procured from different parts of the country, and found by farmers to produce an ameliorating effect upon the land, yet proves them to be, in many instances, wholly deficient in that substance. See the section on "Marl," in Holland's Survey of Cheshire.

corn and vegetables; it must, therefore, be considered as a soil, and when laid upon the land this addition must necessarily yield a more abundant support to succeeding crops.

If this view of the subject be correct, it may be assumed, that all kinds of marl which abound in calcareous matter may be considered applicable to every soil to which lime is beneficial; subject, however, to the effect which may be also produced by the other portions of their substance when applied to land of a peculiar nature. Thus—as we have already more fully stated in the preceding part of our observations—on light, sandy, and gravelly soils, an advantage is gained by the large quantity of clay which the marl appropriate to such land usually contains, by rendering them more stiff and impervious to the rain, and therefore stronger: on wet and heavy lands, on the contrary, as it renders the soil more retentive, unless very great care be bestowed on their drainage, it may occasion permanent injury; but shell and stone-marl occasion it to become loose and friable. Attention should therefore be paid, not only to the nature of the marl, but to that also of the soil to which it is to be applied; and when a choice of marl can be procured, its earthy portion should differ as widely as possible from that of the ground upon which it is intended to be laid.

In fine, marl may be considered as an improver of the soil under so many different circumstances, that it can hardly be recommended in too strong terms; for if it be used with judgment, it adds staple to the soil, improves its quality, and renders the application of putrescent manure more effectual. The use which some farmers make of it, however, deserves the highest censure,—'many of them taking repeated crops of oats in the interval of one summer-farrow for wheat, by way of cleansing the land; after which, barley and oats again, as long as the land will produce anything, until it is at last laid down with weeds and couch-grass. Such is the view taken of their conduct by the surveyor of Lancashire, where it is very extensively employed, and in which opinion he is by no means singular. The rotation which he recommends—with reference, of course, to land that is not too strong—is to take one crop of oats the spring subsequent to marling; plough the stubble immediately, in order to expose the marl again to the influence of the frost; fallow, with manure, for turnips—a crop which, under this management, is never known to fail; then barley, clover, wheat, turnips fed off with sheep, and barley again, with well-dressed hay seeds, and white clover and trefoil for a perennial ley, or at least for some years*. Under which management, poor land may, when properly tilled and duly supplied with putrescent manure, be rendered highly exuberant without being in the least degree harassed.

Analysis of Marl.

The value of marl, as a manure, must of course be referable to the nature of the different kinds employed. It is, indeed, evident that, being intended to correct or improve the soil, its constituent parts should be known, and their qualities explained, before any use can be rationally made of it: and, therefore, the more accurately its properties are ascertained, the more confidently may the propriety of its application be determined. Farmers, indeed, cannot be expected to be sufficiently acquainted with chemistry to be able to analyze it, though the most calcareous sorts may be known by means of acids, as applied to lime; or, the common earthy kind, when put into water, will fall to pieces, allowing a considerable portion of sand to fall to the bottom of the vessel: by which simple tests, they might often derive considerable advantage. Its qualities are, however, more generally taken, by mere practical men, more upon trust derived from the experience of their neighbors than from any actual knowledge of its properties; but although, when thus guided, they cannot go far wrong, yet they may be misled by circumstances of slight apparent difference, and, in cases of new pits being opened, no certain estimate of its effect can be formed until a complete analysis has been made. This should, indeed, be done in all such instances; for it costs but a trifle, is easily performed, and without having recourse for the purpose to a regugar scientific chemist, the object may be attained by application to any intelligent apothecary, by furnishing him with the following account of the modes of procedure:—

The ingredient of marls, on which their fitness for agricultural purposes depends, is the carbonate of lime. It is owing to the presence of this earth that marls effervesce on the addition of acid, which is one of their distinguishing characters: to ascertain which—

'Let the marl be put into a glass partly filled with water, which will expel a portion of air contained mechanically in the marl, and thus obviate one source of fallacy.—When the marl is thoroughly penetrated by the water, add a little muriatic acid, or spirit of salt. If a discharge of air should ensue, the marly nature of the earth will be sufficiently established.'

Then, to find their composition—

'Pour a few ounces of diluted muriatic acid into a Florence flask, place them in a scale, and let them be balanced. Then reduce a few ounces of dried marl into powder, and let this powder be carefully and gradually thrown into the flask, until, after repeated additions, no further effervescence is perceived. Let the remainder of the powdered marl be weighed, by which the quantity projected will be known. Let the balance be then restored. The difference of weight between the quantity projected, and that requisite to restore the balance, will show the weight of the air lost during the effervescence, and will stand thus,—

'If the loss amount to 13 *per cent.* of the quantity of marl projected, or from 13 to 32 *per cent.* the marl assayed is calcareous marl, or rich calcareous earth.

'Clayey marls, or those in which the argillaceous ingredient prevails, lose only 8 or 10 *per cent.* of their weight by this treatment; and sandy marls about the same proportion. The presence of much argillaceous earth may be judged by drying the marl after being washed with spirit of salt, when it will harden, and form a brick*.

Though it is well known that Mr. Pedder has returned from Europe, we cannot but give the following letter and information as a preparation for his recent work.

From the Boston Commercial Herald.

Beet Sugar.—The immense benefits to be expected from introducing the Sugar Beet into the United States, had for a considerable time occupied the attention of James Ronaldson, Esq.; when in the month of January last he was introduced to Mr. James Pedder, a gentleman who possessed information on the subject of the Sugar Beet. Mr. Pedder had been long known to John Vaughan, Esq., who, with Mr. Jacob Snider, Jun, now took a lively interest in the concern, and after several interviews it was determined to despatch Mr. Pedder to France, with the view of obtaining accurate information on all subjects, connected with the culture of Beet and the uses to which it is applied. The responsibility and expense of this undertaking were assumed by Messrs. Ronaldson, Vaughan and Snider, in the confident belief that they would be sustained by their countrymen in this laudable undertaking. It was important that Mr. Pedder should be despatched immediately in order to witness the process of making Sugar in France, and to send out seed in time to be planted in the United States the present season. Mr. Pedder left Philadelphia on the 8th day of February, and his mission has been attended with the most gratifying success, nearly 600 lbs. of seed having already been received and portions of it distributed through various parts of the country. Several patriotic individuals have made contributions towards defraying the expenses of this undertaking, in sums of from ten to fifty dollars each. But the amount yet received is inadequate to the expenditure. An association has been formed of which Mr. James Ronaldson is President, John Vaughan, Vice President, and Jacob Snider Jun. Secretary and Treasurer. The object of this society is to collect and disseminate information for the benefit of the community generally without any view to pecuniary emolument. Further contributions in aid of this object are respectfully solicited, and will be received by the following named gentlemen:

Jas. Ronaldson, Esq. President, corner of 9th and Shippen sts.,
John Vaughan, Esq. Vice President, 32 Walnut street,
Jacob Snider, Jun. Treasurer, and Secretary do.

Managers.

Samuel Richards, Esq., Arch, above 9th,
Nathan Dunn, Esq., Portico Row,
Joseph D. Brown, Esq, Church Alley,
Isaac S. Lloyd, Esq, Penn Square.
Samuel Breck, Esq.,
J. S. Lovering, Esq. Church Alley,
B. M. Hollinshead, Esq., No. 14 North 6th street,

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* Dickson's Lancashire, Stevenson's edit., p. 491.

*Henrys' Elem. of Exper. Chem., vol. ii. chap. xv. sect. iii. See also Kirwan on Manures, p. 12.

Joseph Sill, Esq , Chesnut-st, opposite State House,
John Richardson Esq., 10th, near Arch-st.
James Wood, Esq.,
Frederick Brown, Esq., 5th and Chesnut street.
Geo. Zantzinger, Esq., 25 Dock street.

As an increased interest is being manifested on this subject, we have solicited and obtained from Mr. Snider, Treasurer and Secretary of the "Beet Sugar Society," extracts from various letters received by him from James Pedder, Esq. the agent of the society, who is now in France seeking information relating to the Beet root, and manufacture of sugar. According to our notice on Saturday, we now give the extracts.

Boulogne, March 11, 1836.

"I begin by saying, if in such a climate, with such a very inferior kind of Beet, the common Mangel Wurtzel, of all colors, hollow and half rotton, they are able to obtain nine per cent. of Saccharine, America is a gold mine. The crushing mill is driven by five bullocks in harness, the roots are pressed towards a revolving barrel, set with teeth and the pulp falls into a box below,—a boy takes about a gallon of this pulp and puts it into a bag which is then thrown on a wicker frame work which rests on a small wagon. This is continued until fifteen or twenty bags are heaped on the wagon; the top being covered by a wicker frame; these are placed under the press and an exhausting pump set to work the juice is extracted in about two minutes, which is conveyed by troughs to a large cistern, and from thence it is let off into a range of evaporating pans made of copper which work by steam.

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I here saw many very fine oxen fatting upon the dry cake of the Beet, sleek and fat as butter, and which I did not expect, some hundreds of *sheep* fed with the same in troughs and confined to the house, many of them very fat, and all looking extremely well; they had all been shorn and their fleeces turned into money. Some of these would weigh 16 lb. a 18 lb. per quarter, a large size for French sheep. * *

What I write will always be the dictation of my firm convictien *at the time I write:* I may have cause to change my opinions as I go on, which I ought to have no objection to do, and which I will candidly acknowledge.

* * * *

The exertions making in France and throughout Germany to simplify the process of preparing sugar from the Beet are immense and increasing. At the recent meeting of the German Naturalists at Bonn, the section of agriculture and rural economy was almost entirely occupied with papers and discussions on the subject. At Valenciennes a manufacturer has succeeded in discovering a method of crystallizing the saccharine matter without producing molasses.

Arras, Saturday, March 25th, 1836.

J. Snider, Jr. Esq.

Dear Sir:—I have been most unexpectedly introduced to Professor—— who is here on a mission from the government of Prussia to learn the best mode of transplanting the sugar manufacture into that country. He is accompanied by a draughtsman, a student from the Royal College of Arts; and they are two of the most charming people I ever met. I shall obtain information which money could not purchase, and which will be inestimable; it will be the result of theory and experience which they have been acquiring at great expense on this their tour of observation and which will secure for us the most complete success. But here I must admit that much of the *poetry* with which the culture and maufacture of Beet sugar has been embellished has *gone out.* I can no longer see that it will almost prepare itself for use and drop in crystals into our coffee, but I have instead of this poetical fiction, the most perfect conviction of complete success in our object, based on common sense and the experience of every day's occurrence which far more than balances what has been lost: for this well grounded hope I am mainly indebted to the Professor, whose convictions as to the certainty of the process and the profit of the undertaking are completed by what he has witnessed at an establishment here, to which I have access by means of a letter from J. B. and where I met with him and his intelligent friend. I have now their ground for my proceeding. When I showed the Professor the different accounts which had been published, especially one at Westphalia, which shows, *almost*, that the sugar will form of itself, let but the ingredients be brought into contact with each other, he smiled and said he knew how to value these accounts; they proceeded in a great measure from the real facility with which sugar might be prepared by the best means now in use in this part of the country, and which is truly astonishing to those who have seriously gone into the examination of the thing; he has given me to understand that I must not expect to find the refining process connected with the absolute formation of the sugar; *that* he says is not necessary or desirable "let but a man be able to make on the same premises 6 or 7 hogsheads of good crystallized sugar, 3 or 4 hogsheads of molasses for fattening bullocks and sheep, in addition to 15 *lbs. of the expressed cake to mix with them, and if he is not content, why then let him go to *vapour hunting.*"

The next and most important manufactory in the world is situated in this town; I have visited it three times in company with the Professor: it belongs to a Mr. —— the most intelligent man I have met by far. He was engaged in the manufacture of sugar from the Beet in the time of Buonaparte and Chaptal, has continued it ever since, and has lately adopted a mode for himself which bids fair to obtain in the end universal *adoption:* this was the work which a gentleman at Paris said I should not be allowed to see and study without an expense of 15,000f. To this noble establishment I have free access by means of a letter from my friend J. B.; but I find it quite impossible to go into a full description of all its parts. Seventy-four men and women are employed here every day, and about ten less during every night. The works consume the steam of 120 horse power, crushing tons of Beets and evaporating the juice and crystallizing the sugar complete in 24 hours. From the washing of the roots to the pouring of the juice into crystallizing pans is only the work of 10 hours, the process being seven, consisting of washing, rasping, pressing, defficating, clarifying, and two evaporatings, in the most simple and perfect manner imaginable, all of which I shall be quite competent to on my return. Mr. —— has invented a most complete set of implements for the cultivation of a crop; *a drill that is perfect,* to sow three rows, or five if preferred, with hoes, &c. of the most simple and effective kinds; by these he is enabled to cultivate several thousands of acres of land in various parts of the country, his largest farm being 4 miles distant from hence, where I have seen his stock of oxen, sheep, and milch cows and farming horses, all fed on the cake and refuse of the sugar house, and cut chaff to wonderful profit. The cake which they are now using is six months old, preserved in magazines of which I have a plan, where it remains perfectly sweet for nine months of the year. It cuts out quite hard and is perfectly vinous in the smell. Mr. C. at this and his other works prepared in 1835, two millions and thirty thousand pounds of sugar, and expects next year to make *three millions,* the whole expense of fabrication, including rent of premises, wear and tear of machinery, interest of capital &c. has been 4 4-7 sous per lb. This man ought to know his business—he says he has made thousands of experiments, has seen all, and tried many, of others, and from these has adopted his present plan as the result. The professor is so satisfied that he has told me when I hear that Mr. C. has adopted some new mode, I will believe that it is better than what he at present uses; all other accounts of improvements &c. will go with me for nothing. I should say Mr. C. has seven works. His kindness to me has been remarkable, I dine with him to-morrow in company with the Professor and his friend. I have many results and calculations made here which have been given me by the Professor, (who has spent twelve days at the works) which I could not have obtained for any money, but which I am confident have cost him a large sum. Mr. C. ridicules the idea of making refined sugar at the same establishment at the same time, according to the poetry of the times. He thinks to produce good brown sugar is quite sufficient for one man and one process and ought else would impede. Hissetam engines is 9 horse power, 111 horse power then goes to evaporate, heat drying rooms, &c. Now the process of the manufacture of sugar as well as the proper cultivation of the plant, I shall I feel be fully competent o.

I wish to be enabled to expend a small sum in procuring models of some and information on others, which I shall not find myself competent to until I hear from you. It seems as though things were determined to turn out to my advantage. When the real authors of all the success in Sugar making first come here, they brought with them a young man as Engineer; he is in this town the head of an immense establishment for the preparation of machinery for the Sugar business, and to him I have been introduced by the kindness of another gentleman, to whom I brought letters from Paris; on my deploring the cost of the machinery in present use, he showed me the drawings of a set of his own invention, for which he is about to take a patent; he will be prepared to describe them fully to me in a short time when I shall immediately communicate to you the result.

I find that the seed which I have sent you is of the true Sugar kind; pray get it all sown and request that it may be kept quite clear, that we may do ample justice to this our first essay. The roots grew large upon land of first quality, a fine deep red loam; I shall be able to introduce a system of management which is truly excellent. Here is a saying, "the Beet culture is at the foundation of all good husbandry," and so it is;

*In these proportions.

the b·st crops in the country are raised after one, two, three, and even four crops of Beet, which are not dunged for generally.—They do not exhaust the soil, but their autumns are terribly against them in taking up and housing, compelling them to leave them in the fields in pits where they are not protected by any thing but a covering of earth from the winter's rains. Fifty pounds of the cake mixed with one lb. of oil cake* are sufficient for the keep of ten sheep for a day, given to them at twice, so that 100 lbs. of Beets, value 25 cts., give 6 lbs. Sugar, 4 lbs. Molasses, and 25 lbs. Cake, and sufficient food for fatting 5 large sheep per day.

(To be Continued.)

FORCE OF THE WATERS.

Extracts from Audubon's Ornithological Biography, Vol. II.

"It was the month of September. At the upper extremity of Dennisville, which is itself a pretty village, are the saw-mills and ponds of the hospitable Judge Lincoln, and other persons. The creek that conveys the logs to these ponds, and which bear the name of the village, is interrupted in its course by many rapids and narrow embanked gorges. One of the latter is situated about half a mile above the mill-dams, and is so rocky and rugged in its bottom and sides as to preclude the possibility of the trees passing along it at low water, while, as I conceived, it would have given no slight labor to an army of woodsmen or millers to move the thousands of large logs that had accumulated in it.—They lay piled in confused heaps to a great height along an extent of several hundred yards; and were in some places so close as to have formed a kind of dam. Above the gorge there is a large natural reservoir, in which the head waters of the creek settle, while only a small portion of them ripples through the gorge below, during the latter weeks of summer and in early autumn, when the streams are at their lowest. At the neck of this basin, the lumberers raised a temporary barrier with the refuse of their sawn logs. The boards were planted nearly upright, and supported at their tops by a strong tree extended from side to side of the creek, which might there be about forty feet in breadth. It was prevented from giving way under the pressure of the rising waters by having strong abutments of woodland against its centre, while the ends of these abutments were secured by wedges, which could be knocked off when necessary. The temporary dam was now finished. Little or no water escaped through the barrier, and that in the creek above it rose in the course of three weeks to its top, which was about ten feet high, forming a sheet that extended upwards fully a mile from the dam. My family was invited early one morning to go and witness the extraordinary effect which would be produced by the breaking down of the barrier, and we all accompanied the lumberers to the place. Two of the men on reaching it threw off their jackets, tied handkerchiefs round their heads, and fastened to their bodies a long rope, the end of which was held by three or four others, who stood ready to drag their companions ashore in case of danger or accident. The two operators, each bearing an axe, walked along the abutments, and at a given signal knocked out the wedges. A second blow from each sent off the abutments themselves; and the men leaping with extreme dexterity from one cross log to another, sprung to the shore with almost the quickness of thought. Scarcely had they effected their escape from the frightful peril that threatened them, when the mass of water burst forth with a horrible uproar.

All eyes were bent towards the huge heap of logs in the gorge below. The tumultuous burst of the waters instantly swept away every object that opposed their progress, and rushed in foaming waves among the timber that every where blocked up the passage. Presently a slow, heavy motion was perceived in the mass of logs; one might have imagined that some mighty monster lay convulsively writhing beneath them, struggling with a fearful energy to extricate himself from the crushing weight. As the waters rose the movement increased; the mass of timber extended in all directions, appearing to become more and more entangled each moment; the logs bounced against each other; thrusting aside, demersing, or raising into the air those with which they came in contact: it seemed as if they were waging a war of destruction, such as ancient authors describe the efforts of the Titans, the flamings of whose wrath might to the eye of the painter have been represented to the angry curlings of the waters, while the tremulous and rapid motions of the logs, which at times reared themselves almost perpendicularly, might by the poet be taken for the shakings of the confounded and discomfitted giants. Now the rushing elements filled up the gorge to its brim. The logs, once under way, ro led, reared, tossed and tumbled amid the foam, as they were carried along. Many of the smaller trees broke across, from others great splinters were sent up, and all were in some degree seamed and scarred. Then in tumultous majesty swept along the mingled wreck, the current being now increased to such a pitch that the logs, as they were dashed against the rocky shores, resounded like the report of distant artillery, or the angry rumblings of the thunder. Onward it rolls, the emblems of wreck and ruin, destruction and chaotic strife. It seemed to me as if I witnessed the route of a vast army, surprised, overwhelmed, and overthrown. The roar of the cannon, the groans of the dying, and the shouts of the avengers, were thundering through my brain; and amid the frightful confusion of the scene, there came over my spirit a melancholy feeling, which had not entirely vanquished at the end of many days. In a few hours almost all the timber that had lain heaped in the rocky gorge was floating in the great pond of the millers; and as we walked homewards we talked of the Force of the Waters."

AGRICULTURAL JURISPRUDENCE.

At the late term of the Supreme Court of Errors, in this city, a question of agricultural jurisprudence was settled, which has often been the occasion of much controversy, and sometimes of a total interruption of that social intercourse and interchange of kind feelings and offices, without which neighborhood ceases to be a blessing, and actually becomes a curse. The question arose in an action of trespass for taking a portion of the fruit from a pear tree. The facts in the case were these. The trunk of the tree stood about four feet from the line between the plaintiff and defendant, and its roots and branches extended some distance into and over the defendant's land. The defendant plucked the fruit from the branches overhanging his land, to within about one foot of the line for which the action was brought.

The defendant claimed, First, that he was tenant in common with the plaintiff, in the tree, and consequently had a right to take from the branches on his side of the line. Second, that if he was not tenant in common with the plaintiff, he was owner in severality in that part of the tree which drew its nourishment from his soil, and that he had a right to take the fruit from the branches that overhung his land. Third, that if he was not owner of that part of the tree which is sustained by and overhangs his land, still he was entitled to the fruits growing on such branches. Fourth, that he had a legal right to remove the overhanging branches and projecting roots, they being a nuisance which he had a right to abate.

The court ruled the three first points against the defendant, and decided that the ownership of the tree was in the proprietor on whose land it was originally planted, and that he of course was entitled to all the fruit, though the roots and branches may have extended into and over the land of the adjoining proprietor. On the last point the court decided that the projecting roots and branches were a nuisance which the defendant might have abated; but had no right to appropriate to his own use.—[Silk Culturalist.]

HOPS.—By accounts received from the Hop Districts in England, it appears the appearance of the crop had improved beyond expectation. It is believed that a larger crop will be gathered than has been known for several years. The quality good.—[New England Farmer.]

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Bray's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Dechertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at No 31 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is $500,000 with liberty to increase to $800,000, divided into shares of $100 each.

The sum of $5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I BLAIR,
JOSEPH E. EDSALL,
Commissioners

Dated Oct. 3rd, 1836 41—9t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do cast steel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron 4—ytf

FRAME BRIDGES.

The subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq., (Civil Engineer,)	Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.

Rochester, May 22d, 1826. 19y-tf.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings o every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
New-York, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

RAILWAY IRON, LOCOMOTIVES, &c.

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

					lbs.	
350 tons	2½ by	⅝,	15 ft in length,	weighing	$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"	$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"	2½	"
80 "	1¼ "	½,	"	"	$1\frac{25}{100}$	"
90 "	1 "	½,	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2⅞ 3, 3¼, 3½, 3½, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.
28—tf Philadelphia, No. 4, South Front st.

NOTICE TO CONTRACTORS.

PROPOSALS for excavating and embanking the Georgia Railroad from the upper end of the work, now under contract, to Greensboro', a distance of 34 miles, will be received at the Engineer's Office, at Crawfordville, on the 21st and 22d days of October next.

—ALSO—

At the same time, for the Branch to Warrenton, 4 miles. And if prepared in season, the Branch to Athens, length 37 miles.

J. EDGAR THOMSON,
33—t22o Civil Engineer.

TO RAILROAD CONTRACTORS.

PROPOSALS will be received at the town of Lindon, until the 20th day of December next, for the graduation of the Lindon Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Lindon, for ten days previous to the letting, and all other information given on application to the subscriber, or the Assistant Engineer.

PROPOSALS will also be received at the same time and place, for furnishing and delivering at Beckley's Landing, 95,000 feet (L. M.) of long leaf pine or cypress scantling, sawed 5 by 9 inches, to be free from sap. knots or wind shakes, and 20, 25 and 30 feet long. Also 60,000 feet, or more, (L. M.) of white, or post oak scantling, sawed 5 by 7 inches, length to be specified hereafter, and 60,000 feet (L. M.) of white or post oak plank, 2 inches thick, 1 foot wide and 15 feet long.

Also for furnishing and delivering on the line of the road 10,500 undressed post oak logs, 8 feet long, and 10 to 15 inches in diameter.

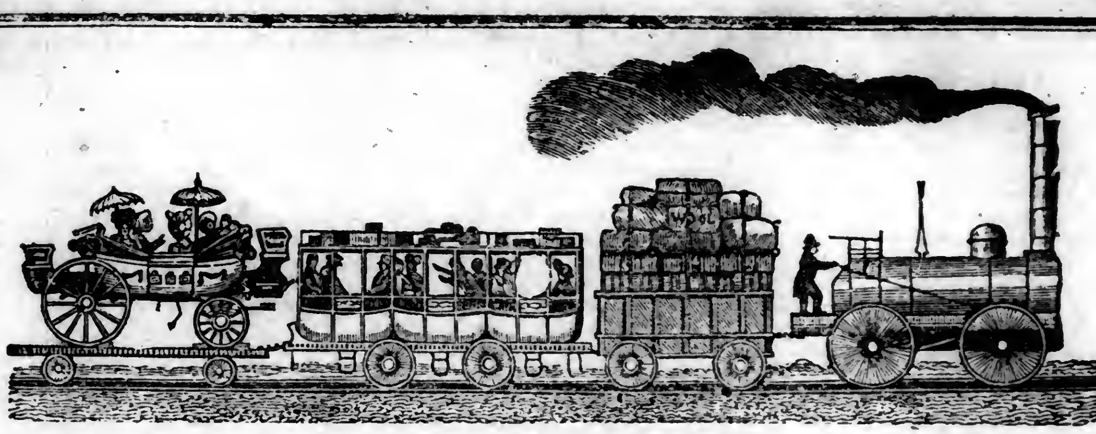
Also for furnishing and delivering 3,160 post oak caps, dressed 8 by 10 inches, 8 feet long, and 6,320 post oak posts, dressed 10 inches square and of lengths hereafter to be specified.

Recommendations will be expected in all cases, of persons not known to the officers of the Company, or to the Engineer. For the information of persons at a distance, I would state, that the Lindon Railroad commences at Beckley's Landing on the Tombeckby River, a stream navigated by Steamboats the greater portion of the year;—and having a direct communication with Mobile and New-Orleans will afford the facility of procuring supplies and implements necessary for the hands employed on the work, or their ready conveyance hither, if procured at a distance.

Persons having mills on the river and disposed to contract for furnishing timber, will have the facility of delivering it by water communication. The country through which the road passes, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season, renders the contract peculiarly desirable to those wanting winter employment.

D H. BINGHAM, C. E.

Lindon, Ala, Sept. 17, 1836. 41—3t



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, OCTOBER 29, 1836. [VOLUME V.—No. 43.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, OCTOBER 29, 1836.

For the N. Y. Railroad Journal.

PENOBSCOT RIVER RAILROAD.

This, for a short road, is one of the most important projected in the State of Maine. It commences at Old Town, on the Penobscot river, and terminates at Bucksport, at the head of winter navigation. The length of the road will be about 28 miles, and connects with the villages of Milford, Bradley, Lower Stillwater, Eddington, Brewer, and the city of Bangor.

At Old Town, Milford, Bradley, and Lower Stillwater, there are about one hundred and thirty saw mills, that cut annually more than one hundred millions feet of boards, which have hitherto been rafted, and run over the falls to Bangor, with great loss and damage to the lumber—a loss, damage and expense far exceeding the cost of transportation upon a railway. During the past winter an application was made to the Legislature of Maine, and a very favorable charter for a railroad from Old Town to Bucksport was obtained. The route has been very fully explored, and a very favorable report made by the Engineer. The land is very level over which the railway will be constructed, with an abundance of cedar, timber and stone on the route, necessary for its construction, which can be had very cheap. The right of way will be generally freely granted, and in no case will any considerable damages be claimed.

Subscription books for stock were opened in September, at Orono and Bucksport, and about one half of the whole has been taken. The remaining half, it is expected, will be taken either in Boston or New-York.

The expense of constructing the road, including locomotives, transportation and passenger cars, is estimated at $271,864.66.

The annual income.

33 millions feet boards from Old Town and Milford, to Bucksport, at $1.50 per M.,	$49,000
30 millions from Lower Stillwater, at $1.40 per M.,	42,000
18 millions from Old Town to Bangor, at $1 00 per M.,	18,000
20 millions from Stillwater to Bangor, at 75 c. per M.,	15,000
Toll on clapboards, shingles, laths and staves,	8,000
Toll on wood and bark,	6,000
400 passengers weekly at $1, each,	20,800
15000 tons of merchandize, including corn, flour, fish, pork, salt, lime, coal, &c., to Orono and above, at 1.50 per ton,	22,500
5000 tons to Bangor, during winter, at 1.25,	6,250
Amounting, in the whole, to	$187,550
Deduct annual expenses, as estimated in report,	23,422
Add interest on cost,	16,311
Annual expense and interest,	$39,733

Leaving a nett annual income of $147,817 or more than 50 per cent. on cost of the railway.

From the New-York Times.

ERIE CANAL ENLARGEMENT.

Messrs. Editors,—A writer under the signature of J. E. B. in your paper of the 9th inst., appears somewhat behind the intelligence of the age. If he had made inquiry at the proper source, he could have learned that contracts to a large amount had been entered into by the Canal Commissioners, under the law of 1834, for the construction of some 40 or 50 of the enlarged Erie Canal locks, and for portions of the enlarged canal between Rochester and the Hudson river, amounting in the aggregate to a sum near $2,000,000; and although these contracts embrace some of the largest structures and most difficult sections, the work is all to be completed in 1838, a little more than two years for its execution.

Here is evidence, if any was wanting, of the falsity of the repeated assertions of your correspondents "Oswego" and "J. E. B.," that the enlargement will require 12 or 15 years for its accomplishment. All the masonry and nearly all of the other work contracted for, is to be done in summer under the most favorable circumstances; and it is within the knowledge of every person acquainted with the subject, that if the funds were provided so that all the work could go on simultaneously, three or four years would be all the time required for the completion of the enlargement; but in the usual course of construction, five or six years is the utmost limit, unless the work is delayed for the want of funds.

The Erie canal is to be enlarged principally by raising the embankments; the culverts and aqueducts are to be extended in summer, and there certainly need be no interference with the navigation by carting

or wheeling the earth to raise the banks; and one of the enlarged locks is to be constructed by the side of the present locks in summer, and when completed, will in its turn be used while the old lock is rebuilt.

J. E. B. avows himself the champion of the "Able report, survey and estimate of E. F. Johnson, civil engineer, to the Legislature of 1835," (Assembly Doc. 195,) for a ship canal from Utica to Oswego. That document has been followed by several statements under different signatures, quoting it as one of great ability and *fidelity*, and the attempt has been made to impress the opinion upon the public that a *ship* canal or a *steamboat canal* (the writers have not settled, it is believed, which they prefer) with their large, unmanageable lock-gates, extra lockage, draw-bridges, and heavy ships, with masts, sails, tackle, &c., interrupted by portions of natural navigation, was preferable to the enlarged Erie canal, with the safety of a canal navigation, for boats of equal tonnage, permanent bridges, and uniformity of traction from Lake Erie to the Hudson River.

I make no war upon these writers, but I again pronounce their statements a "medley of folly, inconsistency and ignorance," and appeal to their own articles for proof. The folly and inconsistency are clearly shown by the manner they condemn the Erie canal enlargement, when, at the same time, Mr. Johnson recommends the enlargement for a part of his *ship canal*—and their ignorance and inconsistency are evident from their estimates.

Mr Johnson estimates the ship canal or steamboat canal from Utica to Oswego, of 92½ miles long, at $1,131,939, or at the rate of $12,237.72 per mile, and this estimate was presented with memorials, asking legislative action. Subsequently, however, it appears that the same individual has discovered his errors, and has estimated the canal of the same dimensions at $3,750,000, or at the rate of $40,000 a mile.

Messrs. Editors, I suppose that J. E. B. is to be believed in his last communication, when he says that Mr. Johnson wrote the anonymous pamphlet alluded to, addressed to the last Legislature, which contains the larger estimate; although they differ more than three hundred per cent. and the smaller estimate is from the "able survey" of Mr. Johnson.

Will your correspondents, and the writers under the signature of Oswego, and J. E. B., acknowledge their error, and inform the public which of their statements are to be believed? Yours, S.

ERIE CANAL ENLARGEMENT.

The estimate of E. F. Johnson, Esq., of that portion of the Ontario and Hudson Canal, extending from Utica to Oswego, via Lake Oneida, &c. as stated in his report of survey, made in 1834, is $1,132,000 (assem. doc. 195) exclusive of the construction of the necessary feeders for the requisite supply of water, &c. This route embraces but 35 miles of *artificial* canal, ten miles only of which is entire new canal.

In the pamphlet signed "Oswego" which produced so great a sensation at Albany, the last winter, the statements of which, *neither have been nor can be refuted*, a round estimate is given of the probable cost of opening the above Canal by the way of Syracuse a distance of 98 miles, 70 of which is *artificial* Canal, at $3,750,000. This estimate was made in 1836, when the prices of labor &c. were one third higher than they were at the period of the survey first mentioned. and as it was made with the view of comparing with the cost of the enlargement of the Erie Canal, the most liberal estimate was made, that there might not be the least ground for cavil on the part of the advocates of the enlargement.

This pamphlet is ascribed, by a writer under the signature of S. in your paper of the 1th, to Mr. Johnson. The estimate last year is assumed by this writer, as applicable to the same routes with the one above mentioned, *notwithstanding an express declaration to the contrary*, in pages 7 and 8 of the pamphlet above alluded to, and is made the foundation of a charge of "inconsistency, and medley of folly and ignorance" in the estimates of Mr. Johnson. With what propriety this charge is made against Mr Johnson, the public will judge by the above statement and following extract from Oswego, pages 6, 7 and 8. After speaking of "the cost of making the proposed enlargement from Albany to Buffalo, 363 miles, estimated by the Engineers in the service of the State at $12,416,150, *exclusive of land damages*" and a number, of difficulties of a serious and expensive character, Oswego observes—"The question may now be asked, how are these difficulties to be avoided? We answer, by opening an entire new channel from the Hudson to lake Erie, by the way of Lake Ontario.

"The total extent of artificial canal required on this route—if along the valley of the Mohawk—through Lake Oneida, the Oneida and Oswego Rivers be adopted, is only 150 miles of artificial navigation. while by the Erie Canal it is 363 miles, making a difference of 213 miles of canal—or, if the route via Syracuse to Oswego be taken, &c a saving would still be made of nearly 170 miles of artificial canal.

"The expense of opening a navigation on this latter route, having a depth of water of not less than *eight* feet, with a width of surface of *ninety feet, which is as small a width as should be allowed for that depth*. will not by the most liberal computation exceed eleven millions of dollars, to wit: 5½ millions from the Hudson to Utica, 3½ millions from Utica to Lake Ontario, and 2 millions from Lake Ontario to Lake Erie, around the Falls of Niagara." J. E. B.

ESTIMATES OF EXPENSE, ANNUAL DISBURSEMENTS AND INCOME OF PENOBSCOT RIVER RAILROAD, BETWEEN BUCKSPORT AND OLD TOWN, MAINE.

An Act to establish the P. R. R. R. Corporation, passed March 15, 1836.

The 1st section provides that, said Corporation shall have all the "powers and privileges, and be subject to all the liabilities" in the Statute of February 16, 1836, concerning Corporations, and in the Statute of March 1, 1836, concerning the "rights and duties of railroad corporations," and may "construct a railroad from any place at or near the tide waters of Penobscot River in the town of Bucksport, to and through the towns of Orrington, Brewer, Eddington and Bradley, and into the town of Milford to the shore of Penobscot River, and across the same to the western bank thereof, at or near that part of Orono, called Old Town, with the right to extend a branch of said railroad from any point of its location in Brewer to any point or place at the shore of Penobscot River at or near the city of Bangor, and from said branch on the eastern shore of Penobscot River in the direction to Old Town to the main railroad, and also another branch in Bradley from any point of the main railroad to the shore of Penobscot River at or near Lower Stillwater in Orono.

2d Section provides for not less than 2500 nor more than 4000 shares of $100 each, and that each proprietor may give as many votes, in person or by proxy, as he holds shares, provided they do not exceed ⅒th part of the whole number—and that there may be not less than 5 nor more than 9 directors.

3d Section authorzes the directors to execute the powers granted for locating and making the railway, laying assesments, &c. —and authorizes the Treasurer, after giving 60 days notice, to sell any share of a delinquent proprietor,—and subjects such proprietor to the payment of balance due, if any after his share shall have been sold.

4th Section authorizes the Directors to establish the tolls—with a provisio that after 10 years from the completion of said railroad, when the tolls shall exceed 12 per cent. per annum on the actual cost of said railway "after deducting all necessary disbursements in concluding its operations," the Legislature has the right to reduce the tolls, so that the nett income shall not exceed 12 per cent., and to enable the Legislature to do this, annual returns are to be made to the Governor and Council of the expenses and income.

5th Section empowers the Directors to erect toll houses, establish gates, appoint toll gatherers, &c.

6th Section provides for the punishment of any one who may wilfully injure the railway. &c.

7th Section makes it the duty of the Directors to make an annual return as required by Sec. 4th.

8th Section requires that 2500 shares shall have been subscribed for, the corporation organized, and the location of the road filed with the County Commissioners of the County where the lands are taken for that purpose, and with the Governor and Council previous to 1st day of January, 1838, and the railroad to be completed before the 1st day of January, 1841, or the act to be void.

9th Section requires the corporation to erect and keep in repair all bridges with their abutments and embankments, which it may be necessary to make over any canal, turnpike, or other highway.

10th Section authorizes the building of a bridge over Penobscot River at Old Town.

11th Section repeals, as to this corporation, the provisions of an act passed March 17, 1831, concerning corporations, which authorizes the Legislature to amend, alter, or annul any charter at their pleasure.

12th Section makes it the duty of the corporation to carry the United States Mail for a reasonable compensation, when required by the P. M. General.

For the additional rights and duties of said corporation, reference must be had to the general laws referred to in Sec. 1.

The *Penobscot River Railroad Corporation* was duly organized on the 22d day of April, 1836, by choosing

SAMUEL M. POND, of Bucksport, President.

JOSEPH R. FOLSOM, of Bucksport.		Directors.
JOHN N. SWAZEY, of	"	
HENRY DARLING, of	"	
SAMUEL LITTLE, of	"	
HENRY SILSBY, of	"	
MOSES G. BUCK, of	"	
WM. S. BRIDGE, of Milford.		
JOHN D. WILSON, of Brewer.		

A. D. DARLING, Sec. and Treasurer.

Books for the subscription for stock, have been opened at Bucksport and Orono, and more than 1000 shares had been subscribed for on the 24th of Sept., 1836, and within a few days after the abandonment of the making a railway on the west side of Penobscot River from Bangor to Old Town, by virtue of a charter to Rufus Dwinal and others. On that event, the attention of the people in Orono was immediately turned to the P. R. R. R. Corporation, and at a large and highly respectable meeting of the citizens of Orono, held at the village of Lower Stillwater, a committee was chosen to confer with the Directors of this Company, and ascertain what had been done, and was being done, to locate and construct the railroad on the eastern side of P. River. This conference resulted in an arrangement that the people in Orono should take an equal share in the stock, and that further surveys should be made during the present season—the road commenced early the ensuing spring, and be completed as soon as practicable.

A railroad on the eastern side of Penobscot River, as provided for by said act of incorporation, will better accommodate lumber dealers on said river, than any other can do—its lower termination being at Bucksport, which contains a harbor open to navigation at all seasons of the year, where extensive wharves can easily be built, and a large depot obtained for piling lumber, the latter without expense to the company. The Engineer's report of this route is extremely favorable, that the ground is very level, and suitable for the construction of a railway. There will be no deep cuts or high embankments necessary on the route. From Bucksport to Orrington there is a great variety and abundance of cedar and timber suitable for the building of the road, and which can be had very cheap. He also reports that the road could be built on the plan of the Hamburg and Charleston* Railroad for less than $3000 per mile, and recommends that mode of making it.

The right of way has already been conveyed, in many instances, by the owners of lands over which the railway will be made, and will be generally conveyed through the whole route, free of any claim for damages, and in no case can the damages be to any considerable amount.

The corporation having, by the arrangement before alluded to with the people of Orono, secured the co-operation, interest, and influence of a large proportion of those concerned in the lumber business on the P. River, and having ascertained the number of mills in Orono and Milford, and the average quantity of lumber sawed by them and the probable amount of timber that will be transported on the railroad to Bangor and Bucksport, are prepared to make a probably accurate estimate of the cost of the railroad, with the annual expenses and income thereof. By reason of the very favorable ground for the proposed route, and the abundance of materials on the spot suitable for the construction of the road, Col. Prescott estimated the cost of the railroad, on the plan he recommended, at the sum of $229,000 only. But suppose the railroad to be built in a different manner, and to cost $400,000, and that the *annual expenses* will be

Laborers, Agents and Clerks,	$24,000
Repairs and fuel, 10 per cent. on cost,	40,000
Engineers,	3,000
	$77,000

The annual income may, with much certainty in regard to the income from the transportation of lumber, be estimated as follows, viz: 38 saws on the east side of P. River near Old Town, each of which will cut 800,000 feet per ann., say 30 millions feet of lumber—

20 millions of which sent to Bucksport, at $2,25 per M., is	$45,000
10 millions of which sent to Bangor, at $1,50 per M., is	15,000
33 saws at upper and lower Old Town and Great Works which average a like quantity, making 26 millions—	
13 millions sent to Bucksport at $2,25 per M.,	29,000
8 millions sent to Bangor at $1,50 per M.,	12,000
76 saws at and near lower Stillwater, in the whole, say 60 millions—30 millions of which sent to Bucksport at $2 per M.,	60,000
20 millions of which was sent to Bangor at $1,25 per M.,	25,000
Toll on clapboards, shingles, laths and staves, estimated at	10,000
Wood and bark to Bangor and Bucksport, estimated at	8,000
400 passengers weekly, at an average of $1 each,	20,800
15,000 tons of goods, including corn, flour, salt, pork, coal and fish, from Bucksport to Orono and above at $2,	30,000
5,000 tons of goods to Bangor when river is closed with ice,	10,000
	$264,800
Deduct expenses,	$77,000

and it leaves a nett increase of $187,800 which is nearly 50 per cent. on the capital. But lest we should overrate the profits, we will suppose the railroad to cost $500,000: that the annual expense will be 25 per cent. more than before estimated, and will amount to $96,250, and the income 35 per cent. less, or only $198,700, from which deduct expenses, and we shall have left $102,350, or more than 20 per cent. on the capital. It ought also to be borne in mind that railroads are generally, if not universally *paid better*, and had *more business* than have been anticipated—the great facilities they afford for the transaction of business, and at reduced prices, serves to increase its amount.

To those who are not acquainted with the damage done to boards by rafting them and running them over falls, it may be thought improbable that lumber will be transported on a railroad, at an expense of $2. per M., when it can be rafted and run in the river for much less money. To such persons we can state that, the mill owners and lumberers estimate the damage to boards in *splits, gravel and mud*, occasioned by running them, at more than $2 per M. Add to this the total loss of a great many boards, and the expense of rigging, and men to look after the rafts at their place of deposit until they are shipped (to say nothing of the trouble and vexation of rafts being broken and the boards being mixed with other lots) and also the expense of rafting and running, and it will amount to $1 per M. more, at least—so that we may safely say, that it costs at least $3 per M. (including the injury to the lumber) to raft it. This is $1 per M. more than it will cost to run it on the railroad—by which mode of transportation the damage from splits and dirt would be saved—and the lumber be deposited on a wharf in perfect order for shipping, or for use. Boards in this condition, and in consequence of not having been in the water, would be actually enhanced in value, and command a much higher price, probably *not less than $2 per M.* By this calculation (and it is believed to be a fair one) it will be seen, that there will be a saving of from $2 to $3 per M. to the owners of lumber, by the railroad. This alone would be sufficient to build half of the railroad new every year. If this estimate be correct, we cannot doubt that *every board* will be transported by railroad, rather than a part only, as set down in the foregoing estimate of the income of the railroad. No one will ever think of rafting his boards, and as heretofore subject them to the hazard of being split and soiled. Mill owners and dealers in lumber assure us that all their lumber will be sent to Bangor and Bucksport on the railroad. Our highest estimates of the *income* of the railroad may therefore be considered as a probable one. It is believed there is no route for a railroad of the same distance, where, all things considered, a railway could be so cheaply constructed as on the route contemplated for the P. R. R. Road, and that there is no one in New-England which holds out so good a prospect of *great profits*. Any one desirous of taking stock in said corporation, and wishing to obtain further information, may apply personally or by letter to Samuel M. Pond or Joseph R. Folsom of Bucksport, John Bennock or Ebenezer Webster of Orono, or of Col. Wright of Milford near Old Town, and any one desirous of subscribing for shares in said corporation, are hereby informed that subscription books are opened, and will be

* The Charleston Railroad was built for less than $5000 per mile.

found with Joseph R. Folsom at Bucks Port, and Ebenezer Webster of Orono.

Since the above and foregoing statement was made, a report of J. B. Sargent, Esq., Engineer of the Hudson and Delaware Railraod has been seen and examined, from which it appears that that railroad is $38\frac{2}{10}$ miles in length, and is estimated to cost per mile, including graduation, superstructure, land, depot, buildings, carriages and machinery, &c., $10,714.30. The plan on which that railroad is recommended to be built, presents a graded surface of 20 feet clear of ditches, with slopes of one to one in excavations, and one and a half to one in embankments. This will give ample room for two tracks of 4 feet 9 inches in the clear, each. The superstructure will have two continuous and parallel lines of sills composed of white pine 4 by 9 inches, and not less than 14 feet long, each. These sills are to be imbedded in trenches sunk in the graduation so that the upper side of them will correspond precisely with the grade of the road. Transversely to these, ties will be placed every 3 feet, measuring from centre to centre, and must be 7½ feet long, and 6 by 6 inches square, of cedar. Notches of 2½ inches deep to receive the wood rail must be made in the ties, and a spike then driven in to secure the tie to the sills, and guard against lateral pressure. In the notches of the ties will be placed the wood rail, and be secured by cedar, locust, or white oak wedges. The rail to be composed of Norway pine, and be in lengths of 18, 21, 24, 27 and 30 feet, and 6 by 6 inches square—the whole to be surmounted by one iron plate rail 2½ by $\frac{5}{8}$ inches which must be firmly spiked to the wood rail, and underlaid at the joints by connecting plates. The horse path to be formed of materials from the side of the road, and slated or gravelled as the material is most convenient. The plan of this road is calculated for an additional track when the demands of business may require it.

The estimated annual receipts from passengers, wood, timber, stone, butter, pork, live stock, grain and vegetables, pressed hay, lime and iron *from* the interior—and gypsum, salt and other merchandize of various kinds *to* the interior, are $78,950.

The estimated annual expense is 5 per cent. on the perishable part of the superstructure,	$6,000
10 per cent. on the cost of cars, engines, &c.,	3,000
Superintendance, repairs, fuel, &c.,	16,000
	$25,000
Leaving the nett income annually of	$53,950

or more than 13 per cent. on the cost.

In comparing the sources of the income with the estimate for the P. R. R. Road it will be perceived that the principal article of transportation on the latter is *boards*,—of which there are none on the former—and the receipts for carrying gypsum, salt and merchandize are only estimated at $12,250 —much less than the probable amount of receipts from carrying merchandize on the former from Bucksport to Bangor and above. Let it be observed also, that the plan of making the H. and D. Railroad is the one upon which the P. R. R. Road will probably be built; and at the expense estimated for the other, $10,714 30 per mile, will amount only to $305,257 55, estimating the length of road at 28½ miles. Taking this sum as the probable cost of the P. R. R. Road, and make an estimate of the annual expenses upon the same basis as Mr. Sargent has made for the other railroad, and the result will be—

5 per cent. on perishable part of structure for road of 28 miles,	$4,422
10 per cent. on cost of cars, engines, &c.,	3,000
Superintendance, repairs, fuel, &c. &c. at same (though repairs will be less on account of the length of way being less,)	16,000
	$23,422

Not one-third the amount of former estimate, and will leave the amount of nett income annually $241,480—which is more than 79 per cent. on the cost, at $305,257 55.

Can there be any doubt that the stock in the Penobscot River Railroad Corporation will be the *most profitable* stock in the *State*, or perhaps in the *nation?*

But as it will be important for the community that boards should be furnished at the lowest prices for which they can be afforded, it will be now shown that the price for transportation can be greatly reduced, (although we have shown that the lumber owners are great gainers by giving the toll mentioned in the former estimate for transportation on the railway compared with the transportation by water as now,) and still leave the income of the P. R. R. Road a very great profit to the stockholders during the first ten years. As railroads increase, and more experience is obtained as to the mode of making them, it is ascertained that the expenses of them is constantly diminishing. The Engineer of the Tioga Railroad in Pennsylvania, Wm. Matthers, Esq., has recently made a very minute estimate of the expense of making that Railroad, a distance of 27 miles, according to the method pursued by the Baltimore and Ohio Railroad Company, for some years past—of course a mode that has resulted from the *experience of years;*—(and Mr. Matthers' estimate has been approved and confirmed by a consulting Engineer, Benj. Wright, Esq.) and they make the expense of the graduation of the road, bed and masonry for the whole length (nearly as long as the P. R. R. Road,) $108,443 83. The superstructure of the road (including even the spikes and small nails) at. $107,044 20—adding the expense of road crossings, turnouts and fixtures, and for contingencies at 10 per cent. on other expenses, $22,318—making the whole expense $237,806 03, which is at the rate of $9,181 73 per mile. The Engineer then adds for 2 locomotive engines with tenders, at $3,500 each, $7,000 —50 transportation cars at $148 each, $7,-000—5 passenger at $450 each, $2,250 —depots, water stations, car houses, &c., $3,500, $19,750—making the whole expense to the commencement of its operations $257,556 03. It appears also from Mr. Matthers' report that a portion of the Tioga Railroad is already contracted for at a less sum than the estimate. In the Engineer's estimate nothing is put down for the damages to the owners of land, and the expense of fencing, but Mr. Matthers says, "It is not likely from the disposition generally manifested that these damages will materially swell this estimate, for full two-thirds of the owners have liberally relinquished all claim for damages." The charter of the Tioga Railroad allows only 2 cents per ton per mile for toll, as the maximum toll—and even at this low price, it is estimated that the income from the toll of that article alone, will be sufficient to pay 6 per cent. on the investment.

If we take the above estimate as the probable expense of the P. R. R. Road—and be it remembered that the route of the latter is straighter and more level than the other—and therefore it may fairly be considered as a liberal estimate—the expense for 28½ miles will be $271,864 66. Let us then take this estimate as the probably correct one, and reduce the toll in the former estimate of income as follows:

To Bucksport 33 millions feet boards from upper and lower Old Town Great-works at $1 50 per M.,	$49,00
To Bucksport 30 millions feet boards from lower Stillwater at $1 40 per m.,	42,000
To Bangor 18 millions feet boards from Old Town at $1 per M.,	18,000
To Bangor 20 millions feet boards from Lower Stillwater at 75 cts. per M.,	15,000
Tolls on clapboards, &c.,	8,000
Tolls on wood, &c.,	6,000
400 passengers weekly at $1,	20,800
15,000 tons of goods, &c. from Bucksport to Orono and above at $1 50 per ton,	22,500
5000 tons of goods, &c., from Bucksport to Bangor during the winter, &c., at $1 25 per ton,	6,250
Amounting in the whole to	$187,550
Annual expense as per estimate on page 8th, in accordance with Engineer's estimate of Hud. and Del. Railroad.	23,422
Leaving as the nett income annually,	$164,138

or more than 60 per cent. on cost of railway, &c.

Should a larger proportion of the lumber be sent to Bangor than is estimated or even the whole quantity sent to Bangor and Bucksport, be 25 per cent less. than the estimate, the nett income would still remain large—but if it be a fact (and there appears no good reason to doubt it) that boards can be taken on the railroad at the low rates in this last estimate, the quantity instead of being diminished, would be greatly increased, and consequently much larger dividends be received by the stockholders.

REPORT OF THE PRELIMINARY SURVEY OF THE ROUTE OF THE HUDSON AND DELAWARE RAILROAD, BY JAMES B SARGENT, ESQ., CIVIL ENGINEER, MADE TO THE COMMISSIONERS OF THE ROAD AND PUBLISHED UNDER THEIR AUTHORITY.

TO THE COMMISSIONERS OF THE HUDSON AND DELAWARE RAILROAD COMPANY.

GENTLEMEN,—In furtherance of the duties devolved upon me by my appointment of engineer to conduct the surveys and examinations of that district of country through which it is proposed to construct the Hudson and Delaware Railroad, I have the honor to submit the following Report—and although fully aware that the character of these surveys are such as will admit of my presenting a delineation and description of the best route that the generally favorable features of the country will allow—still the preliminary examinations have been made with much care, the topographical features extensively viewed, and as carefully considered and sketched as was deemed necessary to prove the practicability of the route, and exhibit a site that will admit of the construction of a railroad on the most approved plan, and at comparatively small expense.

To establish a definitive location was not the design in the commencement, nor does the present object, however desirable to attain and necessary to the ultimate completion of the work, require it—yet it is hoped that sufficient data have been collected, and ample deductions made therefrom, to show that the curves will be easy, the grades light, and all the circumstances usually attendant upon works of like magnitude, in the highest degree favorable and gratifying.

But if these facts are interesting in themselves and conclusive evidence of the utility and advantage of hastening the completion of the work, the peculiar and favorable circumstances under which it can be commenced, and the abundant support that the company will necessarily derive from its commanding location, are considerations still more cheering and vastly more important to the company and a numerous and wide spread community.

The Hudson and Delaware Railroad in New-Jersey may properly be considered (what it is designed to be in effect) a continuation of a road of the same title in the State of New-York. The proposed line of the latter commences at Newburgh on the Hudson river, and terminates at the New-Jersey line in the valley of the Wallkill,—that of the former was commenced at the termination of the latter, and pursues, first, the valley of the Wallkill,—second, that of the Pepo Coton to the summit dividing the Hudson and Delaware rivers, near Augusta—and thence down the Paulins Kill to near Columbia on the Delaware river. From Columbia the line is continued up the same through the Water Gap to opposite Dutot's Island, the place proposed for crossing the river with the Susquehannah and Delaware railrord.

The charter of each of the three railroads, mentioned above, grants to the respective companies the privilege of uniting their interests and combining their means for the purpose of effecting a continuous line of communication between the Hudson and Susquehanna rivers, upon such terms and in such manner as the contracting parties shall agree. The two extreme roads between which the one we are treating of is to form so important a link, have already passed the odeal of uncertainty and doubt in regard to their utility, rapid progress, and early completion.

That in the State of New-York is being prepared for vigorous prosecution under my supervision, and I am well aware that the holders of the stock fully appreciate the importance of the road across New-Jersey, and will be disposed at any time to enter into liberal and extensive arrangements for the promotion of the present and future interests of both; that they deem its importance to themselves coeval with that of their own, and a union of facilities and interest both in constructing and in using them, when completed, of paramount importance.

That in Pennsylvania, it is understood will be vigorously prosecuted during the coming season. Extensive preparations for it are making, and those most intimate with the circumstances of the company, and largely interested in its success, have entire confidence in its early completion.

A map of the country traversed by the survey, together with a profile of the line, are respectfully submitted, and will exhibit a route very nearly upon the ground most approved for the construction of the work, except in three instances, where it deviates from the immediate course of the vallies and encounters high and broken ground. These deviations are objectionable and should not be adopted; although, it is admitted, that the road upon them would better serve the immediate and adjoining districts than it will or can upon the low ground: but to adopt them would be to add greatly to the rise and fall of the whole route, and thereby to detract from the useful effect of the motive power, and to add to the cost of traction, which would be a serious injury to the main object. These routes were surveyed to the exclusion of those pursuing the course of the streams, but the latter were known to be in the highest degree favorable, and it therefore became a matter of policy and economy to settle the question in regard to the practicability of those most desired by the inhabitants, and of doubtful character. The dotted lines upon the map, and the lower ground surface upon the profile will give an approximate representation of the line prefered, and in the description of the line, we shall refer to each of them separately and in their proper places.

DESCRIPTION OF THE LINE.

In order to render this part of our subject convenient for reference, and to embody in a condensed form as much information as possible, the line will be divided into seven sections, and observations made upon each separately.

SECTION NO. I.—6 MILES 3320 FEET LONG.

From the New-York Line to Deckertown

This section includes the first and most important of the lines that are deemed inadmissible. It commences at Kimble's Point in the line between New-Jersey and New-York and was traced along the high lands that bound the Wallkill passing in front of Mr. Chandler's farm house, near to Wantage chapel, in front of Mr. Wilson's house, and on a line nearly parallel with, and but a short distance south of the road leading from Unionville to Deckertown, to the latter place where it enters the village, and the valley of the Wallkill, just south of the academy.—Upon this line an elevation of $132\frac{1}{2}$ feet above the starting point is attained which leaves the descent to Deckertown 117 feet, and will require on the ascending grades a ratio of $38\frac{3}{4}$ feet per mile, and in the descending, $36\frac{1}{3}$ feet per mile. But if the valley of the Wallkill had been pursued an almost level grade might have been obtained, and the cutting and filling exhibited on the upper line in a great measure avoided. It is true that the distance would be somewhat increased, but it is believed that when the line shall be accurately and carefully located the aggregate distance on the lower route will not materially exceed that stated for the upper and present survey.

SECTION NO. II.—8 MILES, 1960 FEET LONG.

From Deckertown to Augusta on the Paulins Kill.

This section embraces that portion of the line that pursues the valley of the Pepo Coton. That stream has its source near to Augusta and the course of the Paulins Kill, and forms a broad and spacious valley to its junction with the Wallkill, half a mile west of Deckertown. The line continues on the north side of the stream and upon the flats to near its source. Thence it bears more north and touches the spurs of the high lands that project across its direction, and passes on to the summit between the Pepo Coton and the Paulins Kill, or as before remarked between the Hudson and Delaware rivers. It passes the Mascote creek at Deckertown, and comes in contact with, and runs a short distance in, Mr. Obadiah Pellet's mill pond, but no where encounters any serious obstacles. The excavations will not be heavy, and in every instance through no harder substance than loam and gravel.—The embankments will be light, and the water can be so concentrated as to render the drainage under the road effectual and cheap. In short, it would be difficult to select a site for a railroad that possesses more general advantages.

SECTION NO. III.—8 MILES 3500 FEET LONG.

From Augusta to Theophilus Hunt's Mills,

Enters with its commencement into the valley of the Paulins Kill and almost immediately after into a narrow, winding and rocky valley that passes through a spur of the highlands and returns again to the Kill about $1\frac{1}{4}$ miles below Augusta. This line was surveyed but not proffered. The Kill here is circuitous but presents wide and favorable flats: they are therefore considered the proper place for the road, and its adoption will not materially change the distance from what is now given. These flats continue about $2\frac{1}{4}$ miles below Augusta where the stream becomes closely bound by bold and rocky shores that extend for some distance below Balesville, and render it necessary in several instances to encroach upon the stream and to pass it twice at Balesville. After passing down about half a mile below Balesville, the valley becomes less rocky and more favorable, but still quite sinuous, and the stream is again crossed at Mr. Roof's and closely followed to the Widow Cassady's property. Here the line diverges towards the north and follows an elevated valley through Mr. Lane Emmon's property, and returns again to the Kill at Theophilus Hunt's Mills and presents the third and last of the lines surveyed that are deemed objectionable. It attains an elevation above the flats at the widow Cassady's of 76 feet, and of 94 feet above them at Mr. Hunt's Mill's, and requires grades of $35\frac{1}{4}$ feet per mile in ascending and of $38\frac{3}{4}$ feet in descending—thus showing that the actual increase of rise and fall that would be incurred by adopting the upper route is 152 feet, and that the ratio of grade must necessarily be more than trebled.

The route following the immediate valley of the Kill is therefore deemed much the best and although it will occasionally come in contact with points of the lime rock and strata of slate that appear along the stream, there will be no serious or prominent obstacles to be encountered, no abrupt curvature, nor great indirectness of course required.

SECTION NO. IV.—5 MILES 2400 FEET LONG

From Theophilus Hunt's Mills to Marksborough.

After passing Mr. Hunt's mills the hills recede upon both sides of the stream and exhibit the beautiful and fertile valley so favorably known as the Stillwater flats. This fine range continues for some distance below Stillwater and affords all the advantages desirable for the cheap construction of a durable and excellent road. In fact the whole of this section may be said to occupy a favorable and uninterrupted valley, although the windings of the stream render it necessary to cross it no less than seven times in order to preserve as much directness of the line as possible: but the bridging cannot be considered objectionable, as the stream does not rise very high, and can in the most instances be crossed at such elevations as shall be deemed necessary to secure the bridge against injury from the floods.

SECTION NO. V.—6 MILES 120 FEET LONG.

From Marksborough to Mr. Jones' farm.

This Section terminates the course down the immediate valley of the Paulins Kill, which as far as Paulina is circuitous, narrow and closely bound by high and prominent shores. The line crosses the Kill six times, and by so doing in a great measure avoids the indirectness of it, and the points of rock that appear frequently on the face of the hills. From Paulina to the termination of the section the line passes over more favorable ground—indeed from the vicinity of Gravel Hill to Mr. Jones' the valley is equal in uniformity and fertility to the Stillwater flats, and the Kill is not again encountered nor any stream of importance passed, except Mill Creek at Gravel Hill. The excavation upon this section, except when some little rock may be encountered, will be loam and gravel, the best of materials to form the banks and the easiest to excavate. The grades will no where exceed 20 feet per mile, and the curvature in every instance favorable for the operations of locomotive steam engines.

SECTION NO. VI.—5 MILES 3400 FEET LONG.

From Mr. Jones' to opposite Columbia.

At Mr. Jones' the Paulins Kill turns abruptly south, while the line continues its direction and ascends with a grade of 10½ feet per mile upon the flats in front of Mr. Vanscoder's, passes over a considerable valley and encounters a cut of about 20 feet previous to reaching the property of Squire Bartow, thence across a small stream and wide ravine near his house and on over very undulating table land to the wide and deep valley near Sodom which it crosses, and then pursues a much more favorable site to the termination of the section.

This section appears rough upon the profile but will not be very expensive, as the excavations will be generally through loam and gravel and will be about sufficient to form the embankments and are so distributed that they can be used for that purpose to great advantage. But above all it will afford a very straight road, light curvature and grades of less than 12 feet to the mile.

SECTION NO. VII.—4 MILES 3680 FEET LONG

From Columbia to opposite Dutot's Island.

The whole of this section lies along the Delaware river and is circuitous, having to form a large circuit around the high bluffs of the Blue mountains, that project to the south and almost at right angles to the line pursued upon the table lands back from the river, in order to avoid deep rock excavation and to enter favorably into that narrow pass in the mountain, so well and generally known as the Water Gap, and so conspicuous for its bold and lofty scenery.

The grades are here necessarily heavier than any descending to the west upon other parts of the line, being 27⅓ feet per mile, descending from the table land to a suitable elevation for passing the Gap, crossing the river and connecting with the proposed route of the Susquehanna and Delaware Railroad.

It will be necessary to incur the most expense, however, on the first mile of the section and in the vicinity of Columbia; the ground there being broken and requiring heavy excavations and embankments. But after the line gets down to the flats they are of sufficient width, with one or two exceptions, to admit of the construction of a cheap and durable road.

A succession of Islands are formed in the river from opposite Snyder's Water Gap Hotel to Dutotsburgh, which present a favorable site for one or both of the proposed roads, and may upon a more full investigation of the subject be found advantageous ground to form a connection between them.

The length of each grade and the ascent or descent per mile in the same upon the whole line is given on the profile and will exhibit the maximum grade at 34½ feet per mile if the routes recommended are adopted; and this need only be had in ascending the summit at Augusta—all the rest being less than 30 feet per mile.*

OF THE PLAN OF THE ROAD.

In entering upon this part of our subject, it may be proper to remark that the plan proposed for the road through Orange County presents a width of road bed of twenty feet, and is designed to give ample space for two tracks of four feet nine inches each in the clear, but it is designed to put only one of them down, until the business of the road is fully tested, and it is ascertained that the one is insufficient to perform it.

The plan of the superstructure and width of track in New-Jersey should correspond with that in New-York. But it is believed that a single track, with suitable turns out and sidelings, will be capable of performing the business that will accrue to the road for a series of years, and it is therefore recommended that a width of road bed adapted to a single track, be adopted. This will require a graded surface of 15 feet clear of ditches, and the cuttings in excavations of earth should have slopes of 1 to 1, and the embankments of 1½ to 1 in all cases.

The superstructure will very nearly correspond with that upon the principal roads in New-Jersey, New-York and Pennsylvania, which has been tested with a hundred other and different plans, and is now most generally approved and adopted. It will have two continuous and parallel lines of sills composed of white pine 4 by 9 inches and not less than 14 feet long each. These sills should be imbedded in trenches sunk in the graduation so that the upper side of them will correspond precisely with the grade of the road. Transversely to these ties will be placed every three feet measuring from centre to centre. The ties should be seven and a half feet long, and 6 by 6 inches square, and of chesnut, white oak, or white cedar timber; also have notches of 2½ inches deep to receive the wood rail and the spike for securing it to the sills, and guarding against lateral pressure. In the notches of the ties will be placed the wood rail, and be secured by red cedar, locust, or white oak wedges. The rail to be composed of Norway pine, and be in lengths of 18, 21, 24, 27, and 30 feet, and 6 by 6 inches square. The whole to be surmounted by an iron plate rail 2½ by ⅝ inches, which should be firmly spiked to the lower rail and underlayed at the joints by connecting plates of iron or zinc. The horse path to be formed of materials from the sides of the road, and slated or graveled as the material is most convenient.

(To be Continued.)

*The highest elevation attained above the New York state line is near Augusta and is equal to 14? feet. The descent from that point to the Delaware River at the Water Gap is 251¼ feet. Making the actual rise and fall to overcome 395¼ feet.

RAILROAD MEETING.

Agreeably to previous notice, a meeting was held at the house of William McFarlan, in Whippany, on Friday the 14th inst. to take into consideration the expediency of constructing a Railroad from Orange, across the mountain, through Livingston, Hanover and Whippany, to some point on the Morris canal. When Silas Tuttle was chosen Moderator, and Caleb H. Ely, Secretary.

1st. Resolved, That it is feasible and expedient to construct a railroad from Orange, across the mountain, through Whippany to some point on the Morris Canal.

2d. That it is necessary to ascertain the probable amount of produce and passengers that will pass on said road when constructed, and that a committee of five be appointed to ascertain that fact, and report the same at an adjourned meeting. That William Scott, N. P. Thomas, Joseph Jackson, Andrew B. Cobb, and Caleb H. Ely, compose the said committee.

3d. That a committee of seven be appointed to explore the route and employ an engineer to ascertain the probable amount of cost to construct said Railroad, and that Enoch Edwards, Philo Andrews, Pell Teed, Jeremiah Mitchell, Jonathan S. Williams, Ichabod Condit, and Stephen D. Day, constitute said committee.

4th. That this meeting stand adjourned to Monday the 31st Oct. to meet at the house of William McFarlan in Whippany, at one o'clock, P. M. at which time said committees are requested to meet and make their respective reports.

5th. That the editors of the Newark Daily Advertiser, the Sentinel of Freedom, and the Jerseyman, at Morris Town, be requested to publish the same, and that the above proceedings be signed by the Chairman and Secretary.

SILAS TUTTLE, Chairman.
CALEB H. ELY, Secretary.

[From the London Mechanics' Magazine.

NEW RESOLUTIONS ON RAILWAY BILLS.

The House of Lords having on Wednesday last adopted these resolutions as sent up from the House of Commons, without amendment or alteration, we lose no time in publishing the following authentic copy of them. They will be found of a very stringent and, on the whole, salutary nature:—

Amended Standing Orders for next Session.

1. That when any application is intended to be made to the House for leave to bring in a Bill for making any railway, ro

for varying, extending, or enlarging any railway already authorised to be made, or for continuing or amending any Act passed for any of those purposes, or for alteration of the existing tolls, rates, or duties upon any such railway, notices of such intended application be given.

2. That such notices (except as hereinafter mentioned) do contain the names of the parishes and townships from, in, through and into which any such railway is intended to be made, varied, extended, or enlarged, and if an alteration in any existing tolls, rates, or duties, is intended to be proposed, the intention of proposing such alteration be expressed therein. But in case any such Bill shall be for the purpose only of altering any existing tolls, rates, or duties, or of continuing or amending any former Act, solely for the purpose of tolls, it shall not be necessary to insert in such notice the names of the several parishes and townships.

3. That such notices be inserted three times in the months of August, September, October, and November of this year, or either of them, in some one and the same newspaper of every county in or through which any such railway is intended to be made, or in which such railway, already authorised to be made, is intended to be varied, extended, or enlarged, or if there is no such paper printed therein respectively, then in the newspaper of some county adjoining thereto.

4. That a map or plan and section of the whole of such intended railway, and also of any intended variation, extension, or enlargement of any railway authorised to be made, upon a scale of not less than four inches to a mile, shall be deposited for public inspection at the office of the Clerk of the Peace of every county, riding, or division, in or through which such railway, or such variation, extension, or enlargement, is intended to be made, on or before the 30th day of November next, which map or plan shall describe the line of such intended railway, or of such intended variation, extension, or enlargement, and the lands in or through which the same is intended to be made, together with a book of reference, containing a list of the names of the owners or reputed owners, lessees or reputed lessees and occupiers of such lands respectively; and where such railway or such variation, extension, or enlargement, is intended to pass through any building, yard, or court-yards, or land within the curtilage of any building, or through any ground cultivated as gardens, an additional plan of such buildings, yards, land and ground, and of the said railway, shall be laid down upon a scale of not less than a quarter of an inch to every 100 feet.

5. That such section shall be drawn to the same horizontal scale as the plan, and to a vertical scale of not less than one inch to every 100 feet, and shall show the surface of the ground in the line of railway marked on the plan, and shall also have marked on it a line showing the railway line when finished (which line shall correspond with the upper surface of the rails,) and a datum horizontal line, which datum line shall be the same throughout the whole length of the railway, and shall be referred to some fixed point stated on the section. That a vertical measure from such datum line to the line of the railway shall be marked in feet and inches at each change of the gradient or inclination, and that the proportion or rate of inclination between each such change shall also be marked. That the height of the railway over or under the surface of the ground shall be marked in figures at least twice in every mile, and also at every crossing of a turnpike road, and public carriage road, navigable river, canal, or railway, or juncture with a railway, and that it shall be stated on the section whether any and what alteration in the present level of such turnpike road, carriage road, river, canal, or railway, is intended to be made. That where tunnelling or arching is intended, the same shall be marked both on the plan and the section.

6. That the clerks of the peace, or their respective deputies, do make a memorial in writing upon the map or plan, section and book of reference so deposited with them, denoting the time at which the same were deposited in their respective offices, and do at all seasonable hours of the day permit any person to view and examine the same, and to make copies or extracts therefrom, such person paying for the same the sum of 1*s.* for every such inspection, and the further sum of 1*s.* for every hour during which inspection shall continue after the first hour.

7. That within one calender month from the time when the map or plan and section shall have been deposited with the clerk of the peace, a copy of so much of the said map or plan and section as relates to each parish, through which any railway is intended to be made, varied, extended, or enlarged, together with a book of reference thereto, shall be deposited with the parish clerk of each such parish in England, the schoolmaster of each such parish in Scotland, and the postmaster of the post-town in or nearest to such parish in Ireland, for the inspection of all persons concerned, at all reasonable hours of the day, such person paying for each inspection the sum of 1*s.*

8. That within one calender month from the time when the map or plan and section shall have been deposited with the clerk of the peace, a copy of the said map or plan, section and book of reference, shall be deposited in the Private Bill-office of this House, and that a memorial in writing of the receipt thereof be indorsed by one of the clerks of the said office upon such map or plan, section and book of reference.

9. That before any application is made to the House, for a Bill for making any railway, or for varying, extending, or enlarging any railway already made, previous application in writing be made to the owners or reputed owners, lessees or reputed lessees, by being sent to their usual place of abode in the United Kingdom, or, in their absence, to their agents respectively, and to the occupiers of the lands through which any such railway is intended to be made, varied, extended or enlarged, and that such applications shall be made on or before the 31st day of December next, and that separate lists be made of the names of such owners, lessees, and occupiers, distinguishing which of them upon such application have assented to, or dissented from, such intended railway, or such variation, extension, or enlargement, or are neuter in respect thereof.

10. That before any petition shall be presented to the House for making any railway or for varying, extending, or enlarging any such railway already made, the lists mentioned in the preceding resolution, and an estimate of the expense, signed by the person making the same, and a copy of the subscription contract after mentioned, be deposited in the Private Bill-office of this House, and that the receipt thereof be acknowledged accordingly by one of the clerks of the said office upon such petition.

11. That before any petition is presented to the House for a Bill for making any railway, a subscription to the amount of one-half at least of the estimated expense shall be entered into by persons under a contract, binding themselves, their heirs, executors, administrators, or assigns, for the payment of the money so subscribed.

12. That no such Bill shall be reported to the House until it has been proved to the satisfaction of the Committee, that three-fourths at least of the proposed capital of the Company has been subscribed under a like contract.

13. That no such Bill shall be reported to the House unless provision be made: 1. That no such company shall be authorised to raise by loan or mortgage, a larger sum than one-third of their capital, and that, until 50 per cent. on the whole of the capital shall have been paid up, it shall not be in the power of the Company to raise any money by loan or mortgage. 2. That, where the level of any road shall be altered in making any railway, the ascent of any turnpike road shall not be more than one foot in thirty feet; and of any other public carriage road not more than one foot in twenty feet; and that a good and sufficient fence, of four feet high at the least, shall be made on each side of every bridge which shall be erected. 3. That no railway, whereon carriages are propelled by steam, shall be made across any turnpike road or other highway on the level, unless the Committee on the Bill report that such a restriction ought not to be enforced, with the reasons and facts upon which their opinion is founded.

Amended Standing Orders for subsequent Sessions.

No. 1 and 2 same as No. 1 and 2 for *next* Session.

3. That such notices be inserted twice in the month of February, and twice in the month of March, of the year immediately preceding that in which such application is intended to be made, in some one and the same newspaper of every county, in or through which any such railway is intended to be made, or in which such railway, already authorised to be made, is intended to be varied, extended, or enlarged, or if there is no such paper printed therein respectively, then in the newspaper of some county adjoining thereto. But in case any such Bill shall be for the purpose only of altering any

existing toll, rates, or duties, or of continuing or amending any former Act, such notices shall be inserted three times in the months of August, September, October, and November, or either of them, immediately preceding the Session of Parliament in which such application is intended to be made, in some one and the same newspaper of every county in or through which any such railway is authorised to be made; or if there is no such paper printed therein, then in the newspaper of some county adjoining thereto.

4. Same as No. 4 for next Session, except that the plan must be deposited "on or before the 1st day of March, in the year immediately preceding that in which such application is intended to be made."

5. Same as No. 5 for next Session.

6. That parties desiring to make any alteration in the line of any railway, the plans for which shall have been deposited, and the notices for which shall have been given as before-mentioned, shall be permitted so to do, provided no one deviation shall exceed one mile in length, and provided a plan and section of such alteration, together with a book of reference thereto, shall be deposited with the clerk of the peace, and a plan and section so far as relates to each parish, together with a book of reference thereto, with the parish clerks of the several parishes in which such alteration is intended to be made, on or before the 30th day of November, in the year immediately preceding that in which such application is intended to be made, and that the intention to make such alteration shall be advertised in manner before directed, twice in the month of September, twice in the month of October, and twice in the month of November, and that personal application shall be made to the owners or reputed owners, lessees, or reputed lessees or in their absence from the United Kingdom to their agents respectively, and to the occupiers of lands through which any such alteration is proposed to be made.

7. That parties desiring to make an application for a Bill to vary, extend or enlarge, any line of railway, for making which an Act of Parliament shall have been passed, shall be permitted so to do, provided that no one deviation shall exceed one mile in length, and provided a plan and section of such variation, extension, or enlargement, together with a book of reference thereto, shall be deposited with the clerk of the peace; and a plan and section, so far as relates to each parish, together with a book of reference thereto, with the parish clerks of the several parishes in which such variation, extension, or enlargement, is intended to be made, on or before the 30th day of November, in the year immediately preceding that in which such application is intended to be made, and that the intention to make the application for such variation, extension, or enlargement, shall be advertised in manner next before directed, in September, October, and November; and that personal application shall be made to the owners or reputed owners, lessees or reputed lessees, or, in their absence from the United Kingdom, to their agents respectively, and to the occupiers of the lands through which any such variation, extension, or enlargement, is proposed to be made.

8. That parties desiring to renew (in the then next ensuing Session) any application to Parliament in respect of any railway, the plans for which shall have been deposited, and the notices for which shall have been given, as before directed, shall be permitted so to do, provided that no one deviation shall exceed one mile in length, and provided a plan and section of such railway, together with a book of reference thereto, shall be deposited with the clerk of the peace; and a plan and section, so far as relates to each parish, together with a book of reference thereto, with the parish clerks of the several parishes through which such railway is proposed to be made, on or before the 30th day of November, in the year immediately preceding that in which such application is intended to be made, and that the intention to make such application shall be advertised in manner next before directed, in September, October, and November; and that personal application shall be made to the owners or reputed owners, lessees or reputed lessees, or, in their absence from the United Kingdom, to their agents respectively, and to the occupiers of the lands through which any such railway is proposed to be made.

Nos. 9, 10, 11, 12, 13, 14, 15, and 16 same as Nos. 6, 7, 8, 9, 10 11, 12, and 13, of standing orders for next Session.

13. That before any petition shall be presented to the House for making any railway, or for varying, extending, or enlarging any such railway already made, the lists mentioned in the preceding resolution, and an estimate of the expense, signed by the person making the same, and a copy of the subscription-contract after-mentioned, together with a statement of any alterations from the book of reference which may have arisen since the same was deposited, be lodged in the Private Bill-office of this House, and that the receipt thereof be acknowledged accordingly by one of the clerks of the said office upon such petition.

14. That before any petition is presented to the House for a Bill for making any railway, a subscription to the amount of one half at least of the estimated expense shall be entered into by persons under a contract, binding themselves, their heirs, executors, administrators or assigns, for the payment of the money so subscribed.

15. That no such Bill shall be reported to the House until it has been proved to the satisfaction of the Committee, that three-fourths at least of the proposed capital of the Company has been subscribed under a like contract.

16. That no such Bill shall be reported to the House unless provision be made:—1. That no such Company shall be authorised to raise, by loan or mortgage, a larger sum than one-third of their capital; and that, until 50 per cent. on the whole of the capital shall have been paid up, it shall not be in the power of the Company to raise any money by loan or mortgage. 2. That, where the level of any road shall be altered in making any railway, the ascent of any turnpike road shall not be more than 1 foot in 30 feet, and of any other public carriage road not more than 1 foot in 20 feet; and that a good and sufficient fence, of 4 feet high at the least, shall be made on each side of every bridge which shall be erected. 3. That no railway whereon carriages are propelled by steam shall be made across any turnpike road or other highway on the level, unless the Committee on the Bill report that such a restriction ought not to be enforced, with the reasons and facts upon which their opinion is founded.

Special Resolution, adplicable to all future Sessions.

That no line of railway shall be deemed a competing line in contemplation, unless the plan and section for the same shall have been deposited, as required by the standing orders, on or before the 1st day of March in the year 1837, or on or before the 1st day of March in any succeeding year.

FACT IN THE THEORY OF VISION.—On the retina and pigment of the eye of the calamary (Sepia Loligo.) It will be recollected that an important argument in favor of that theory of vision which assigns the choroid coat and not the retina as the seat of vision is drawn from the supposed structure of the eye of the cuttle fish. Mr. T. W. Jones has recently made a new dissection and microscopic examination of the eye of the Sepia, in which he finds that the supposed pigment in front of the retina is not really such, but a nervous expansion of a peculiar texture, tinged of a reddish brown color, a circumstance which has given rise to the error of supposing it merely a pigment.—[Lond. and Edin. Philos. Mag., January.]

FOX'S DIPPING NEEDLE DEFLECTOR.—This is a compendious instrument for determining the magnetic dip, intensity, and variation, invented by R. W. Fox, Esq., of Falmouth, England It consists of a dipping needle accurately poised on an axis passing through the centre of gravity, to be deflected from the position of the dip by two bar magnets fitting into tubes attached to the back of the instrument, and the tubes being capable of motion round the axis of the needle so as to produce a greater or less proximity of the magnets to the poles of the needle. The needle having first been brought into the plane of the meridian, the approximate dip is obscured while the bar magnets or deflectors are not in place.—The plate to which the deflectors are screwed is then moved to make a convenient angle with this dip and the magnets inserted the north pole of one near the north pole, and the south pole of the other near the south pole, of the dipping needle. The

needle is thus deflected to a certain angle which is measured. The deflectors are then moved by moving the plate which carries them until they make the same angle with respect to the first dip, but on the opposite of it. The needle is thus again deflected, but in the opposite direction, and the half sum of the observed angles is the dip. By varying the position of the deflectors several observations may be obtained on different parts of the limb of the instrument, and, with a greater or less leverage, in the force of terrestrial magnetism. The relative intensities are observed by the amount of deflection produced by the magnets at a given angular distance from the line of dip, or by weights placed upon a flexible cord passing over a wheel attached to the axis of the needle, either with or without the use of the deflectors. A telescope attached to the plate or arm, carrying the deflectors, serves to determine the variation by a star, or by the image formed by a lens upon a plane of plaster of Paris, when an observation of the sun on the meridian is preferred. The readings of the vertical circle on which the needle plays are made accurate by a second graduated circle, placed near to the front of the box and of course between the eye and the needle. Verniers are provided for reading the angle of the deflectors and the azimuths. The instrument is provided with the usual means of levelling. When packed, the magnets form a circuit, with a view to a permanent condition in the several needles, or bars.—[Ann. Rep. Cornwall Polytech. Soc.]

From the Journal of the Franklin Institute.

REPORT OF THOS. JEFFERSON CRAM, PRINCIPAL ASSIST. PROF. NAT. AND EXP. PHILOS. U. S. MIL. ACADEMY, UPON EXPERIMENTS RELATIVE TO THE STRENGTH OF CAST-IRON BEAMS.—[COMMUNICATED BY PROF. A. D. BACHE.]

1. Soon after the destructive conflagration which devoured a large and valuable portion of the City of New-York, last winter, as a very natural consequence, the attention of capitalists became more fully awakened to the importance of constructing fire-proof buildings. Accordingly a demand was made upon Gov. Kemble, Esq., Principal of the West Point Foundry, for estimates of the cost of furnishing cast-iron, to replace the combustible parts which had hitherto been used in the interior of store houses and shops. To answer fully the demand which had been made upon him, Mr. Kemble thought it expedient to make a careful series of experiments upon the relative strength of cast iron beams of various forms, in order to ascertain, beyond a doubt, those which would be convenient for the particular object in view, and which would, at the same time, afford the greatest strength with the least cost. Through the politeness of Mr. Kemble, I had an opportunity of being present at the time of subjecting his cast-iron beams to the test of experiment; and believing that the results of those experiments will prove highly useful to the cause of construction in general, the writer of this begs leave to make them public through the medium of the Journal of the Franklin Institute.

2. It is presumed that the accompanying drawings will enable the reader to understand the forms of the experimental beams, it being remarked, that, in each case, the form was such as would be generated by giving the figure representing the cross section, a motion of translation only, along a straight line—keeping the moving area constantly perpendicular to the line of motion. The lower rectangle, *e, e, f, f*, would thus generate the "lower rib," and the upper rectangle, *a, a, b, b*, would generate the "upper rib," of the beam; and the rectangle, *c, d, d, c*, would generate what we shall call the vertical plate of the beam. It will be seen at once, that almost any distribution of a given quantity of material, may be effected, by merely varying the dimensions of the rectangles in constructing the pattern for the casting.

3. The arrangement, for augmenting at pleasure, the pressure upon the beam, consisted of a combination of levers—one of which being a large Roman steelyard with a scale at the extremity of the longer arm: a small weight being placed on the scale, had its effect greatly augmented by the combined multiplying effects of the levers; and this increased effect was exerted by means of a cylindrical piece of iron laid straignt across the middle of the top surface of the beam; so that the pressure acted uniformly along the transverse line of the middle of the upper surface of the beam. By this arrangement a small weight could be carefully applied to the scale of the steelyard without exerting a percussive effect.

4. In every case, the beam was supported by resting each of its extremities upon a well squared piece of iron about two inches in diameter, so that before exerting any pressure upon the beam, the bearing of each extremity was about two inches; and it may be well to remark here, that, immediately after the beam felt the pressure, the extremities bore only upon the inner edges of the supporting pieces of iron; and hence, the "distance between the points of support" in what follows, must be regarded as the perpendicular distance between the inner surfaces of said supporting pieces of iron.

5. The pressures exerted are expressed in English pounds avoirdupois; the linear dimensions are expressed in English inches and parts, and the superficies in square inches. The dimensions were measured several times and when any difference was found, a mean of the whole was taken as the final result. The drawings are all made upon a uniform scale, the top and the front views containing, of course, but a small portion of the beam in length. The depressions recorded in the tables, were measured with the utmost care,

6. EXPERIMENT I,

Fig. 2.

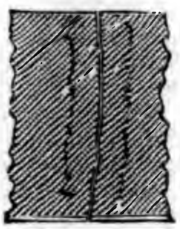


Fig. 4.

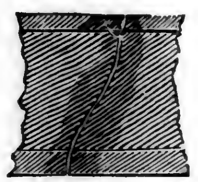


Fig. 3.

Fig. 1.

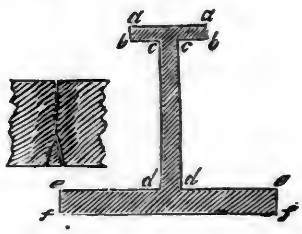


Fig. 1. represents a cross section of the beam.

Fig. 2. a top view of the fracture of the lower rib.

Fig. 3. a top view of the fracture of the upper rib.

Fig. 4. a side view of the fracture of the beam.

DIMENSIONS, &c.

Depth, *a, b*, of upper rib,	.31 in.
" *c, d*, of vertical plate,	4.15
" *e, f*, of lower rib,	0.66
Total of the beam,	5.12
Breadth *a, a*, of upper rib,	2.36 in.
Thickness *d, d*, of vert. plate,	0.394
Breadth *f, f*, of lower rib,	6.74
Area *a, a, b, b*, of cross section of upper rib, (in sq. in. and parts,)	0.7316
Area *c, d, d, c*, of cross section of vertical plate, (in sq. in. and parts,)	1.6351
Area *e, e, f, f*, of cross section of lower rib, (in sq. in. and parts,)	4.4484
Area total of cross section of beam,	6.8151

Total length of beam, 60 inches; distance between points of support 54 inches; and weight of the beam 105 lbs.

CIRCUMSTANCES.

The pressure being exerted upon the top of the upper rib, the upper part of the beam experienced a compression of its particles; and the lower part an extension of its particles. Augmenting the pressure by degrees—so carefully, however, as not to produce a percussive effect—the beam bent more and more as the pressure increased, until of a sudden it ruptured. The annexed table exhibits the depressions of the middle of the beam in proportion as the pressure was augmented

Pressures upon the middle.	Depressions of the middle.
½ (105)= 52½ lbs.	0.00 in.
15676	0.28
17244	0.32
18028	0.34
19596	0.40
20380	0.42
21948	0.46
23516	0.52
25084	0.58
25868	Beam broke.

No indications of rupture were observed during the successive augmentations of the pressure, until the beam suddenly broke under the last pressure recorded in the table ; and the whole time between the applications of the first and last pressures was nearly twenty-five minutes.— The drawings faithfully exhibit the appearance of the fracture ; and it will be perceived that the fracture of the top of the beam was produced by compression, and that of the bottom, by extension. Dividing 25868 lbs., by 68151 square inches, it will be found that this beam broke under a pressure of 3796 lbs., per square inch of cross section ; and an inspection of the table will show the circumstances of its resistance to flexure It should be remarked, that this beam was cast on its side, and therefore had less strength than if it had been cast on end.

7. EXPERIMENT II.

Fig. 6.

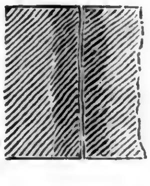


Fig. 7.

Fig. 5.

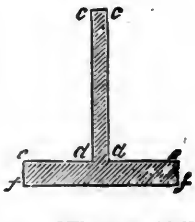


Fig. 5. represents a cross section of the beam at the place of fracture.

Fig. 6. a top view of the fracture of the lower rib.

Fig. 7. a side view of the fracture.

DIMENSIONS, &c.

No upper rib,	0.00 in.
Depth c, d, of vertical plate	5.10
" e, f, of low rib,	0.74
" total of beam,	584
Thickness c, c, of vert. plate	0.46 in.
Breadth f, f, of lower rib,	5.12
Area c, c, d, d, of cross section of vertical plate (in sq. in. and parts,)	2.346
" e, e, f, f, of cross section of lower rib, (in sq. in. and parts,)	3.7888
" total of cross section of beam, (in sq. in. and parts,)	6.1348

Total length of beam 60 inches ; distance between points of support 54 inches ; and weight of the beam 77 lbs.

CIRCUMSTANCES.

There was no upper rib to this beam ; therefore the pressure was exerted upon the top, c, c, of the vertical plate so as to compress the upper parts of the beam and to extend the lower parts. The pressures were augmented at intervals of a few minutes, and with all possible care to prevent percussion. The following table contains the pressures exerted, and the corresponding depressions, which were carefully noted.

Pressures upon the middle.	Depressions of the middle.
½ (97) = 48½ lbs.	0.00 in.
15672	0.28
16456	0.28
17240	0.32
18024	0.32
18800	0.36
19592	0.38
20376	0.40
21160	0.42
21944	0.46
22728	0.48
23512	0.54
24296	Beam broke.

No signs of a rupture appeared until all of a sudden the beam broke a few seconds after the application of the greatest pressure recorded in the table : the whole time between the applications of the first and last pressures, was about thirty minutes. The drawings show, that the fracture at the top was produced by compression, and, that at the bottom, by extension of the particles of the beam. Dividing 24296 by 6.1348, we obtain 3960 lbs., for the pressure per square inch, of cross section, which this form of beam sustained before breaking. The table shows the state of the flexure at the different periods of the operation, and the drawings will explain the peculiarities of the fracture. This beam was cast on end; and it will be seen, that this form sustained more, before breaking, by 164 lbs., to the square inch of section, than that of Experiment I.

8. EXPERIMENT III.

Fig. 9.

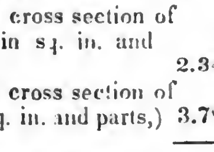


Fig . 8.

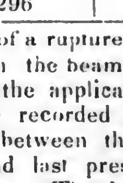


Fig. 8. is a cross section of the beam when rupture took place.

Fig. 9. a side view of the fracture.— The fractures were nearly straight across the ribs.

Depth, a, b, of upper rib,	0.800 in.
" c, d, of vertical plate,	3.12
" e, f, of lower rib,	0.80
" total of beam,	4.72
Breadth a, a, of upper rib,	2.42 in.
Thickness, c, c, of vert. plate,	0.94
Breadth, e, e, of lower rib,	2.42
Area a, a, b, b, of cross section of upper rib, (in sq. in. and parts,)	1.9390
Area, c, c, d, d, of cross section of vertical plate, (in sq. in. and parts,)	2.9328
Area, e, e, f, f, of cross section of lower rib, (in sq. in and parts,)	1.9360
Area total of cross section of beam, (in sq. in. and parts,)	6.8048

Total length of the beam 60 inches ; distance between points of support 54 inches ; and weight of the beam 102 lbs.

CIRCUMSTANCES.

This beam very suddenly broke under (the first pressure applied,) 15674 lbs.— Indeed, it was doubtful even whether that amount of pressure had yet been fully exerted. Admitting however, that the whole pressure was felt, the beam broke under a pressure of only 2304 lbs. per square inch of cross section ; and if the whole amount of pressure was not exerted, of course the beam was still less strong. This beam was cast on its side from the cupola furnace, and with no selection of metal, but all from one ladle. The sudden rupture of this beam made it impossible to measure the depressions. The drawing of the fracture would seem to indicate that it broke by extension.

EXPERIMENT IV.

9. The beam tried in this experiment, was exactly of the same form and dimensions as that of experiment II. ; but it was not so good a casting. It was placed with the rib uppermost, in a manner exactly reverse of that described in experiment II., so that the pressure was exerted upon the top surface of the rib, the beam resting with the edge of the vertical plate upon the supports ; and thus causing a greater portion to experience compression, and a less portion to experience extension, than in either of the other experiments. Under these circumstances, the beam ruptured very suddenly even before the pressure arising from the apparatus of levers alone, had been brought to act fully upon the rib ; thus affording a striking example of the great gain of strength, by giving a proper position to the beam with respect to the manner in which its different parts are to be strained —whether by compressing or by extending its particles.

10. Representing by 1.00 the strength of beam in experiment I., per sq. inch of cross section, the relative strengths of the different forms to resist rupture, will be expressed as follows :

Beam of the form described in Exp. I., Strength to resist rupture, 1.00

Beam of the form described in Exp. II., Strength to resist rupture, 1.04

Beam of the form described in Exp. III., Strength to resist rupture, 0.44

By comparing the areas of the cross sections of the different forms, it will be seen that greater strength may be gained, at a less expense of metal, by giving the

beam the form in experiments I and II., instead of the form in experiment III.

All of which is respectfully submitted.

THO. JEFFERSON CRAM.

To Prof. A. D. BACHE, Univ. of Penn.

West Point, June 1836.

ON THE ELICTRICAL RELATIONS OF CERTAIN METALS AND METALLIFEROUS MINERALS.—Mr. R. W. Fox finds that the crystalized grey oxide of manganese, holds a much higher place in the electro-negative scale than any other body with which he has compared it, when immersed in various acids, and alkaline solutions.—This and some of the other bodies examined by him, rank thus: 1, manganese; 2, rhodium, loadstone, platinum, arsenical pyrites, plumbago, nearly equal; 3, iron pyrites, copper pyrites nearly equal to the second; 4, salina; 5, standard gold; 6, copper-nickel; 9, silver; 8, copper; 9, sheet iron.—[Extract from Trans. Royal Soc. Lond. 1835.]

INDIANA IMPROVEMENTS.—A grand festival took place at Brookville, Ind., on the 13th ult, to mark the commencement of the White Water Canal. Upwards of 4,000 persons, it is estimated, were present, among whom were the most distinguished citizens of the State. The work, or a great portion of it, was put under contract the next day at Lawrenceburgh.

M. Gambert, the Astronomer, Director of the Marseilles Observatory, and correspondent of the Institute, died at Paris. This gentleman is well known in the scientific world for his frequent discoveries of comets.

From the Journal of the Franklin Institute.

COMMUNICATION OF A FORMULA FOR FACILITATING THE REDUCTION OF OBSERVATIONS OF THE SOLAR ECLIPSE OF MAY 15TH, 1835. BY S. C. WALKER.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN: The formulæ communicated by me in the April number of the Journal, were intended for announcing the time of the principal phases of the solar eclipse of May 15. By applying a direction derived from observations made under a known meridian, they may be used for determining the longitude of places at which it was observed, when not too far distant from Philadelphia, for which place alone they are strictly correct. The error of the middle time of the eclipse, as deduced from the formula, amounts of one second of time for New-York and Albany, to two seconds for Baltimore and Washington, and to eight seconds for Boston and the University of Virginia. By applying to the middle time by the formula, a correction depending upon the first and second powers of the difference of longitude from Philadelphia, results may be obtained, in which the great st variation from a rigorous computation for the above places, will in no instance exceed 0. 6 sec., and in which the average discrepancy will not exceed 0. 4 sec. In the former communication it was omitted to mention that l, denotes the *geocentric* latitude of the place for which the computation is made.

Retaining the same notation and constants as before, we have for the resulting longitude for the place of observation from Greenwich, + East—West

$$\lambda = A + B + C$$

Where,

$$A = \lambda' + x + \left\{ M - M' \right\} - [8.8557] \left\{ D - D' \right\}$$

$$B = [4.9781] \left\{ 5h.\ 0m.\ 40s. + A \right\}^2 - [7.1701] \left\{ 5h.\ 0m.\ 40s. + A \right\}$$

$$C = -\tfrac{1}{5} \left\{ A + B\lambda -' \right\}$$

In these equations

λ' = Assumed longitude from Greenwich, in seconds of time.
M = Local mean time of middle, observed,
M' = do. computed by formula.
D = Duration, observed.
D' = do. computed,
x = A correction for the errors of the tables.

The unknown quantity x, is the mean of the times at beginning and end, in which the moon by its apparent motion, traverses a space equal to the tabular error on its true orbit, projected upon its apparent orbit.—No material error will arise from assuming x, as constant for the limits to which this formula extends. Of the extent to which it may be used, an opinion may be formed from the following table, in which the middle time $M' + B$ derived from it, is compared with the rigorous computations for several places in the American Almanac.

Place.	M'	B.	Middle by Formula M' + B	Middle by Am. Almanac.	Difference.
Philadelphia,	8 17 55.35	+0.00	8 17 55.35	8 17 54.75	+0.60 s.
Boston,	8 42 30.80	+7.73	8 42 38.53	8 42 38.90	—0 37
Providence,	8 39 42 55	+6 31	8 39 48.86	8 39 48.65	+0.21
Albany,	8 3 11.15	+0.60	8 30 11.75	8 30 11.80	—0.05
New-York,	8 25 1 45	+0.32	8 25 1.77	8 25 1.65	+0.12
Baltimore,	8 9 40.95	+1.69	8 9 42.64	8 9 43.20	—0.56
Washington,	8 6 58.30	+2 56	8 7 0.86	8 7 0 30	+0.56
University of Virginia.	7 58 10.33	+7.37	7 58 17.70	7 58 18.15	—0.45
					8)2.92

Greatest difference, 0. 6 sec. Mean difference, 0. 36 s.

The determination of x, requires observations under known meridians. This eclipse having been visible at European observatories, the value of x, will admit of accurate computation. If we assume the longitude of independence Hall, Philaddlphia, at 5h. 0m. 40s. west from Greenwich, we shall have, after correcting for the small differences of longtitude of several places of observation in Philadelphia, the following values of x,

Observations of R. M Patterson, M. D.		$x = -$ 11.15 sec.
"	T. M'Euen, M. D.	$x = -$ 9 67
"	W. H. C. Riggs,	$x = -$ 11.40
"	S. C. Walker,	$x = -$ 11.93
		44 15
Mean of four observations,		$x = -$ 11.04

Bs an application of the formula, let it be required to deduce the longitude of the Capitol at Washington, from the observations of F. R. Hassler, Esq. Latitude 38° 52′ 54.″ Beginning observed 6h. 53m. 58s. End at 9h. 20m. 8s., A. M. Mean time.

Computation of the longitude of the Capitol.		1st. Approximation.	2d. Approximation.
(1)....	assumed λ'	— 5h. 8m. 7.20	— 5h. 8m. 10.02
(2)....	assumed	— 11 04	— 11.04
	M	+ 8 7 3.00	+8 7 3 00
	M'	+ 8 6 58.30	+8 6 54.88
(3)....	M—M'	+ 4.70	+ 8.12
	D	+ 2 26 10 00	+ 2 26 10 00
	D'	+ 2 26 13.60	+ 2 26 12.24
	D—D'	— 3 60	— 2.24
(4)....	$-[8.8557]\left\{ D-D' \right\}$	+ 0.26	+ 0.20
(1)+(2)+(3)+(4)....	A	— 5 8 13.28	— 5 8 12.74
	5h. 0m. 40s.+A	— 7 33.28	— 7 32.74
(5)	$+ [4.9781]\left\{ 5h.\ 0m.\ 40s. + A \right\}^2$	+	+ 1.92
(6)	$- [7.1701]\left\{ 5h.\ 0m.\ 40s. + A \right\}$	+	+ 0.67
(5)+(6)	B	+ 2.56	+ 2.59
	A+B	— 5 8 10.72	— 5 8 10.15
	A+B—λ'	— 3.52	— 0.13
	$-\tfrac{1}{5}\left\{ A+B-\lambda' \right\} = C$	+ 0.70	+ 0 03
A+B+C	$=\lambda$	— 5 8 10.02	— 5 8 10.12

Similar computations from John Gummere's observations, give the longitude of Haverford School.

Observed beginning	7h.	3m.	24.5s.
" end	9	31	47.
" latitude	40°	1′	12″
assumed λ''	5h.	1m.	26.8s.
First approximation λ'	5	1	16·94
2d " λ	5	1	16.15

From the Journal of the Franklin Institute.

OBSERVATIONS OF THE SOLAR ECLIPSE OF MAY 15TH, 1836. COMMUNICATED BY DIRECTION OF THE AMERICAN PHILOSOPHICAL SOCIETY.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN:—By direction of the American Philosophical Society, I send you an abstract of the observations of the late solar eclipse, which have been communicated to the Society It is not complete, some particulars being required which will probably be obtained from the observers, by the committee to whom the observations have been referred, to prepare them for publication in the Society's transactions.

The times of beginning and end are in mean time of the places of observation.

Very respectfully yours,

A. D. BACHE,

One of the Secretaries, Amer. Philos. Soc.

Table of observations of the beginning and end of the solar ecliepse of May 15th, 1836, as observed at Philadelphia, &c.

Places of Observation.	Time of beginning of Eclipse.	Time of end of Eclipse.	Observers' Name.	REMARKS.
Philadelphia.	h. m. s.	h. m. s.		
1. Hall of Am. Phil. Soc.	7 3 45.8	9 32 38.3	Dr. R. M. Patterson,	
2. Dr. McEuen's house.	7 3 38.0	9 32 38.1	Dr. T. McEuen,	2770 feet west of Philos. Hall.
3. "	7 3 50.0	9 32 26.5	Mr. W. H. C. Riggs,	
4. No. 100 S. 8th st.	7 3 40.9	9 32 44.1	Mr. S. C. Walker,	1340 feet west of Philos. Hall. Teles. 42 inches achrom.
5. No. 231 Market st.	7 3 41.0	*9 32 34.0	Mr. Sellers,	
Haverford school,†	7 3 24.5	9 31 4.07	Mr. Jno. Gummere,	Telescope 42 inch. achrom.
Germantown, Pa.	7 3 54.5	9 32 44.5	Mr. Isa Lukens,	
	7 3 55.5	9 32 49.5	Mr. C. Wistar,	Telescope 3 feet achrom
Phœnixville, Ches. co.‡	7 3 12.0		Mr. H. Wilson,	
West Hills, L. I.§	7 12 48.5	9 43 40.0	Mr. J. Ferguson,	Large repeating circle of coast survey, used or observations.
Washington City,	6 53 58.0	9 20 08.0	Mr. F. R. Hassler,	

* Doubtful,

† Assumed lat. 40° 01′ 12″. Long. 5h.01m. 25s.

‡ Assumed lat. 40° 08′ 07″ Long. deduced by H. Wilson, from eclipse, 5h. 01m. 57s.

§ One of the station points of the coast survey. Lat. 40° 48′ 49.2″. Long. 73° 26′ 12″

From the Journal of the Franklin Institute.

REPORT ON MESSRS. GARRETT AND EASTWICK'S LOCOMOTIVE STEAM ENGINES.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, the Locomotive Engines made by Messrs. Garrett and Eastwick, report :—

That they have examined one of these engines now in progress of construction, at the shop of Messrs. Garrett and Eastwick, and witnessed the performance of another which has been completed and placed on the Philadelphia and Trenton Railroad for trial.

They are constructed upon the principle of outside connections, the general arrangement being similar to that adopted by Mr. M. W. Baldwin, with some modifications, however, of sufficient importance to give them a distinct and original character.—The most striking peculiarity is in the manner of reversing. This operation is performed in the different engines heretofore in use, by various contrivances, all of which involve the necessity of ungearing the connection of the eccentric rods with the rock shafts : consequently their action depends upon the contingency of throwing these parts again into gear, which can be effected only at particular points in the revolution of the eccentries.

In the engines under considerrtion, the reversing is performed by means of moveable valve seats, which are placed between the slides and the true seats, and connected with hand levlers by rods passing through stuffing boxes in the steam chest.

In each moveable seat are five passages, four of which are steam ways and one for the exhaust ; two of the steam ways and the exhaust opening pass directly through the seat, the other two steam ways pass only about one-third through, and communicate with chambers which form oblique passages from one end of the seat to the other, so that the steam which enters the upper opening at one end of the seat, escapes by the lower opening at the opposite end.

When the moveable seat is so adjusted that the direct passages coincide with the openings in the true seat, the action of the valve is similar to the common short slide; but if the seat be shifted, so that the communication shall be through the oblique passages, the course of the steam to the cylinder will be reversed without any change in the motion of the slide. This arrangement possesses the merit of simplicity in a high degree, and as its action does not depend upon any contingency, the engine can be reversed with certainty and precision. A small loss of steam results from the increased thickness of the valve seat, but it is believed the amount will not be sufficient to produce any appreciable effect upon the power of the engine. It has been suggested that the inequality of wear to which the movable seat will be subjected in its different positions, must render its surface irregular, and impair the tightness of the valve; some inconvenience may arise from this source, the extent of which can be determined only be experience; it is not apprehended, however, that the evil will be of a serious nature.

The situation of the cylinders and driving wheels in engines, with outside connections, allows a leverage to the working strain which very much insrease the wear between the driving axles and their boxes, and also twists the frame out of its proper form. Messrs. Garrett and Eastwick have endeavored to guard against the injury resulting from this cause by some slight changes in the parts most exposed to its effects.

Instead of turning down the bearings of the driving axle to obtain a shoulder for preventing lateral motion in the axle, they leave the axle its full size throughout, and provide against lateral motion by facing the hubs of the wheels, so as to form shoulders which bear against the outer ends of the boxes. The increased extent of bearing surface which is thus obtained both within the boxes and at their ends, enables them to resist more effectually, the thrust of the engine and adds to their durability.

The firmness of the whole machine has been increased by bracing the cylinders to the fire box, and bolting to the under side of the frame a strong plate of iron, which passes entirely around it and is secured to the pull bar.

The Committee have been informed that the engine which is upon the Trenton Road, has given entire satisfaction during a trial of several weeks constant service ; the exhibition of its performance witnessed by them was highly gratifying, and they feel themselves warranted in saying that these engines afford evidence of ability to manufacture locomotives equal to any in the country for excellence of workmanship and general finish.

By order of the Committee.

WILLIAM HAMILTON, Actuary.

July 14, 1836.

From the Journal of the Franklin Institute.

REPORT OF MR. RAUB'S STEAM GAUGE.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, Mr. Raub's Steam Gauge, Report :—

That Mr. Raub's Steam Gauge consists of a safety valve or piston, differing in no essential feature from ordinary safety valves except that there is connected with it, by means of a lever, a weight, suspended in the water of the boiler, in such manner that when the water gets below a certain point, at which the weight is placed, the increased power of the weight, arising from its losing the support of the water, assists in opening the safety valve.

The practical effect is this .—If the safety valve is so graduated that steam will be blown off at a certain pressure, say seventy-five pounds to the inch, when the boiler is properly filled with water, it will escape at a lower pressure, say fifty or sixty lbs., to the inch, according to the dimensions of the weight, when the water is too low. In this way it is proposed to avoid the explosions, or other evil effects which might arise from a portion of the boiler becoming bare of water and heated to a higher degree.

The principle of which the weight acts, is like that of the floats which have been heretofore used, to show the height of water in the boiler, except that the weight in Mr. Raub's machine is connected with the ordinary safety valve, and the steam is blown off in large quantities when the water is too low, instead of a simple alarm being sounded.

The question for the consideration of the Committee is whether this combination, is advantageous. It is a matter of doubt, whether the blowing off of a quantity of steam when the water is deficient in the boiler, is not pernicious, as tending still more to exhaust the water ; and whether the old application of the float to regulate the supply of water is not better. Waving these questions, however, it appears evident to the Committee that if a weight or float is to be used to cause the escape of steam, when the water is too low, it is better to have it attached to a seperate valve, instead of being connected with the ordinary safety valve; because on the latter plan it will not operate when the steam is at a low density or pressure, although the water be deficient ; and because when it does operate, the engineer cannot know whether its action is in consequence of the water being too low, or the steam too high. Hence the advantages usually anticipated from the use of floats, cannot be realized from this machine.

Whether floats or weights can safely be relied on for showing the low state of the water in the boiler, and for obviating its effects, is a question of experience which it is unnecessary here to discuss, inasmuch as Mr. Raub does not claim to have originated them, but to have made an improvement in their application : and for the reasons above stated, the Committee are not satisfied that his steam gauge, in its present form, will be found practically advantageous.

By order of the committee.

WILLIAM HAMILTON, Actuary.

May 12, 1836.

From the Journal of the Franklin Institute.

COMMITTEE ON SCIENCE AND THE ARTS. REPORT ON MR. AMASA HOLCOMB'S REFLECTING TELESCOPE.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a Reflecting Telescope, invented by Mr. Amasa Holcomb, Southwick, Massachusetts, REPORT :—

That the following description of the instrument, submitted to the Committee, is given by Mr. Holcomb, viz :

"It is of the reflecting kind, having the front view, and has a focal length of about nine and a half feet, and an aperture of eight and a half inches. It has six eye pieces, of powers from ninety to nine hundred and sixty."

The evenings of the 22d and 23d of April, proving unfavorable, a third trial was made on the following night, when the performance of the instrument was very satisfactory. It is of the same size as the largest submitted last year. The mechanical execution of the mounting is quite superior, and leaves little to be desired, whether we regard steadiness, convenience in command of the instrument, or facility of finding objects.

The committee do not hesitate to pronounce this instrument superior in performance to any that have yet been exhibited by Mr. Holcomb.

The ring of Saturn was seen to be double by all the members of the committee present, the dark space between the rings could be observed on each ansa, half way to the conjugate axis of the perspective ellipse, under which it was viewed.

ζ Bootis which last year was so far separated that the discs became tangent to each other, presented the same appearance this year, with a power of 250. But with a power of 960 the dark space between the stars was equal to one-fourth of the disc of either.

In ζ Cancri, the close pair, distant about 1″.1, were so far separated that the dark space was visible as a line between them. This was considered too difficult for either of the telescopes exhibited last year.

A power of 960 was used in examining γ Virginis. This remarkable pair, of which the distance is 0″.8, according to Herschel's ephemeris, or 0″.6, according to Struve's late measurements, give no indications of being double.

This instrument was made to order for John A. Fulton, Esq. of Chillicothe, Ohio, a gentleman whose liberal encouragement of this department of the arts is worthy of all commendation. While, however, the committee would applaud the patriotism of those individuals, or corporate bodies, who encourage American artists, they cannot but remark, that should the course of Mr Holcomb be suddenly arrested, and the manufacture of these instruments cease in this country, their place could hardly be supplied by importation, at three times their present cost.

The four or five choice instruments made by Mr. Holcomb, have been the result of twice as many years of labor and perseverence, for which no adequate compensation can have been expected, except that satisfaction which every lover of science feels, in improving and extending the means by which it may be pursued.

The committee have little doubt that under proper auspices, and at an expense not exceeding that already encountered by some of our corporate institutions, in procuring instruments of little use, a twenty foot telescope might be made, which should do honor at once to the artist and the country.

By order of the committee.

WILLIAM HAMILTON, *Actuary.*

March 11, 1836.

From the London Mechanics' Magazine.

DEFEAT OF THE STEAM-CARRIAGES' BILL.

Report from the Lords' Committee appointed to consider the Bill entitled "An Act to Repeal such portions of all acts as impose prohibitory Tolls on Steam-Carriages, and to substitute other Tolls on an equitable footing with Horse Carriages ;" and to report to the House.

Order to report,—

That the Committee have proceeded to the examination of witnesses on the Bill referred to them, and have to report to the house, that the evidence of the principal engineers who have turned their attention to the construction of carriages propelled by steam upon the highways proves that very considerable progress has been made towards their perfection, and that they can travel with great rapidity.

The noise and smoke attendant upon their use have been very materially diminished ; but it has been shown in evidence that they still have the effect of terrifying horses, and that accidents have occured in consequence.

Much conflicting evidence has been tendered to the Committee as to the safest shape and the proper limitation of the size of vessels for generating steam to be used in these carriages. All the witnesses, however, agree that in whatever shape the boilers may be made, their size should be such as would in case of explosion not endanger the safety of the public ; and the committee do not feel themselves at present competent to come to such a conclusion on these two important points as would enable them to recommend the necessary enactments, if it was found expedient to proceed further with the Bill.

No adequate means have yet been provided effectually to guard against the emission of sparks from the chimneys of the engines which would guard effectually against the danger arising from them, although, with proper care in the selection and preparation of fuel, it does not appear that the danger is very imminent.

It also appears by the evidence of some of the witnesses examined, that although the management of the carriages is by no means difficult when under the superintendence of an experienced conductor, yet that they require much greater skill than is necessaryon the management of locomotive engines up in railways : and to find persons properly qualified might be a matter of considerable difficulty.

It is essential that the weight and size of the carriages to be employed should be regulated, so as to prevent their being made of that weight and size which might prove destructive of the roads and a serious nuisance to the public.

It appears also that the tolls intended to be imposed by the Bill are calculated upon an erroneous view of the powers of a horse. The rate of toll is calculated upon the supposition that each horse is able to draw a

ton weight; whereas it is shown that a horse cannot, at a rapid pace, upon ordinary roads draw more than half that weight.

The Committee entertained serious objections to the Bill referred to them; and they are not of opinion that these objections are counterbalanced by the prospect of any public advantage. The evidence, on the contrary, proves that the proposed mode of conveyance can only be applied to passengers; and it appears that some experienced engineers, after a careful examination of the expenses attendant upon it, have been induced to abandon all hopes of its success as a profitable undertaking.

It is probable, therefore, that any encouragement on the part of the Legislature would only give rise to wild speculations, ruinous to those engaging in them, and to experiments dangerous to the public. The Committee, therefore, recommend that this Bill should not at present be proceeded with; at the same time, they have no doubt that the further imposition of prohibitory tolls in local acts is not a desirable mode of legislating upon such a subject.

And the Committee have directed the evidence taken before them to be reported to the House, together with the index thereto.

AGRICULTURE, &c.

[From the Boston Commercial Herald]

BEET SUGAR.

(Continued from p. 671.)

Arras, April 4, 1836.

Dear Sir—Pardon me if I tease you with my frequent letters, but the fact is, I *hear* so much of Beet Sugar, I *see* so much of Beet Sugar, and *eat* so much of Beet Sugar that you must not wonder if I return to you in the shape of a *Marmalade.* I believe I told you in my last letter that I was setting off for Lisle, Valenciennes and neighborhoods; my main object was to ascertain where was the best system of Sugar making practised that I might be able by observation to know which to prefer; but I had another end in view, namely: to find out where it was that refined sugar, loaf sugar, was made from the Beet by a single process: every one *who knew nothing of the matter* assured me it was done somewhere, while all the manufacturers declared the thing was impossible; still I was determined *if possible* to hunt it up, and at Famars, in the neighborhood of Valancies, I found a very large manufacturer who was absolutely making beautifully white sugar from the Beet, by a simple process; and although he is selling it at a price two cents only below the refined sugar, yet it is, after all, *powdered sugar*, and by no means loaf sugar; when I told him what I had been led to expect, he declared the thing to be impossible, by no means to be desired, and totally incompatible with the profitable preparation of sugar in the brown state, which requires the most incessant care and circumspection while in process, and is of a magnitude sufficient to engross all the time and talent of the most industrious. I have therefore, been pursuing an *Ignis*, but not a *fatuus*, for I have added exceedingly to my knowledge and experience, but not one jot to the conviction which I before entertained, of the facility with which sugar from the Beet might be prepared to any extent; I am therefore returned to Arras to study the art at the finest establishment in France, and where they have a sufficient quantity of the roots remaining for another week's crushing—I hope more. At Valenciennes and the neighborhood there were, three years ago thirteen sugar manufactories; now, there are sixty-four! Land which was worth 500f. an arpent will now bring 1200, labor has very much risen, and never, in any country did I witness such excellent farming. The residuum from the sugar houses is extremely rich, as a manure, and this they are now spreading on their young crops of clover, which are prodigiously flourishing; they do not manure for the Beet, but for the preceding crop. and one half the expense of hoeing and cleaning the Beet is charged to the following crop, which is so much benefitted by the operations.—The drill which they use, Crespels, sowing 8 lbs of seed to the acre, is a most valuable instrument for the lands in America. At a manufactory in Valenciennes, conducted by a farmer, who is also a Brewer, a wine merchant and a distiller, I saw some very good machinery, which crushes 50,000 lbs of Beet in 24 hours; at another they crush 70,000 lbs. while a third crushes 75,000 lbs. evaporating all the juice and crystalizing all the sugar therefrom in 16 hours only. 100 lbs. of Beet yield 85 pounds of juice. The brewer purchases beet root for 1 franc per 100 lbs., and sells the pressed cake, for oxen and sheep at 5 cents per basket, about half a bushel: on the other side of Valenciennes, at the distance of a few miles, I was introduced to a person whose premises are enormously large, I saw, in one stable 50 large plowing horses, 7 saddle horses in another stable, 30 fatting oxen, which have nothing but the cake and straw, to feed on, and two of the largest oxen I have seen for many years, finishing off with cake mixed with oil cake, a most capital food; his sheep were feeding on the cake, but they were a breeding flock; his beet roots were very fine, and has been preserved from the frost, much better than those of many of his neighbors, he calculates that, in a good season, the beets yield 10 per cent. of saccharine, say six of crystalized sugar, 3 of molasses, and 1 of molasses contained in the cake. Now all the manufactories which I have yet seen were very large, and conducted at an expense of machinery truly astounding: this I was regretting to a person in this town, who told me there was a curious man residing in one of the back streets, who had made sugar this winter, with machinery of his own invention, and almost by the labor of his own hands: he took me to see his works, but he had finished crushing: I found him a native genius; he told us he had not the means to purchase the expensive machinery, still he was determined to make sugar, and so he did; his premises are small, and his works entirely *without steam;* his crushing mill is driven by horses, which he feeds upon the cake, and he hires land ready prepared for the beet. of the neighboring Farmers; thus he has every disadvantage, and yet, in this way he made 100,000 lbs. of sugar from the 2d Sept. to the 21st March. (I think he said) and intends to make 200.000 next year. It is curious to see his machinery after being so much amongst steam engines, and a power of 120 horses, &c., but much of it might be adopted for the use of our Farmers. He has given me permission to make drawings of the whole, and I mean to off coat and work with him at crystalizing his molasses, the most difficult part of the process by far. * * * * But the cultivation of the beet embraces three grand and distinct objects: 1st the making of the sugar. 2d the feeding of cattle, 3d the improvement of agriculture or rather of *husbandry*, either of these is of vast importance; together, they form a whole, which I have no fear about, let competition come from what quarter it may.

* * *

One thing is certain, all the Continent is preparing to make Sugar from the Beet, and from hence to Belgium the country is covered with it and Sugar-houses; in many places between Valenciennes and this, I counted six or eight of these large buildings together, and at one place there were actually twenty in sight at one time! This says something—what is it?

* * *

At Valenciennes, a gentleman is erecting an immensely large building as a Refinery for Beet Sugar—he will refine two millions of pounds a year; he politely showed me the works, and invited me to visit him again, when all is in operation, which I intend to do, as this part of the business may eventually be of importance to us. There are many very large Sugar-houses near Lisle. which I am to see after I have finished here; they will not then be crushing but working up Molasses. I can then see their machinery. which is almost differen, in every manufactory which I visit, especially the arrangement.

Tuesday, 5th of April.—I have now spent a long day at Mr. C.'s noble manufactory.—Indeed I know not how to express what I feel. One thing is quite certain, the manufacture will soon be planted in America by some one, and be followed up by hundreds.

* * *

The land must be *healthy*, not a *wet subsoil*, for if it be so, although it might produce the finest crops, they would decay during the winter to a certainty.

* * *

My friend—he of the small manufactory—will enable me to do all that is necessary for our farmers, but they must not expect to work at such a profit as is done by the improved machinery. But I find, after all, I must purchase the Drill. I have spent some time to day examining its parts, and the more I see the more am I satisfied it would not be in my power to do justice by a model either to it, to myself, or to the *land of my adoption.* It is to be taken to pieces and packed more snugly; but whatever be the cost or the labor, I am willing to debit it with the whole with no fear for the result: you will see it is cheap too.

* * *

If I stay, I shall witness much of the cultivation of the crop of Beet, and probably some other crops that might be advantageously transported to America.

* * *

Arras, 22d April, 1836.

Jacob Snider, Jun. Esq:

Dear Sir:—Your welcome letter of 22d March I have received, and am truly thankful that all our friends are in health; will they accept my affectionate and grateful remembrance. By this time you will have received several letters from me on the subject of my mission. I have said that the Beet sugar business is becoming of the greatest importance to the whole continent; as a proof that it is so, there is not a coppersmith or iron founder in this department of France who has not more orders for machinery than he can execute. One in this town, who employs 300 workmen in copper brass, and iron, has orders for two years to come, chiefly in the sugar machinery for foreign countries. I have also said that the success attending the fabrication has in a great measure been owing to the encouragement held out by the government who have offered premiums for the best modes of preparation, and in this they have been joined by the scientific bodies in France and other countries. Thus far all has been well, and no one can calculate the good that has been

effected by this branch of Agrico-manufacture: the face, both of the country and its inhabitants, has been changed, and industry and happiness have been the result; but now the government is about to work a revolution, which, like all others that have taken place in this country, aims at too much; it must pull down before it can repair. A tax is proposed to be laid upon Beet Sugar, which will in its consequences as effectually ruin the manufacture as *that* has been supported by the favor of the same government, for it is not possible for one manufacturer in ten to observe the restrictions to which all are made subject. In the first place every manufactory must be enclosed by a high wall built at the expense of the proprietor, and to have but one door of entrance, just within which a house is to be prepared for the residence of Excisemen, who are to be on duty here day and night, and to have the supervision of the concern; every man who makes 100,000 kilogrammes of sugar is to pay these Excisemen 2000 francs per annum for their support; 150,000 kils., 3,500 fr., and then comes the primary tax of 15 francs per kilogramme, on all sugar that is made. Now what is the object of the Government? Is it to assist the colonies? to levy money in the way of a tax? or to ruin the Beet sugar trade? If it be the first let them reduce the duty upon Colonial sugar; if the second, let them tax the sugar as is proposed, to which there is no objection; if the third, the plan which they propose will serve their purpose most completely. Now a great proportion of the manufactories are erected in situations where they could not be surrounded by a wall, as they are attached to other buildings; to remove these is quite out of the power of the proprietors, who have in many instances expended a fortune in their erections and fittings up: these therefore must be abandoned, as must all those of small extent, who could not if they would, afford to keep the attendants out of their slender business; many others would quit a pursuit fettered with such odious exactions. It is true some of the large manufactories might be continued, for sugar would rise in price in consequence of a scarcity in the market; the result however would be, the people would be debarred, as formerly, of the use of it. I have been led into this subject by your remark that the Island of Guadaloupe has petitioned to be permitted to trade elsewhere than to France; but this, that Island has long done, and permission has not been given; nor will it be necessary if this tax be levied: but in the event of their being so permitted, how shall we in America be effected by it? would sugar be permitted to be introduced to the destruction of our own manufacture? From what I have seen I am not afraid to compete with the cane, acre for acre, for it is not the mere article of sugar that is of importance, or rather of the greatest importance; it is the spirit of industry, of happiness,—of beef and mutton, if you will, that it engenders in a country, which is of far greater consequence. Permit me to transcribe from one of the papers some remarks which are I think peculiarly applicable to the subject.—"However desirable it might be to preserve or to favor the Colonies, the time of their exclusive supply of the market with sugar is gone by; the species of cultivation now naturalized in 36 departments of France is well worth the produce of three Islands lost in the bosom of the ocean. To prefer the latter to the former is about as reasonable as to adhere to the use of bows and arrows after the invention of gunpowder.—The making of beet sugar, for which the population, in France has shown a wonderful aptitude, is a kind of *God-send* that should be taken advantage of, for the uniting together of agricultural and manufacturing art; the whole system of the law for imposing duties on Beet Sugar is bad, it starts from false ideas, and leads to the most lamentable results."

I am aware, however, that the question of free trade, like that of the currency, is to be handled delicately; I am not competent to the task and must leave this knotty point to those who are. I shall be capable however, to make Beet Sugar on my return, and if he who made two blades of grass grow where but one grew before, deserved well of his country, may I hope to enjoy that luxury on my return. The present season is remarkable for having its crushing process extended to an unusual length, which has given me advantages which I could not else have enjoyed. We are now busily engaged with the molasses of second and third qualities, and I visit two manufactories for the purpose of initiation into this important branch of the process; I am also farming and planting beet roots for seed as well as preparing the material for clarifying at Mr. C.'s mills, at a short distance from the town. Mr. C. has two farms near, both of which I visit; he will have 400 acres of Beets on these this year; here are many hundred acres of wheat after Beets, clean as a garden, but the rotation is not good; spring corn is preferable, with seeds, and so Mr. Walker will say, I know. I went to inspect the large sugar house of Monsieur, the Deputy, last week; I had a letter of introduction to him from the Mayor of Boulogne; he was absent on his duty at Paris, but his lady received me graciously, giving me a letter to the manager of the works; he was not present, so I reserved the letter, to show you the warmth and kindness which I experienced from all. The works cost £12,000, and expend the steam of 90 horse power, but the principle is not good, and they work to great disadvantage; several of their boilers cost 2,000 francs each.—They keep 40 horses and mules, and were engaged in sowing Beet seed with Mr. C—'s drill, which I should say drills five rows at once, harrowing in and rolling the seed at the same time. In a few days I am going to Valenciennes, to see a manufactory belonging to a farmer who has received the silver medal from the Society of Arts in Paris, for machinery by which with the help of his own family, he makes 50lbs of Sugar a day. I have heard also of two other manufacturers there who have improved machinery. But it is in this part of the country where they grow immense quantities of the white poppy for the oil. It is used instead of olive oil, and is sent to Paris and elsewhere to mix with that, and goes from thence all over the continent as the best *olive oil*. It is a very profitable crop, is cultivated with the greatest ease, and harvested most cheaply, coming ripe in about three months (some say two.) I visit two crushing mills, and am astonished to find that the produce of oil is 25 per cent from these insignificant seeds. One of these mills is on a very grand scale: the machinery in one room cost £4000, but is by no means necessary. I go to-morrow to see a windmill, where the same work is done to profit. The poppy is cultivated on exhausted soil, without manure; such yielding most oil. The seed is drilled, and kept clean, and the capsules when ripe are shaken into cloths spread upon the ground; and in one hour after, the oil is made and fit for market! This then is the crop for us; the plant flourishes well in light soils. I have this day dispatched to Havre, to the care of Messrs Wells & Green, a box containing 23 lbs. brown sugar, 1st and 2d quality *made under my inspection;* 5 lbs. of white powdered sugar of great quality, made from the Beet at Famars, near Valenciennes; two bottles poppy oil of 1st quality as samples, and 2 gallons of poppy seed of the true species, for sowing this season; which will yield seed sufficient for a good breadth next season. Will you *disseminate* this poppy seed very extensively; that we may judge of the proper soil, and the climate best suited to its growth.

Extract of a letter from a gentleman in London, dated March 30.

I enclose a letter from Mr. Pedder. He feels very sanguine. Has sent Beet seed per Havre Packets. He is very anxious to purchase the *seed drill*, about £20, and proposes having a model made. He considers it a highly valuable machine. I purpose writing to him to say that if he still entertains this opinion and a model will not clearly put you in possession of its merits, I will venture to authorise his drawings on me for the amount. Mr. Pedder seems very intelligent and assiduous and has been highly favored by circumstances. Dr. B. gave him very useful letters, and he met at Arras a Prussian professor and chemist, with a draughtsman, in pursuit of the same object who had nearly finished his enquiries and gave him the benefit of them; also, an engineer sent there by Messrs. Taylor & Co. and who is giving him every information.—He says the machinery is expensive and powerful. Mr. Pedder will remain in that neighborhood some time. I think you were fortunate in selecting Mr. Pedder; and he hopes to succeed.

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Bray's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Dechertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at No 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is $500,000 with liberty to increase to $800,000, divided into shares of $100 each.

The sum of $5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I BLAIR,
JOSEPH E. EDSALL,
COMMISSIONERS

Dated Oct. 3rd, 1836 41—9t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County. State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lou's'a.
Capt John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order. IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO
4—ytf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron 4—ytf

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

								lbs.	
350	tons	$2\frac{1}{4}$	by	$\frac{5}{8}$,	15 ft in length,	weighing		$4\frac{68}{100}$	per ft.
280	"	2	"	$\frac{1}{2}$,	"	"	"	$3\frac{50}{100}$	"
70	"	$1\frac{1}{2}$	"	$\frac{1}{2}$,	"	"	"	$2\frac{1}{2}$	"
80	"	$1\frac{1}{2}$	"	$\frac{1}{4}$,	"	"	"	$1\frac{25}{100}$	"
90	"	1	"	$\frac{1}{4}$,	"	"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 15 feet 2¼, 2½, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

TO RAILROAD CONTRACTORS.

PROPOSALS will be received at the town of Lindon, until the 20th day of December next, for the graduation of the Lindon Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Lindon, for ten days previous to the letting, and all other information given on application to the subscriber, or the Assistant Engineer.

PROPOSALS will also be received at the same time and place, for furnishing and delivering at Beckley's Landing, 95,000 feet (L. M.) of long leaf pine or cypress scantling, sawed 5 by 9 inches, to be free from sap, knots or wind shakes, and 20, 25 and 30 feet long. Also 60,000 feet, or more, (L. M.) of white, or post oak scantling, sawed 5 by 7 inches, length to be specified hereafter, and 60,000 feet (L. M.) of white or post oak plank, 2 inches thick, 1 foot wide and 15 feet long.

Also for furnishing and delivering on the line of the road 10,500 undressed post oak logs, 8 feet long, and 10 to 15 inches in diameter.

Also for furnishing and delivering 3,160 post oak caps, dressed 8 by 10 inches, 8 feet long, and 6,320 post oak posts, dressed 10 inches square and of lengths hereafter to be specified.

Recommendations will be expected in all cases, of persons not known to the officers of the Company, or to the Engineer. For the information of persons at a distance, I would state, that the Lindon Railroad commences at Beckley's Landing on the Tombeckby River, a stream navigated by Steamboats the greater portion of the year;—and having a direct communication with Mobile and New-Orleans will afford the facility of procuring supplies and implements necessary for the hands employed on the work, or their ready conveyance hither, if procured at a distance.

Persons having mills on the river and disposed to contract for furnishing timber, will have the facility of delivering it by water communication. The country through which the road passes, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season, renders the contract peculiarly desirable to those wanting winter employment

D. H. BINGHAM, C. E.

Lindon, Ala., Sept, 17, 1836. 41—3t

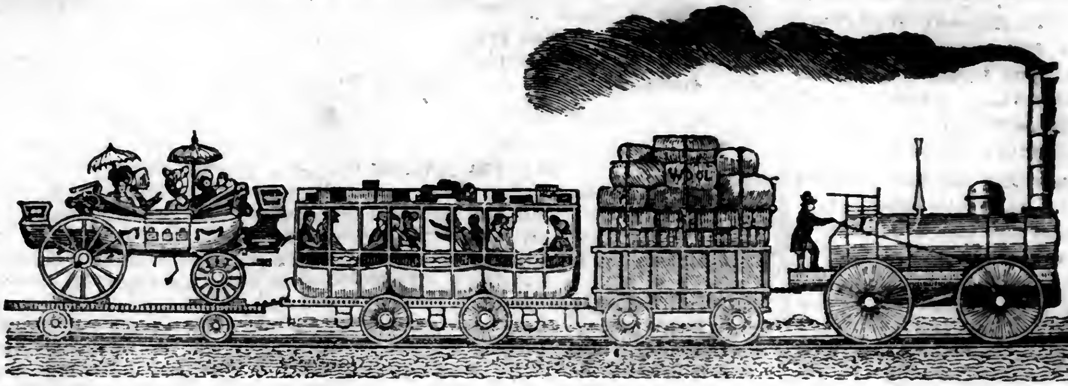
RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, NOVEMBER 5, 1836. [VOLUME V.—No 44.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, NOVEMBER 5, 1836.

TWO HUNDRED LOTS will be sold at NEWBURG, on Saturday 12th instant. These Lots are in the immediate vicinity of the large Steam Engine Manufactory about to be erected, at the north part of the village of Newburgh—and twenty dwelling houses will be required to be built immediately, to accommodate the workmen. Great inducements are here held out to those who wish to invest in real estate, as twenty dwellings would be taken at once on a lease for 3 or 5 years, at 15 per cent. on their cost. Further information will be given to any one disposed to purchase and build, on application to this office.

AMERICAN INSTITUTE.

We have in preparation an account of the articles exhibited at the recent Fair, but are prevented from giving it in this number. Cuts of many of the machines will be given.

NEW-HAVEN AND HARTFORD RAILROAD.

We are informed that contracts for grading and preparing the Northern section of this road have been completed so far as it was desirable to pursue them at the present time. Ten out of the twenty-one sections are contracted for, upon terms highly favorable to the interests of the company, and the remainder can be disposed of at will. The work on the southern section is going on with great spirit,—every material is provided for,—and there can be little doubt that, with the present enterprizing agents and engineers, a large portion of road will be in operation during the ensuing summer. [Con. Herald.]

CONTINUATION OF THE RAILROAD.

We learn from the Richmond Compiler that the railroad between Richmond and Fredericksburg is now in use to Downer's bridges, about 48 miles from Richmond, leaving less than 16 miles of stage travelling to Fredericksburg. The trip from Richmond to Washington city is now performed in 13 hours. And two lines run regularly each way every day. The hours from Washington are in the morning at half past five and in the evening upon the arrival of the afternoon train of cars from Baltimore. The hours from Richmond are in the morning, at half past five; and in the afternoon at half past one—being upon the arrival of the Stages from the South. [Baltimore Patriot.]

WELLAND CANAL.

We find the following article in the Constitution, of the 28th ult., a paper published at Toronto, U. C. by W. L. McKenzie, who is a violent opposer of the W. Canal Company:—

"We have seen an acquaintance from the Welland canal, who informs us that the trade has greatly increased this year—but that it is almost entirely for the convenience of the Americans—vessels sailing from one American port to another with goods and produce. He doubts whether a thousand dollars of Canadian tolls have been received this year from the shipping. The canal is in pretty good order, and Welland Canal Bank Notes pass very generally among the people. It is expected that the assembly will redeem this paper, and let the improvement of the schools, roads and bridges lie over another year. This would help Oswego and Cleveland greatly."

BRIDGE ACROSS THE HUDSON.

The bridge over the sprout of the Mohawk from Green Island to West Troy is completed. It was built by the Rensselaer and Saratoga Railroad Company, to be used in connection with the bridge from this city to Green Island, for the purpose of crossing the Hudson, and to afford a safe and easy passage at all times from this to West Troy. These bridges are valuable specimens of durable architecture, and will prove a great accommodation to the citizens of Troy, and the travelling community generally.

HARTFORD AND NEW-HAVEN RAILROAD.

The citizens of Hartford will be gratified to learn that this work is in rapid progress of completion. The northern section of the road extending from Meriden to Hartford, was placed under contract on the 14th inst., to be ready for the reception of the superstructure by the 15th of August next.

Should the Co. experience no further delays, the work will soon be completed upon this end of the line, where our citizens by their friendly aid may do much to promote its progress. That part of the road extending from New-Haven to Meriden is in a state of very great forwardness, and the whole works will be completed and the Road in full operation during the next fall. [New-Haven Paper.]

REPORT OF THE PRELIMINARY SURVEY OF THE ROUTE OF THE HUDSON AND DELAWARE RAILROAD, BY JAMES B. SARGENT, ESQ., CIVIL ENGINEER, MADE TO THE COMMISSIONERS OF THE ROAD, AND PUBLISHED UNDER THEIR AUTHORITY.

TO THE COMMISSIONERS OF THE HUDSON AND DELAWARE RAILROAD COMPANY.

(Continued from page 677.)

ESTIMATES.

Estimates of the probable cost of both railroads and canals in this country, have usually been deduced from preleminary surveys, and whether the plan upon which they were predicated was or was not pursued in the execution of the work, they have in a vast majority of cases been attended with more expense than was stated in those calculations.

The result has been injurious to the community, and detrimental to that confidence which the importance of the business should have maintained between the projectors of the improvements and the engineers that have planned and executed them. These estimates too have frequently been drawn at length, and much detail furnished of the different kinds and quantities of labor to be performed, all of which were of necessity more or less conjectural, and in the result only exhibited a labored deduction from doubtful and uncertain data.

We shall not therefore attempt in this a specification of the kind and quantity of labor to be expended in grading the whole road: but shall select from the profile a mile of it that is deemed a fair average of the work to be done, and give the estimate upon it multiplied by the length of the road as the probable cost of the graduation.

ESTIMATE FOR ONE MILE OF GRADING.

7,500	Cubic yards of earth excavation at 11 c. per yard	$825 00
11,500	do. do. embankment at 12 c. per yard	1,380 00
1,100	Cubic yards of rock excavation at 50c.	550 00
	Wood work of Bridges and farm crossings	250 00
	Masonry in Bridge Abutments, Culverts, small drains, &c.	700 00
	Total,	$3,705 00
	Multiplied by the whole length of the road $45\frac{3}{8}$ miles—gives	$168,392 25

SUPERSTRUCTURE PER MILE.

31,680	Feet (B. M.) of white pine sills at $13 per M.	411 84
31,680	Feet (B. M.) of Norway pine rails at $22 per M.	696 96
1,760	Chestnut ties at 25 cents	440 00
3,520	Red Cedar, Locust or White Oak wedges at $6 per M.	21 12
	Spikes, connecting plates, &c.	110 00
320	Rods of laying track and forming horsepath at $175	560 00
22	Tons of Iron plate rail at $70 per ton	1,540 00
	Total,	$3,779 92
	Calling the distance 47 miles, as an equivalent for sidelings, gives as a total for superstructure.	$177,656 24
640	rods of fence at 90 cents—575 dollars per mile; or for the whole distance	26,179 20

MACHINERY.

2	Locomotive Steam Engines, at $6000	$12,000 00
8	Carriages for Passengers, at 750	5,600 00
30	Freight Cars at 250	7,500 00
16	Horses and Harness at 100	1,600 00
1	Half of bridge across Deleware,	9,000 00
	Depot buildings, turning platforms, &c.	7,000 00
	Total,	$414,927 69
	Add 3 per cent for contingent expenses,	12,447 83
	Total,	$427,375 52
	Which is for a single mile including all expenses for machinery, animal power and fixtures of every description necessary to put the road in operation.	$9,403 20

The above estimates are confidently believed to be liberal; they have been made with the full expectation that they are soon to be tested by the construction of the work; and, although briefly stated, are deductions from much observation on the character of the work to be encountered, and a careful consideration of every part of it.

GENERAL REMARKS ON THE WANTS AND RESOURCES OF THE COUNTRY.

A glance at a map embracing the range of country through which the Hudson and Deleware Railroad is to form so important a part, of the line of communication, between the Hudson and Susquehanna rivers, will exhibit the counties of Sussex and Warren, in New-Jersey, in a secluded and unfavorable light, lying on the north of the Mosconecunk Mountains, separated by natural and almost impassable barriers from a participation in the benefits which their sister counties derive from canals and railroads, that are every where spreading over them; affording extensive facilities, ready intercouse with markets, and developing and bringing into active use all their resources—while these two counties, equal and probably superior in natural, agricultural and mineral productiveness to any in the State, remain comparatively isolated, and without any of the advantages so liberally afforded to the adjoining ones. It is therefore evident that, so far as the wants of the citizens can be supplied in this respect, the Hudson and Deleware Railroad is calculated to effect it; hence its construction becomes an object of vital and pressing importance to every citizen that wishes to see those counties rise, in the scale of commercial and agricultural importance to an elevation commensurate with their vast natural resources.

The whole surplus productions of these counties, now find their way to New-York, either through Morris, Essex and Bergen counties in New-Jersey, or through Orange to the Hudson river at Newburgh. They must be hauled over hilly and rough roads at an expense of labor and time that in many instances equals the nominal value of the article transported, which shuts out from market vast quantities of the coarser productions of the soil, that under more favorable circumstances would become items of general exportation, and tend greatly to enrich the farmer and enhance the real value of his land.

There are also in the mountains bordering the valleys through which it is proposed to construct the road, inexhaustible beds of iron ore, which are now being extensively worked, at Hamburgh and its vicinity, while new and wealthy companies are forming, and extensive preparations making to increase the quantity manufactured, and bring it extensively into use. In short, it needs no stretch of the imagination to conceive the iron districts of New-Jersey equal in importance and value to any in the world, for the ore is of the purest and most approved quality, wood is abundant and cheap; and if necessary Anthracite coal from the Lackawana beds, or the bituminous from Bradford county Pa., can soon be obtained at a moderate price: and water power durable and extensive abounds in the immediate vicinity. In fine every facility, and every means necessary to render the smelting of the ore cheap, and for converting the *Pigs* into any form or shape suited to the market, are its peculiar advantages.

It is also said that Zinc of a superior quality is obtained from the ore which abounds in the same mountains, and that from the abundant quantity that has been discovered, and the successful experiments made in obtaining the Zinc from it that the most flattering hopes are entertained of its future value and importance.

Lime stone appears along the Wallkill, the Pepo Coten, the Paulins Kill, and in short over nearly the whole of Sussex and Warren counties. It is of the first class, and yields a large portion of pure and excellent lime, and may therefore be calculated as an article of transportation, in both directions upon the road.

Slate appears in many places along the line, and particularly as we approach the valley of the Delaware. It has not however been quarried to any extent on the New-Jersey side of the river; but, between Columbia and the Water Gap on the Pennsylvania side, vast quantities are quarried, and machinery on a liberal scale, is constantly employed, in the manufacture of articles from it, suited to the various uses to which it is being so generally and extensively employed.

Dense forests of Chestnut, White Oak, Maple &c., cover the mountains upon either side of the line, and will afford an incalculable amount of valuable timber for market —of Chestnut in particular, there are vast quantities which, will answer the double purpose of furnishing cheap and excellent materials for the superstructure of the road, and of contributing to its business when done.

The water power of the Pepo Coton and Paulins Kill, is of the first class. The latter has its course for about 30 miles in the immediate vicinity of the line, and a fall of 225 feet from Augusta to the Delaware river, together with such concentration at different points as will admit of its application to the most extensive machinery. It is already in partial use at Balesville, Hunt's Mills, Stillwater, Paulina, Marksborough, &c.; and its tributary Mill Creek is extensively employed at Gravel Hill—the completion of the Railroad, will bring the whole into full and active use, and with the abundant materials which the immediate vicinity will supply for the operation of the manufacturer. Sussex and Warren counties will become as important as a manufacturing district, as they are rich in agricultural and mineral productiveness.

But these counties are emphatically ag-

ricultural—the surplus productions of which exceed that of any districts of like extent in the State. Wheat, rye, oats, corn, flax-seed, pork, butter, live stock, &c., are among the important items from them, that yearly find their way to the New-York market.

In the report of the Commissioners upon the Delaware and Susquehanna Railroad, it is stated that Warren county alone "is supposed to produce annually upwards of one million bushels of grain of various kinds for market. It is believed also that it supplies not less than fifteen hundred tons of butter, and a like amount of pork, —and that Sussex county disposes of still greater quantities than those estimated for Warren."

We have somewhat at length alluded to the various local interests that are to be effected by the road and ultimately contribute to its support, and it is believed that sufficient has already been shown, to demonstrate the entire security that the company will have for a rich and full reward for constructing it. But if its own local resources are great and ample for its support, they must be vastly increased by its connection with the works before allued to. Gypsum, salt, and merchandize of every description necessary for the consumption of a vast range of country that stretches far beyond the limits of the road to the amount of many thousand tons would annually be transported over a part or the whole of it, and access would be given to the vast forests in Pennsylvania, that lie to the south of and adjoining those that have for years afforded to the Hudson and Delaware Canal Company, immense quantities of timber for the use of their works, and for transportation to market. This timber is of the most valuable species; consisting of white and yellow pine, oak, chestnut, birds-eye and curled maple, cherry, white and black ash, poplar and linden, nearly all of which now bear more or less transportation over rough roads to the Delaware river and the adjoining counties in the State; and must therefore be immensely increased by a Railroad passing through the very centre of them, and opening an avenue directly to the city of New-York.

The main and important advantages, however to be gained by the proposed connection with the Delaware and Susquehanna Railroad and the Hudson and Delaware in New-York, will be found in the transportation of the Anthracite Coal, from the Lackawana valley. These beds are justly considered equal if not superior to any in the State. The quantity of the coal is believed to be inexhaustible, and its peculiar formation in the highest degree favorable for mining. And this too gives to the proposed line of railroad from the Hudson to the Susquehanna river, its chief importance, to the city of New-York and the whole Atlantic border. To the citizens of New-York in particular, who have been accustomed to observe the difficulty in obtaining it, and the constant and uniformly increasing price that it demands, a supply of fuel is becoming an object of the most anxious solicitude. Improvements have extended in every direction and have poured in their supplies of wood from distant forests, and of coal from almost every region where it has been discovered.

Still the demand is constantly in advance of the supply, and with the rapid and unprecedented accumulation of steamboats that ply to and from New-York, the various uses to which steam power is being applied must continue to advance and to rapidly augment the quantity consumed and exhaust the forests from which the larger portion is now obtained. It is therefore evident that sooner or later recourse must be had to more extended improvements, and that a greater supply must be drawn from coal beds, and it is believed that this can be furnished through the Hudson and Delaware Railroad in as large quantities and at as low a rate as on any other work now in use or that can be constructed.

It has been estimated that coal can be delivered and disposed of at the Water Gap, on the Delaware river, for $1 50 per ton. If so, then it can be delivered into the New-York market at $4 00 per ton; but if it should cost 5 or 6 dollars per ton to deliver it in New-York and allow to each of the companies engaged in it a liberal compensation for the transit—this channel would still compete, and successfully too, with any other engaged in the business.

The travel too upon it would be very great. It is well known that the emigration from the east to the west formerly gave preference to this route, and that until the completion of the Erie canal it was deemed the cheapest and most expeditious line of communication. It is, therefore, but reasonable to infer, that with facilities equal to those afforded upon a more northern and distant route, a considerable portion of it would again return to its original channel, particularly that destined for the South West.

We have thus endeavored to allude to the general as well as local resources that the road through Sussex and Warren counties will have to augment its business, increase its revenue and add to its importance, and will now submit a statistical estimate of the business that it would do, and the per centage that it would pay upon the cost if entirely dependant upon its own local resources and its connection with the road leading to the Hudson river at Newburgh.

ESTIMATED ANNUAL RECEIPTS.

30	Passengers daily each way=60, or 21,900 yearly	at	$1 75	$38,325
4,000	Cords of Wood	"	1 75	7,000
1,500	Tons of Butter	"	1 50	2,250
2,500	Tons of Pressed Hay	"	1 50	3,750
500	Tons of Iron	"	1 50	750
2,000	Tons of Pork and live stock	"	1 50	3,000
100,000	Bushels Grain & Vegetables	"	04	4,000
25,000	Bushels of Lime	"	08	2,000
	Rails, Stone, Timber, &c.			1,500

RETURN FREIGHT.

3,000	Tons of Gypsum	at	$1 75	$5,250
1,200	Tons of Salt	"	1 00	3,100
5,000	Tons of Merchandize	"	1 00	8,750
	Total			$78,675

ESTIMATED ANNUAL EXPENSE.

Interest on first cost ($42,800)	$29,960
5 per cent. on the perishable part of the superstructure	6,500
10 per cent. on depots, cars, engines, horses, &c.	2,800
Superintendence, repairs, fuel, &c.	16,000
Total	$55,260
Deduct the amount from the estimated receipts leaving	$53,375

as the annual net income, or $12\frac{1}{2}$ per cent. on the capital invested.

The estimates of the annual receipts as given above are considered in every item within the actual tonnage that would pass upon the road at its opening—and the effect of such facilities to increase the amount transported to and from countries under like circumstances, is seen and admitted wherever they exist.

Those for the annual expense are known to be liberal and sufficient for even a greater transit than has been stated. Hence it must be inferred that the road even under the most limited circumstances that *can* exist, will amply and fully sustain itself, and it is therefore unnecessary to enter into any calculation to show how far the tonage would be augmented and its value increased by its connection with the Susquehanna and Delaware Railroad. That it will be ultimately connected is unquestionable, and that its importance will thereby be doubled, at least, has already been shown.

We shall only attempt to add one more evidence to those already adduced to show the policy of constructing the work, and trust that it will be found so consistent that we shall not be doubted by the most incredulous. We allude to the increased value that will be given to real estate—and shall assume that a cheap, safe and rapid communication between the lands lying within ten miles of, and upon each side of it, and the great commercial emporium, will be enhanced in value to the amount of five dollars on each acre. The distance will be about forty miles from the New-Yotk line to the Delaware river at Columbia, and we will consider it the limits in length. We have then twenty miles in width and forty in length, or eight hundred square miles in the area, which is equal to five hundred and twelve thousand square acres—multiplied by five gives two million five hundred and sixty thousand dollars as the increased value of the lands, or nearly six times as much as the road will cost.

All of which is very respectfully submitted, JAS. B. SARGENT, *Civil Engineer.*
NEWBURGH, August 19th, 1836.

BALTIMORE AND SUSQUEHANNA RAILROAD.

OFFICE BALTIMORE AND SUSQUEHANNA RAILROAD COMPANY. }
October 11th, 1836.

To the Stockholders of the Baltimore and Susquehanna Railroad Company.

GENTLEMEN:—The President and Directors respectfully submit to you their ninth annual Report of the operations of the Company.

In their last report you were informed that the general route of the road to York had been decided on by the board, after a deliberate examination of the results of the surveys instituted throughout the intervening country. In the past year, two divisions of the "Baltimore and Susquehanna" and one of the "York and Maryland line" railroads, embracing the whole line from Timonium to York, were successively put under contract, as the final locations were completed; and except upon a few small sections, the construction of both roads is now in active progress throughout their entire extent. The "Wrightsville and York"

Railroad, which will connect with the "York and Maryland line" road, thereby forming a continuous line of railroad from Baltimore to the Susquehanna River, is steadily advancing, and will, it is expected, be completed before the road can be opened from this to York.

During the winter and early part of the spring, the unusual inclemency of the weather was such that but little work could be done: and when at length the season became more propitious, the operations of the contractors were unexpectedly retarded by the great scarcity of laborers. Every exertion was made to increase the force employed; but it was found that from the number of public works which were carried on in different parts of the country, the demands for hands was greater than could be supplied. Towards the latter part of the summer, however, the healthiness of the country along the line of our works attracted many from less favored districts; and for some months past the construction of the road has advanced with energy and rapidity. Upon many sections, the graduation and masonry are nearly completed, and throughout the line the amount of work done bears witness to the zeal and diligence of the contractors. The bridges, which will be of wood, under the plan of Col. Long, are also preparing; and the Board have the fullest confidence, that long before the period shall arrive for their next annual report, they will have announced the opening of a direct and regular channel of communication with Pittsburgh, and all the widely extended country which is intersected by the great works of Pennsylvania. The accompanying report of the Chief Engineer will show more particularly the character and amount of the work done on the different sections of the road.

In the month of December last, contracts were made in England for the whole quantity of iron rails which will be required, including an amount sufficient to lay down a new track from Baltimore to Timonium.—For, since the construction of that road, experience has shown that true economy prescribes the use of a rail of strength sufficient to bear locomotive engines of considerable weight, whilst it can at the same time be laid down with much less timber than was formerly employed. That adopted by the Board is a modification of the T. rail designed by J. Trimble, Chief Engineer of the Company, which has been highly approved by those qualified to judge of its merits. Being of the weight of nearly 60 lbs. to the yard, it will be simply laid upon woooden sleepers, or stone blocks dispensing entirely with the string-piece.—A very heavy and constant source of expense in the annual repairs required upon the wooden superstructure of a railroad, far exceeding the interest upon the additional cost of the the heavy iron rails will be thereby avoided, whilst at the same time they can with ease be kept in a proper state of adjustment, and the transportation over them can be carried on with increased rapidity, safety, and economy. The average cost in England of the rails, (of which upwards of 2200 tons have already arrived here) will be about £10. 6s. sterling per ton; a much lower price than they could have been obtained for at any period subsequent to the date of the contracts. Ten locomotive engines have also been contracted for, in this country and in England: all of which are to be delivered in the course of the ensuing winter and spring.

Before laying down the new rails upon the old division of the road, it is the intention of the Board, if they have the means within their power, so to change its location in several places, as to avoid many of the curves of small radius, which are found to offer much interruption to rapid motion with steam power upon the road. As none can doubt the importance of making as perfect a road as practicable, a road which must always be one of the great avenues from Baltimore to the west, and will for a time be the only one of the same character, it is the earnest wish of the board, and they are fully satisfied that all the means in their power should be used, so to re-construct the old division of the road, as to render the facilities of transportation upon it, equal to those which will characterize the residue of the road to York. As the rails must, at all events, be renewed, it is evident that the desired improvements in the location can be made at the same time at far less expense and inconvenience than at any future period.

With the view of ascertaining the best mode of extending the road into the city, surveys have been made through different streets, but the Board have as yet taken no further action on the subject.

The amount of the loan authorized to be made to the Company from the State Treasury by the act of December, 1834, ch. 241, was One Million of Dollars, the whole of which has been received. This sum was believed by the Board sufficient for the completion of the road to York; and it would probably have been adequate not only to the construction of the road, but also to the procuring of the means of transportation upon it, but for the great advance which took place in the labor and materials after the passage of the act. For instance the price of the common flat bar railroad iron, which at the commencement of the year 1835, was £6 17s. 6d. sterling per ton, had advanced at the time of the contracts made by the Company, to between £8 and £9, and rose in the next month to £11. But the Board were fully satisfied that every motive of sound policy required them to adopt a rail of different form and much greater weight than the flat bar rail: and they accordingly as before stated, selected the one recommended by the engineer, although the usual cost of rails of that description is 40 shillings per ton higher than that of the flat rail. In addition to the enhanced price of the iron, the cost of the new rail is more than five times as great as that of the rail formerly laid down, owing to its much greater weight. The number of tons of iron rails and fastenings required per mile for each track of the new road i 94, whilst upon the old road to Timonium were used not more than 11 tons per mile for a single track. A similar increase in the wages of labor likewise added to the cost of graduation. Throughout the summer the wages paid by the contractors, have been $2 and upwards per day.

But notwithstanding the enhanced cost of the road above the estimate of 18 4, arising from the circumstances mentioned above, the Board are yet satisfied that the loan furnished by the State, will suffice for the completion of the road from Timonium to York. For the purpose, however, of procuring the requisite means of transportation upon it, of establishing proper depots, of altering the location of the old road, and of extending it into the city, a greater amount of funds will be required than the Board now have at their disposal. But they cannot anticipate that any difficulties will be permitted to interrupt the successful prosecution of your enterprize when on the very point of its completion; or that after so long and arduously contending with rival States, to regain a portion of that western commerce which was once her own, the city of Baltimore will not be prompt to grasp with avidity, the glorious prize, when it shall be shown to be brought again unquestionably within her reach.

The account of the receipts and expenditures of the Company to the 1st day of January, 1836, has been heretofore submitted to you. From that day to the 1st October inst., they were respectively as follows, viz:

Balance on hand 1st January, 1836,			$538,543 79
Receipts.			
From State of Maryland,		250,000 00	
" Transportation,		12,246 50	
" Interest on Loan,		14,489 55	
" Sale of Instruments,		205 00	276,960 00
			$815,503 84
Expenditures.			
Expenses of office,		1,207 43	
Salaries, (Prest. & Sec.'y,)		1,811 61	
Depots,		301 00	
Interest (paid State,)		28,125 00	
Transportation,		12,583 64	
New Road, viz:			
Graduation and Masonry,	186,919 68		
Contingencies of Construction,	950 01		
Iron Rails,	107,253 01		
City Division,	167 50		
Timonium Division,	353 22		
Lumber,	2,017 22		
Wagon Department,	1,526 92		
Printing and Advertising.	386 25		
York and Md. L. R. R. Co.,	14,286 09		
Damages,	6,454 43	320,319 23	364,422 91
Balance on hand,			$451,180 93

The whole amount of transportation of the year is $13,283 99, of which $1,028 46 is not yet collected.

The expenditures for transportation have been increased by the carriage of materials for the new road, for which no charge has been made.

Since the date of this account the last instalment of the loan from the State amounting to $250,000 has been received, increasing by that amount the balance on hand.

Before concluding this Report, the Board would take occasion to submit for your consideration a few general remarks upon the results which may be anticipated from the

completion of your road. The great works of internal improvement in the State of Pennsylvania, with which it is the primary object of this company to form a connexion on the banks of the Susquehanna, being now in full and successful operation, the effects which have been produced by their completion, are objects of the deepest interest to you, and are of vital tmportance to the city of Baltimore.

By the last annual Report of the Canal Commissioners to the Legislature of Pennsylvania, it appears that on the 1st Nov. 1835, that State had completed upwards of 600 miles of canal and slack-water navigation, and nearly 120 miles railroad; and that at the same time there were completed or in a course of construction by different incorporated Companies within the State, about 400 miles of canal and 520 miles railroad. This was previous to the very liberal aid which at the last regular session of the Pennsylvania Legislature was extended to works of internal improvement in every quarter of the State; the effect of which will soon become visible in the addition to the foregoing list of many miles both of railroads and canals.

The returns of the transportation upon the works constructed by the State alone, since they were first opened for public use, were as follows, viz:

Years.	No. of Boats.	No. of Cars.	No of miles trav by pas.	Amt. of tolls received.
1830				27,012 90
1831				38 241 20
1832			152,780	50,909 57
1833			878,315	151,419 69
1834	664	349	14,085,191	309,789 15
1835	760	774	11,231,924	684,357 77

The receipts by the State as above, were exclusively for tolls and for the use of motive power on the railroads, which is furnished by her—the transportation being carried on, and the freight of course received by individuals and companies. The payments to the State for the year 1835, were—

For amount of tolls on canals	$403,068 43
For " " on railroads	194,623 24
For motive power on "	86,726 10
	$684,357 77

The quantities of a few of the principal articles transported, were as follows, viz:

Flour,	263,662 bbls.
Wheat,	243,559 bush.
Corn and other grain,	393,315 "
Tobacco,	6,715,542 lbs.
Iron,	53,797,710 "
Merchandize,	36,859,711 "
Groceries,	23,335,993 "
Leather,	1,664,718 "
Mineral Coal,	121,995 tons.
Whiskey and Dom. Spirits,	1,241,384 galls
Sawed Lumber,	14,528,557 feet.

From the above statements some idea may be formed of the vast amount of that internal trade, which circulates throughout the State the life blood of her prosperity, and of which the amount during the present year is understood to have far exceeded that of any former period.

But the value of the Pennsylvania works is not to be estimated solely by the magnitude of the trade which is even now transported over them. By the progressive completion of the various lines of communication West and North of Pittsburg, the commercial importance of that place and the amount of internal trade which will there centre, must every year be rapidly augmented; whilst the resources of the region of country traversed by the improvements which follow the North and West branches of the Susquehanna have scarcely yet begun to be developed. And by the railroad communication now forming between Williamsport, on the west branch canal, and Elmira or New-Town, situated on the New-York and Erie railroad, an avenue will be opened to the fertile regions of the Genessee, and a connexion will be formed with both the Erie canal and the New-York and Erie railroad, at points from both of which the distances to the city of New-York will much exceed those to Baltimore.

It is to the Baltimore and Susquehanna railroad that we look to secure to tho city of Baltimore a particicipation in the immense trade of which we have spoken. The great line of communication from Pittsburg to the Atlantic cities, is by canals and the Portage railroad, to Columbia; and thence by the Columbia railroad, a distance of 18¾ miles, to Philadelphia. From Columbia to Baltimore the distance by the railroad now constructing will not exceed 70 miles. We will therefore have the same mode of access to the Pennsylvania canals, which is enjoyed by Philadelphia, with the difference of distance in our favor, and on the other hand, will be given to the agriculturist and manufacturer of Pennsylvania, the reciprocal advantage of being enabled, after transporting his commodities to Columbia, there to enjoy the benefit of a choice of markets between the two rival cities, each striving to offer such inducements as may attract his custom. The distance from Pittsburg to Baltimore by this route will not exceed 382 miles; and if it be the interest of the citizens of Pennsylvania to open the cheapest and shortest routes to the markets for their produce, the construction of a railroad from York to Harrisburg will propably effect a further reduction in that distance of at least ten miles.

The distance from Lake Erie to Elmira by the New-York and Erie railroad will be 205 miles, and thence to New-York 303 miles, whilst that from Elmira to Baltimore by the railroad to Williamsport, and thence by the Pennsylvania canals, will be but 245, a difference in favor of Baltimore of 58 miles.—From Elmira by the Chemung canal, the Seneca lake and Seneca canal, the distance to Montezuma, on the Erie canal, is 84 miles, making the whole distance from Baltimore to Montezuma 329 miles, whilst that from Montezuma, to New-York by the Erie canal is 366, a difference in our favor of 37 miles. Through the Susquehanna route, therefore, the city of Baltimore will be placed nearer to lake Erie than is the city of New-York, and may enter into competition with her for that trade of which the latter has now the monopoly; and that this route will become the grand and national channel of communication between the North and South for travellers, and for United States mail, cannot be questioned, since from Lake Erie to Baltimore the distance by it will be but 450 miles, whilst between the same points, by the route via New-York and Philadelphia, it will be 906, a differance of 256 miles.

Such are the benefits which the city of Baltimore has to expect from the completion of your enterprise. The disadvantages under which the traders have labored, have been sorely felt; and during the past year it has in repeated instances happened that sales have been effected in this city, of goods destined for the Western markets, only on condition that the vender would at his own cost deliver them in Philadelphia, whence they were to be transported along the canals of the Susquehanna valley. But when a direct communication shall be afforded from Baltimore to the same canals, a wide field will be thrown open to the commercial enterprise of her citizens, and all their energies will have ample room for exercise. Like the magnificent Susquehanna itself, the commerce of a region almost unbounded in extent, will flow from a thousand sources, until uniting upon her banks, it rolls along in one wide stream of wealth.—Through your exertions, Baltimore will be enabled to enter upon favorable terms into the zealous competition with which her rivals seek to divert to themselves the fertilizing branches of this mighty current, and to the activity and industry of her citizens may we safely trust to avail themselves of the advantages you will have placed within their reach.

With the prospect then of at length reaping the full reward of your labors, the President and Directors cannot but offer their congratulations to the stockholders, upon the advance of their work towards completion. Looking to all the considerations which give value to a railroad, the Board still entertain the most confident belief that the revenue which the Baltimore and Susquehanna railroad will yield, will fully justify the most sanguine expectations which they have held forth, and they as firmly trust that the advantages which will accrue from it to the city of Baltimore will be at least as great as have been represented.

By order of the Board,

CHAS. HOWARD, President.

FIRST ANNUAL REPORT OF THE BOARD OF DIRECTORS, TO THE STOCKHOLDERS, OF THE HARTFORD AND NEW-HAVEN RAILROAD COMPANY.

To the Stockholders of the Hartford and New Haven Railroad Company:

The Board of Directors submit the following as their first Annual Report upon the affairs of the Company:

The Board being organized, the first duty which devolved upon them was the appointment of the proper agents. As soon as arrangements could be made, the Engineer was directed to examine, and whenever such a course would be advisable, thoroughly survey those parts of the State lying between Middletown on the east, and the Farmington Canal on the west. This was directed with a view to ascertain whether any route could be found more feasible than the one designated in the Preliminary Report of the Engineer, on which was pred.

cated the original estimate of this work.—The Board were induced to adopt this plan, because they believed it a duty which they owed, not only to the Stockholders, but to the State. They were aware that the location of the work would thereby be subject to considerable delay; still, having in view the importance of this road—which presents a fair prospect of being, at no distant day, the great trunk or outlet of the valley of the Connecticut—drawing its resources from Canada—intersecting the great Western Railroad, between the State of New-York on the west and Boston on the east, in addition to other great advantages which might be mentioned—it appeared to them clearly expedient, that in locating so important a work, no reasonable time or expense should be spared, to ascertain that route which should prove the *very best*. Careful and extensive surveys have accordingly been made, embracing in the whole some hundreds of miles, with estimates and comparisons of the different routes; which will not only enable the board, as it is presumed, to give a good and sufficient reason for the route they have selected but also render clearly unnecessary, any subsequent examinations with a view to rival routes, which might have been the result of a less thorough examination. Much valuable information has been also obtained, which may be important for purposes of future reference.

Large maps of the most prominent routes are in the possession of the Company. For more particular information on this subject, the Board refer to the Report of A.C. Twining, Esq. Chief Engineer, which is appended to this Report.

It might reasonably be expected, that in locating so important a work as a Railroad, which is to be *permanent* and *fixed* for ages, care would be taken to bring into comparison and competion the various local interests to be affected thereby. In order, therefore, that there might be a fair representation of those interests, as well as a just estimate of the resources of the various routes, much pains was used to elicit information on all the various subjects which would have a bearing upon the question; in relation to all of which, arguments offered by the friends of the different routes were patiently and publicly heard, and received their due weight in deciding the location. It may, however, be proper to remark, that the circumstance of their being different routes which were feasible, and each possessing its peculiar advantages, placed the Board in a condition less favorable for prompt decision, than that ordinarily devolving on similar agents, who often find themselves limited in their choice to a single line,—and that too, less promising than either of the routes subject to the decision of the Board.

The general location having been settled definitely, the attention of the Board was directed to obtaining titles to land. It is well known, that in many public works of this kind, much embarrassment has been occasioned by a hasty and premature entrance upon property of that kind,—a want of a due regard to the rights of the occupants,—and a neglect to obtain good titles. On this subject, as well as others which came under the attention of the Board, they deemed it prudent to avail themselves of the experience of others, and obtain the land by private arrangement, and avoid, if possible, availing themselves of the extreme, though necessary powers, which, by a provision in the Charter, the Legislature has given them. With a view to accomplish so desirable an object, the Board employed judicious agents, who were directed to offer the full value of the property, having in view the advantages and disadvantages resulting from the Railroad. The agents have, in most cases, been successful; and there remain but few unextinguished titles on the location as far as Meriden,—the money, with few exceptions, having been paid and deeds taken.—For the amount of this and other applications of the funds, reference may be had to the Secretary's Report. The amount paid under the head of land, includes fencing and keeping the same in repair, land, damages, &c.; and although it may seem large, the Board believe, that in the result, it will prove better for the Company than if the same titles had been obtained at much less prices through the intervention of appraisers. It may also be proper to remark, that more land has been taken than would in all cases have been judged immediately necessary, unless the Board had taken into consideration, that this work is located, not for a few years only, but for centuries; and, if provision were not now made to meet the increase of business and other contingencies, an error might be committed which could hardly be remedied. Should the land, however in any case, be more than shall be wanted, it can always be made available at an advance from cost. These remarks, in addition to their immediate application, are intended to intimate the necessity, in relation to all matters relating to this work, of a large and extended view of things connected with it, whether immediately or remotely; by which course numerous evils will be avoided, which might otherwise be of incalculable injury.

The termination of a Railroad, and its connection with other means of conveyance, is a subject of paramount importance. To this subject the attention of the Board was early directed, in relation to this Railroad; and, while the termination at New Haven was designated by the Charter, it was found, that great obstacles were in the way of obtaining the facilities necessary to connect with water transportation, by reason of the great expense of constructing wharves to the channel of the New-Haven harbor. At no point did it seem practicable, at present, to form this connection with the harbor, but by passing upon Tomlinson's Bridge, so called. To the forming an arrangement with the Bridge Company, on terms at all consistent with the interests of this Corporation, there were interposed great obstacles: 1st. The only wharf at which a steamboat could lie, was leased for a term of years. 2d. The freight transported by the Railroad Company would be subject to a wharfage which, even at a low rate, would amount to a great sum annually. The great price of the ground, the inconvenience and expense to which the Company would be subject for wharfage of materials in constructing their Road, and many other circumstances which would embarrass the connection with water transportation, induced the Board to employ an agent to purchase the major part of the stock of the Bridge Company. This purchase was made in accordance with the recommendation and approval of the Engineer, and, on this subject, the Board feel an assurance, that the purchase is a great acquisition to the Company, and will eventually very materially affect its receipts,—being a most valuable property, affording the most desirable facilities of access to steamboats, and at such places, and on such terms, as best accord with the requisitions of the Road.

The Bridge Corporation, although under the control of this company, sustains its distinctive features, agreeably to the act of incorporation; and when the purposes of the Railroad shall have been secured and answered, that stock may be disposed of.

In order to facilitate the business of the Railroad Company, as well as to accommodate the usual business at the bridge, the Bridge Company have contracted for the construction of an additional wharf or dock, for the repair of others, and the excavation of the continguous mud to such an extent as to enable vessels drawing the usual depths of water to come up to the wharf. For these purposes the Railroad Company have authorised a loan to the Bridge Company of $10,000. This appropriation, besides being indispensable for present purposes, will be the means of bringing a great accession to the permanent income of the bridge. Other improvements in wharves are in progress, the expense of which will be principally defrayed from the income of the bridge and wharf, and which will add much to the value of both.

The Board, aware of the importance of availing themselves of all proper means to promote the present and future prosperity of this work, have desired to take an enlarged view with reference to that object. In addition to what has been referred to on this point, they have deemed it very important to bring under the direction and supervision of the Company, as far as practicable, the manufacture of cars and transportation carriages; not only to save expense in first cost, together with the expenses and trouble of transporting so bulky an article, but also with a view to have always on hand that practical knowledge which is so important in a work of this kind, especially as respects repairs. For this purpose the Board have established a car manufactory, which is in successful operation, and will enable the Company, it is presumed, to furnish the necessary cars and transportation carriages for the opening of the Road.

In order to meet the current expenses of a work of this kind, it must be obvious that reasonable provision should be made in advance. This makes it indispensable that the installments should be punctually paid. No plan, however well matured and faithfully executed, can succeed without it. To insure the success of the work, punctuality in all the pecuniary concerns is of paramount importance; by which the interest of the stockholders will be greatly promoted, and the expectation of the public answered in the early completion of the work.

By the Treasurer's and Secretary's reports, which are appended to this report, may be seen at one view, the amounts which have been paid, under the various heads of expenditure; which it is presumed will satisfy the stockholders that the disbursements have been made with economy and prudence.

There are some outstanding claims which could not be settled at present. The Company is also indebted for work done by contractors, which could not be closed, being held in reservations agreeably to the contracts. The fourth installment is designed to pay for the land from Meriden to Hartford, and meet the engagements of the Company, which are rapidly increasing upon them as the work advances.

On the subject of installments the Board have to acknowledge a very prompt payment by most of the stockholders, whilst they extremely regret the backwardness of some. It would seem that a sense of honor, and the importance of the enterprise, would be a sufficient reason to insure punctuality. It was hoped that this stock was taken for other purposes than speculation, and with reference to its intrinsic value.

The Board regret extremely that any coercive measures should be necessary, and cannot but indulge the hope, that delinquents will save the Board from any legal proceedings, as unpleasant to themselves as it must be to the holders of the stock. On this subject the Board deem it proper to state, that a few of the stockholders who have not paid reside at a distance; and some, in places not known to the Board; and some of the persons who held stock are deceased, and the claim has been represented to the administrators.

It may perhaps be expected by the stockholders, that the Board should give their views with regard to the present and future prospects of the Road. They would therefore state their opinion, that the present condition of the work is encouraging, and they see no reason why the stock should not sustain an intrinsic value above what it did when the subscription was made. And, as to the future prospects of the Company, two circumstances deserve particular notice.

1. The peculiar location of the Road, giving a reasonable prospect of its extension up the valley of the Connecticut, besides intersecting the great Western Railroad.

2. The advantages which the Company would derive from its connection with a line of boats to New-York, and the other circumstances which are inferrable from the same.

If we may be permitted to draw an inference from past improvements, we can hardly estimate too largely the increase of the business of the Road when completed. While many other similar works are prevented from being available for a great part of the year, in consequence of being connected, in the line of transportations, with rivers and canals, which are closed with ice; it is obvious that a route which ensures so constantly the means of transportation, is of great importance, in comparison with those which are unavailable for a considerable part of the year.

It is reasonable to conclude, looking to the vast resources of the country and the line and connection of this road, that the travel and business will increase in a ratio vastly beyond the first impressions of its friends. The truth of this remark time alone will determine; but it will not be thought a strange one, when, it is considered, that it is now but fifty years since the only means of public transportation, from this city to Hartford, was a common two-horse wagon, and that was thought, at the time, a hazardous experiment.

In conclusion, the Board would state, that they believe the Hartford and New-Haven Railroad an important enterprise, as a means of facilitating travel and business, and entitled to the confidence and co-operation of the stockholders and the public.

The Board would also further state, that, in their opinion, the section of country where the road is located, is vastly interested in maintaining the work in self-defence; for while facilities for travelling and transportation are afforded to other portions of New-England, east of us, it must be obvious, that if the same facilities are not provided here, a loss will be sustained which cannot be regained. All of which is respectfully submitted.

By order of the Board of Directors,

James Brewster, President

ENGINEER'S REPORT.

To James Brewster, Esq., President of the Hartford and New-Haven Railroad Company.

Sir.—In compliance with your request, I respectfully present this report, giving a condensed view of all the operations which have been undertaken and executed in the Engineer Department for the year past; also embracing a view of the present state of the work and its prospects for the year to come.

Immediately after being called to the charge of this work, in the fall of 1835, it was made my duty to examine a route by the way of Middletown, and, if expedient, execute a careful survey. It was always known to those in the least acquainted with the merits of the different routes, that a line by the way of Middletown must necessarily be longer, and must pass over higher ground than other lines which had been surveyed originally for this Railroad. Still it was the opinion of a large body in the community, that the advantages of such a route, in a fiscal point of view, to the company, would overbalance its physical disadvantages. It was therefore judged expedient to give to that large section of the State, which felt itself deeply interested in the location by the way of Middletown, the opportunity of the most careful selection and location among the different routes which existed in that region, and a full and fair opportunity to represent their resources, and the amount of income which they would offer to this road. Other very weighty reasons presented themselves for this course, having reference both to general principles and the facilities for procuring land upon favorable terms by the competition which would be created. Two parties were accordingly employed for about two months in exploring the whole region, and the best route which could be found was carefully located. The result was, that although that route was not finally selected by the Board, yet all its friends, so far as is known, feeling that the most careful attention had been given to their claims, by the Directors of this work, and perceiving for themselves, in the comparison of their favorite route with the one which was finally adopted, the great superiority of the latter, acquiesced entirely in the correctness of a location out of their own immediate region.

As soon as the Middletown explorations and location had been completed, attention was turned to the middle region, by way of Meriden and Berlin. In the original surveys it had been found that two routes existed in this region south of Berlin into New-Haven; one on the east and the other on the west of the Qunnipiac river, which were very equally balanced in their expense and in their physical character. A line was accordingly located on each side of the river, for the purpose of an accurate comparison. An entirely new route was also laid, which passed east of the village of Worthington, crossed the Madebeset river about one mile north of that village, at an elevation of nearly seventy feet, and continued directly through Newington, and east of the quarries of Rocky Hill, into Hartford. An attempt was also made to enter Hartford from the south, by connecting the route last named with the northern part of the Middletown route, by running up the valley of a brook which comes down the vicinity of a small settlement called Griswoldville, into what is called Beckley Quarter, north of Worthington.

It was deemed important that the subject of location should be in readiness for the decision of the Board as early as February; and the foregoing operations had consumed the time allowed, so nearly, that no time was left for any thing more than a hasty and rapid examination of a third general route, which was from the first known to exist, and to possess many probable advantages. Examinations, however, were made to such an extent as would enable the Board (it was judged) to decide respecting the comparative merits of that route. The whole matter of location, however, having been made subject, by a clause in the charter, to the revison of three commissioners, appointed by the State, was by them laid over till a particular survey and location of the last mentioned route should have been made. Being therefore directed by the Board, I executed this survey and location, all of which, together with the estimates, was completed in the beginning of April, on the 7th of which month, it will be recollected, that the line by way of North-Haven, Wallingford and Meriden, was finally selected by the Board, with the sanction of the commissioners, leaving the northern portion of the route, from Meriden to Hartford, open for future decision.

This first division of the road as far as Meriden, being the southern half of the entire route, after having undergone a thorough revision wherever improvements could be made in the line, was immediately prepared for contract, and early in the month of June, was put under contract, so far as the grading is concerned, to three responsible and able companies. The entire preparation of the road for a double track, is by the contracts, to be complete by the months of April and May, 1837.

A prominent reason on the part of the Board for delaying their decision respecting the northern division of the route, from Meriden to Hartford, had been the variety of questions which would present themselves respecting the proper entrance into the latter city, and the fact that the doings of the Board were subject,—to the extent of the city limits,—to the sanction of the authorities and freemen of the same. But after the negotiations between the President of the Board and the authorities and freemen of that city, in the result of which the entrance was fixed upon, to the entire satisfaction of the citizens, no time was lost in bringing before the Board the entire subject of location to Hartford. The line which has been before alluded to, as being laid east of Worthington through the village of Newington, having been abandoned by reason of the great expense of crossing the Madebeset river, added to a strong and earnest petition of most of the influential inhabitants of Newington, desiring the removal of the line from their vicinity, there remained no route but that one which passes through the meadows called the Green Swamp, and the parish of Kensington. A portion, however, of this last named route was, by direction of the Board, re-surveyed, at the request of the citizens of Worthington, with a view to accommodate, if feasible, that village with a line coming into immediate contact with them on the west. The decision of the Board, made on the 30th of August, in favor of the Kensington portion of the route, together with the sanction of the commissioners, completed the entire location of the road from New-Haven Harbor to Hartford Main street. This division last located, from Meriden to Hartford, is in a condition to be put under contract immediately.

While the foregoing detail exhibits the fact that various feasible routes existed, possessing each its claims to attention, and being dispersed over three distinct districts, separated from each other by chains of mountains and highland, let it also be observed that these surveys have exhausted

the entire subject, from the Farmington canal on the west, to the Connecticut river on the east; so that it has become a perfect certainty, that the line as it has been finally fixed, has no equal in all that region, either as respects its physical characteristics or its cost of construction,—and while the foregoing considerations have reference to the road, viewed especially in its adaption to the long travel, and as a link of the chain which is probably destined to reach to the upper extremity of the Connecticut valley, it is no less true that this particular route is better accommodated to the local business and circumstances of the intermediate country between Hartford and New-Haven, than any other could be. After departing from New-Haven, it cuts into the midst of the clay beds of North-Haven, where several millions of bricks will annually be made; it skirts the villages, first of North-Haven, and next of Wallingford; it passes into the immediate vicinity of Yalesville, directly through Meriden lower village, and one half mile only from the upper village,—comes near to the cement factories, the mill seats and clay beds in Kensington, and is distant but about one mile and a half from each of the villages of Worthington, New-Britain and Newington. At the same time it is so located in the middle district, between the Connecticut river and the Farmington canal that during the season when they are closed, and for nearly or quite five months of the year, its influence will reach Middletown on the east, and Farmington, Bristol and Southington on the west. I should not omit to mention the circumstance, that, although this road will come into immediate contact, for three-fourths of a mile, with the city of New-Haven, and terminate at the deep waters of the harbor; and although at its northern extremity it will deliver its passengers and freight in the very heart of Hartford, but a few rods south of the State-House, and on the Main street, still a change of power will not be necessary at either extremity, nor for any part of the distance.

I shall conclude that part of the subject which relates to the surveys and location, by observing, that on all the routes the aggregate distance which has been surveyed, located and re-located with precision, amounts to about three hundred and fifty miles. This has been done chiefly with two parties, and, to a considerable extent, in the winter season.

With respect to the present condition and future prospects of the work, a few brief remarks will suffice. I have already mentioned that the upper division, from Hartford to Meriden, can be put under contract without delay. On the division from Meriden to New-Haven, which has been under contract since June, the contractors are actively engaged upon the prominent sections of heavy work. The iron rails are contracted for, also the cross sleepers for the entire road. Negotiations for the wooden rails are far advanced, and two engines have been ordered, which will be finished as soon as they can possibly be required. There is, therefore, nothing to forbid the expectation that this work may be wholly or nearly finished from New-Haven to Hartford, in fifteen months from the time of putting the upper division, from Hartford to Meriden, under contract.

I am, Sir, very respectfully,
Your Obed't Serv't,
ALEXANDER C. TWINING, *Engineer.*

SECRETARY'S REPORT.

To the President and Directors of the Hartford and New-Haven Railroad Company.

GENTLEMEN,—I herewith submit the following report of Disbursements, in constructing the road of this Company.

The total amount of moneys expended for the Company, up to September 5th, 1836, is	$107,009.64
Of this sum there has been paid, expenses for obtaining the Charter of the Corporation, for expenses by Commissioners in opening the books for subscription to the Capital Stock, for books, stationary, furniture, fuel, lights, office rent, &c.	4,473.82
For expenses of Engineering,	10,147.15
For land and damages, (including Agencies,)*	57,816.27
For cash paid in part for the purchase of fifty-seven and a half shares of bridge stock,	20,609.63
For a loan to the Bridge Company for building a wharf,	3,500.00
For building of cars and the materials,	2,183.74
For Graduation,	6,279.0
For Salaries,	2,000.00
	$107,009.64

The indebtedness of the Company is as follows:

Notes given for the purchase of lands,	$12,000.00
Notes given for the purchase of bridge stock,	37,350.00
Sundry small accounts,	40.75
Balance due on Salaries,	1,800.00
	$51,190.75

TREASURER'S ACCOUNT CONDENSED.

William H. Elliot, Treasurer, in account with the Hartford and New-Haven Railroad Company.

1835.		DR.
	Sept. 5, To Cash, first installment,	$50,000.00
1836.	Jan. 16, to Aug. 25, To Cash from Union Bank,	48,215.00
	Feb. 16, to Sept. 3, To Cash from Phœnix Bank,	21,117.69
	Aug. 23, To Cash from Morgan Ketchum & Co.	1,699.0
	Aug. 23, To Cash from O. Pease, Secretary,	22,160.2
	Aug. 23, To Cash from Interest accrued,	1,132.69
		$144,324.68
		CR.
1836.	Sept. 6, By bills receivable.	$22,714.79
	Sept 6, By check to James Brewster, for error,	45.00
	Sept. 6. By orders paid to this date,	107,009.51
	Sept. 6, By funds in Treasurer's hands,	14,555.38
		$144,324.68

*This item includes land, fences, and damages, for the line of the road, and also the payments made for the following pieces of property:

Car Factory and lot of land in New-Haven,	$4,000.00
Land and buildings purchased in Hartford,	4,000.00
Land purchased of Pardee and others, at the termination of the road in New-Haven,	16,000.09
Land in North-Haven,	1,000.00
Several smaller pieces of land,	3,000.00
	$28,000.00
Leaving amount paid for line of the road and Agencies.	$29,870.77

From the Jerseyman.

RAILROAD TO CARPENTER'S POINT.

The public have been anxiously looking for the report of the Engineers who surveyed the railroad route from this town to Carpenter's Point. A letter from E. Beach, Esq., the Chief Engineer, to the Commissioners, gives the information that A. H. Jackson, Esq., the accomplished Engineer and Surveyor who run the route, took sick whilst making out the report, and died on the 21st ult., which caused the delay. A letter from Mr. Jackson to Mr. Beach, dated the 12th of August, was enclosed, which gives a sketch of the bearings, distances and elevations, and from which we have been permitted to make the following extracts:

"The Kittaninny, or Blue Mountain, running nearly parallel with the Delaware River from Carpenter's Point to the Water Gap, has ever been considered a serious objection to the construction of any feasible or expeditious communication between the north-west parts of New-Jersey and the city of New-York. Culver's Gap, so called, presenting the only practicable indenture or ravine by which the elevation of the mountain could be overcome, I commenced the survey at that place, three miles north of Branchville, running to the line of the State of New-York opposite Carpenter's Point, distant $18\frac{17}{20}$ miles, and 496 feet below the starting point, on a slope rising to the east. Soil generally composed of detached gray rock, gravel and sand.

"Continuing the survey from Culver's Gap southerly to Branchville, $7\frac{1}{20}$ miles, 334 feet below the Gap. Here it was deemed necessary to survey two routes to Dover; the Western, through Newton and Stanhope, and the Eastern, through Sparta and Berkshire Valley. The principal difficulty anticipated on the Western route was, in crossing the Scott's or Sparta mountain, between Stanhope and Andover, I therefore commenced at a point 225 feet above the water in the Morris Canal at Stanhope, and running along the stream of the Lubber's Run, crossing Scott's Mountain at Cat Swamp, thence through Andover and Newton to Branchville, $22\frac{3}{4}$ miles from Stanhope, and 275.47 feet below the same, making Culver's Gap 59.01 feet above Stanhope.

"The Eastern route commenced at a point $5\frac{13}{20}$ miles south of Culver's Gap, diverging to the east from the Western route, passing through Lafayette, 12 miles from the Gap, and 363.23 feet below it. To Sparta $18\frac{2}{3}$ miles from the Gap, and 162.20 feet below it. Thence crossing Sparta Mountain through a ravine to the head of Brookland Pond, or Lake Hopatcong, 23 miles from the Gap, and 8 feet above it.—Down the east side of the lake to 1 mile west of Dover, $30\frac{1}{20}$ miles from Culver's Gap, and 296.58 feet below it.

"Continuing the survey of the Western route from Stanhope to the point of stopping the Eastern west of Dover, $8\frac{3}{4}$ miles, and 237.57 feet below Stanhope, gives the Western route 38^4 miles from the Gap.

"From Dover, through Rockaway and Denville, by the head of Speedwell Pond to the Liberty pole on the Morris Green, it is 543.82 feet below Culver's Gap, and $61\frac{3}{4}$ miles from Carpenter's Point by the Eastern route.

"The graduation of the route from Carpenter's Point to Morristown by the Western route will in no instance require more than 60 feet ascent per mile in travelling northward, and with but two exceptions not over 40 feet per mile in travelling southward; in these two instances for a short

distance the graduation will necessarily be 60 feet ascent per mile. The line of survey on both routes is generally on a gradual slope, requiring but little cutting or embanking, and the soil in most cases of a kind easily excavated, and calculated to form permanent embankments, being principally loose stones and gravel. The bridges and culverts required are inconsiderable when the length of the route is taken into consideration; and the most durable materials for their construction abounds in exhaustless quantities on the route. Timber and stone of a good quality for the superstructure of the road are abundant along the line. These remarks are applicable to both routes, in every respect, excepting the graduation of the line on the eastern route from Sparta to the head of Hopatcong Lake, 4¾ miles, where it will be necessary, in order to cross the Sparta Mountain, to assume a graduation of about 100 feet per mile ascent and descent, and a like graduation will be necessary in descending from Seward's Mountain into Berkshire Valley, about 2¼ miles.

"The route across Scott's and Seward's Mountains was surveyed in reference to a decrease of distance between Sparta and Dover of about eight miles. Another route, with a graduation of from 40 to 60 feet ascent and descent per mile, was partially examined from Sparta, following the Brogden Meadow Valley, and passing Stag Pond, Lubber Run and thence up a ravine and intersecting the western route at the feeder from the lake near the Morris Canal, distance about 10 miles from Sparta. In this case the two routes would be nearly equal as regards distance and graduation, providing the western route should be continued up the Lubber Run valley from Mr. White's, and intersect the eastern at or near Rose's school-house, about 1½ miles distant, which would leave Stanhope 3 miles west, and the route equally practicable."

From the Georgian.

RAILROAD CONVENTION MEETING

At a meeting held at the Exchange on 15th October, 1836, for the purpose of taking into consideration the propiety of sending Delegates to the Internal Improvement Convention, to be held at Macon on the 7th day of November next, the Hon. John C. Nicoll was called to the chair, and Col. M. Myers nominated and appointed Secretary —The chairman opened the meeting by stating its object.

The Hon. James M. Wayne then addressed the meeting in a very perspicuous and able manner, detailing the material occurrences which took place at the Knoxville Convention, in July last, pointing out the different routes which had been proposed there, for the contemplated Railroad, and the advantages which would result from each. He designated other routes, and pointed out the benefit the State generally would derive from their being adopted. He presented to the meeting a very comprehensive view of the geographical advantages possessed by the State, the facility with which she could be connected with the West, and the mutual commercial importance to be derived from such a connection —he stated that the Convention intended to assemble at Macon, was of vital interest to our city, and the State generally, and the necessity of discarding all sectional feelings, and uniting for the improvement of the whole State. Judge Wayne displayed a perfect knowledge of the subject before the meeting. After Judge Wayne had concluded, Dr. Arnold offered the following resolution:—

Resolved, That it is important that the county of Chatham and city of Svannah, should be represented by Delegates, in the Internal Improvement Convention proposed to be held at Macon on the first Monday in November.

Resolved, That a committee be appointed to make a selection of Delegates and that the Corporation of the city, be requested to make an appropriation of money, to defray the expenses of the Delegates.

Resolved, That in sending Delegates to said Convention, the citizens of this county and city, disclaim all wish of any sectional or local interest of the county or city, and that they are animated by a sincere and honest desire alone, to contribute to the general welfare of the State, by the adoption of a system of Internal Improvements, which will give to every section of the State equal benefits.

The following committee were appointed by the chair to nominate Delegates to the Convention.

Col. W. T. Williams,
Thomas Purse,
Joseph Washburn,
Dr. R. D. Arnold,
Robt. Habersham.

On motion the meeting adjourned.

Jno. C. Nicoll, *Chairman.*
M. Myers, *Secretary.*

From the London Mechanics' Magazine.

LONDON AND BIRMINGHAM RAILWAY.

REPORT OF THE DIRECTORS TO THE SIXTH HALF YEARLY GENERAL MEETING OF THE PROPRIETORS, HELD AUGUST 5, 1836.

The Directors have the satisfaction to announce to the Proprietors, that the progress of the works generally, in the last six months, has been such as to warrant the expectation which was held out at the last meeting, that the whole line will be completed by the summer 1838, and the first twenty-one miles from London in the spring of 1837.

Of the Primrose Hill Tunnel, which is 1105 yards long, only 114 yards remain to be made; the Kensal Green Tunnel is finished, and traversed by the Company's locomotive engines; 1423 yards are completed of the Watford Tunnel, the total length of which is 1793 yards; and the difficulties which were presented by the quicksand in the Kilby's Tunnel have already been so far surmounted, as to leave no doubt in the mind of the Company's engineer, that they will not delay the opening of the railway beyond the time mentioned. With reference to the other portions of the work, the Directors are making every exertion to forward them, so as to give the Proprietors the benefit of a revenue at the earliest possible period; satisfied that although for the attainment of this object an additional charge will be incurred by the Company, the advantage to be derived from it will be more than commensurate to the expense.

The Directors have entered into a contract, under the guarantee of two responsible sureties, with Mr. Edward Bury, of Liverpool, an able and experienced builder of locomotive engines, for the conveyance of passengers and goods, on the railway, by locomotive power, to whatever extent may be required, at a fixed rate of remuneration; the Company providing engines of Mr. Bury's specification, and Mr. Bury, on his part, maintaining and keeping them in repair; the contract to be in force for three years from the opening of the railway.— The Company have thus assured to themselves the advantage of locomotive power at a uniform and moderate rate, and under a system of management which it is the interest of the contractor to render mutually beneficial to the Company and himself.— The Directors have also contracted for such locomotive engines as will be first wanted, and for a portion of the carriages.

The Directors in referring to the Bills for railways, connected with the London and Birmingham, which have received the Royal Assent in the present Session, feel themselves called upon to congratulate the Proprietors on the great accession of traffic which they may anticipate from the direct communication opened with the northern and eastern parts of the kingdom, by means of the Midland Counties, North Midland, and Birmingham and Derby Railways, not to mention the connection between Birmingham and Gloucester, by the Birmingham and Gloucester Railway, nor minor lines, which will all contribute to swell the revenue of the Company. Acting upon the suggestion of the Proprietors at the last General Meeting, and considering it desirable that a connexion should be secured with Leamington and Warwick, the Directors have instructed the Company's engineer to ascertain the levels for a branch line to those places, to join the London and Birmingham Railway near Coventry; and they have also set on foot the usual investigation into the traffic, so as to be prepared to follow up the object with such measures as may, in the opinion of the Proprietors, be deemed expedient.

By the statement of accounts now to be laid before the Proprietors, it will appear that

	£	s.	d
The receipts to the 30th June were	1,955,608	0	5
The disbursements . . .	1,492,100	16	8
That the balance in favor of the Company was, at that date . . .	463,507	3	9

And that the amount received on loan, pursuant to the powers given by the last General Meeting, was 443,800*l*.

It is estimated that the liabilities of the Company, for the next six months, will be sufficiently met by the cash at their disposal, and by loans which have been tendered and agreed for, with the addition of calls. Great as the present scale of expenditure will appear, the Directors are satisfied that so long as the works proceed with energy proportioned at that expense, the Proprietors will hail the increase as an additional evidence of the approach of their great undertaking to completion.

The iron railroad from Nuremberg to Furth appears to be successful. Between July 23d and August 19th, no fewer than 17,362 travellers passed along it.

AGRICULTURE, &c.

BONES AS MANURE.

Bones, although of comparatively late introduction as manure, have yet occupied so much of farming attention within these few years, that we have no hesitation in placing them at the head of those miscellaneous substances which are usually employed for that purpose. They have indeed been used in some parts of England for a long time, and have been extensively imported from the Continent into the town of Hull, where several machines have been erected either for grinding them into powder, or bruising them into small pieces; which modes of application have been found so advantageous, that they have, within the last twenty years, excited general attention, and are now in almost universal use as the principal manure for raising turnip crops on the calcareous soils in Yorkshire and Lincolnshire. It is upon this description of land that they are the most decidedly valuable, and the testimony of some farmers of experience, proves that to mix them with a portion of vegetable or coal ashes, is a profitable application for the production of turnips; as, by this method, the vegetation of the seed is quickened, and the young plant, getting rapidly into rough leaf, thus escapes the fly.

Long before the great advantage which may be derived from ground or well-crushed bones was generally known, many persons were aware of their fertalizing properties. To render them available, however, the wasteful and injurious process of reducing them into ashes by fire was then commonly resorted to; by which, indeed, a certain degree of benefit was imparted to land upon which sulphate of lime or gypsum will have effect, but could not be so effectual, in point of nourishment, as bone in an uncalcined state, because the oil and other nutritive matter which it contains is thus dissipated. In other instances, they were either reduced by lime, or laid at the bottom of the farm-yard, and decomposed by the effect of urine, and in some cases were partially broken by the hammer. In these modes, however, great quantities were wasted, which is now prevented by the improved method of preparing them by machinery: it is therefore useless to enter further into the details of practice which has become obsolete.

When reduced to powder, the bones alone are ground, being divested by the process of boiling, not only of every particle of flesh, but also of a material portion of oil which is also extracted; and it is only in that state that they can be brought to the condition of fine powder. In this state, it is only reasonable to suppose that they cannot be so beneficial to the land as when fresh and unboiled; yet we find, by the report of the Doncaster Association "on bone manure,"—to which we shall presently refer—that they have been found more effectual after having passed through the manufactories. When not ground completely into powder, they are, however, broken in the machines, by cast-iron rollers, formed with deeply indented rims, by which they are first partially bruised, and then falling down upon other sets of rollers, each with the teeth more closely fixed they are in this manner reduced to various sizes, from one inch to half an inch in thickness, and a considerable quantity of coarse dust is also procured by the process. These bones are usually sold under the respective designations of inch, three-quarters inch, half-inch, or dust; but the greatest demand is for those of the half-inch size, which contain all the dust which has been formed in crushing them. The "dust" is collected in great measure by ridding the inch and three-quarters inch bones.

When the bones are not boiled, each pair of rollers is furnished with a set of malleable iron scrapers attached below, in order to clear the teeth of any animal matter which may adhere to them, and thus the oil substance contained in the bones is saved.* As bone-mills have been now very generally erected, there are few parts of the country where the manure cannot be procured in a prepared state; but when the bones are only to be had raw, and it is an object with the farmer to reduce them to a small size, they can be easily broken to pieces by his own laborers. Several farmers have indeed erected small machines with two cylinders of cast-iron, with teeth, which lock into each other, by which they are broken into small pieces. The price at the mills varies, of course, according to the trouble of preparation, the distance of carriage, for grinding, and the demand; but commonly average, for the dust, from 2*s.* 6*d.* to 3*s.*, and in some late instances even 3*s.* 6*d.* have been paid—for pieces, from 2*s.* to 2*s.* 3*d.*, according to size—and 1*s.* 10*d.* for rough bones, per imperial bushel. No allowance appears to be generally made by the dealers on those which have gone through the process of boiling.

The expense of bones purchased in the rough state, and broken on the farm, is thus stated as an actual charge incurred per acre—

24 cwt. bones, prime cost,	£2	3	2
Carriage of ditto, 7 miles,	0	7	0
6½ days, man breaking bones, at 1*s.* 10*d.*,	0	11	11
3½ do. a girl spreading do. on the drills,	0	2	11
	£3	5	0

EXPERIMENTS.

The effects will be best seen by the following trials:

On the estate of Garrowby, on the Yorkshire Wolds, belonging to Sir Francis Wood, the crops of turnips had dwindled to nothing, and the fallows, though tolerably manured, were covered only with common hemp, nettle and other weeds, instead of turnip plants; but by the use of twelve to twenty bushels of bone dust in drills, the turnip crops have become excellent, and the following crops are very considerably improved.*

At Clumber Park, the seat of the Duke of Newcastle, in Nottinghamshire, 600 bushels of small bones were, in 1822, spread upon twenty-four acres of grass land, in the dairy farm, consisting of dry, sandy, and gravelly soil, which had been laid down about ten years. Their effect upon the pasture improved the condition of the cows so materially, that about twice the quantity of butter was made from them than from cows grazed upon land of similar quality, but not boned; and this effect, it is said, still continues.†

Twenty-five bushels of bruised bones, per Scotch acre, having been applied by Mr. Watson, of Keillor, near Cupar Angus, to Aberdeen yellow turnips, on some sharp black land, brought them above ground on the third day, and into rough leaf on the tenth; on the fifteenth, they were fit to be thinned out; while farm-yard manure, though applied to the same soil, at the rate of twenty-five cart-loads per acre, did not bring them up till the fifth day, nor render them fit for the hoe until the twentieth.—They in this manner manifested the same superiority until the month of September, when the weather having set in dry, it was expected that the crop would cease growing; which was the case with that part which had been dunged, but the bone turnips continued to grow vigorously, and upon a comparative trial in the middle of October, their produce exceeded those which were dunged, by six tons per acre: twenty-eight tons to twenty-two.‡

On some land, the quality of which is not stated, crushed bones were laid by Mr. Falla, of Gateshead, near Newcastle-upon-Tyne, at the rate of 100 bushels per acre; the rest of the field being manured with well-rotted stable-dung, at the rate of fifteen two-horse cart-loads per acre; that part which was boned was superior to some parts of the dunged ground, and fully equal to the rest.§

Mr. Graburn, of Barton, in Lincolnshire, has manured with crushed bones, at the rate of thirty bushels, and with dung at eight loads per acre, for turnips, after which the turnips were much later than the rest. On the second year of seeds, after the turnips, he covered the dunged part with yard manure a second time, and two years afterwards, a third time; then sowed the land with wheat, and the boned ground produced rather a better crop than that which had been thus thrice dunged.‖

During the dry summer of 1826, thirty-four acres of a siliceous sandy soil, on the estate of Sir Charles Throckmorton, at Buckland, in Oxfordshire, half of which had been manured with farm-yard manure, and the remainder with bones. The whole

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*See the Prize Essays of the Highland Society, for a detailed description, accompanied with plates of a very complete mill for crushing bones, erected by Mr. Anderson of Dundee.—N. S., vol. i. p. 301. Ibid. p 73.

*Doncaster Report, p. 6.

†Ibid. p. 13.

‡ Quart. Journ. of Agric. N. S., vol. i. p. 14.

§Farmer's Magazine, vol. xvi. p. 300.

‖ Lincoln. Report, p. 300.

was sown with turnips, drilled in the Northumberland fashion; and that portion on which the bones were laid presented a remarkably fine crop, nearly a fourth part advanced in bulb about the latter end of August, while that part which had been dunged was merely getting into leaf.—The experiment was repeated in 1827, on green-globe turnip, sown on the 20th of July, upon similar lands, with the same superiority in favor of the bones; the succeeding crop of barley also produced five bushels per acre more than that which followed the dunged turnips, and the cover was also heavier.*

The Honorable Captain Ogilvie, of Airlie Castle, has also applied bone dust, at the rate of 15 and 20 bushels per acre, to a light sandy loam, with a subsoil of gravel and sand, coming in some places nearly to the surface; and after the experience of five years upon a series of trials commenced in 1827, he found all the successive crops of turnips, barley, and grass-seeds so decidedly superior to those which had been previously produced by other manure, that the Highland Society last year awarded their honorary silver medal to his Report.

To these facts in favor of bone manure, others must, however, be also stated of an opposite tendency, particularly when placed in opposition to farm-yard manure, to which we wish to call especial attention in comparison with bones, as being at the command of every farmer.

On the estate of Mr. Evans, jun., of Dean House, also in the county of Oxford, bones were tried for the wheat crop upon calcareous stony land, in comparison with stable-yard manure; but the dung had so greatly the advantage, that the bone crop appeared but little if any degree better than that on soil without any manure whatever.†

On the lands of Mr. Hawden, in Kincardineshire, turnips were sown in the month of June, on various soils, in drills laid off at 27 inches apart: the manure was laid on in single Scotch acres; and the produce of the roots, exclusive of tops, accurately weighed, as follows:—

On a mixture of stiff clay and gravel,			
12 tons of farm-yard manure produced	26 tons	8 cwt.
1¼ " bone-dust,	"	23 "	12 "
On a soft sandy soil, naturally inclined to moor,			
16 tons of farm-yard manure, produced	29 tons	12 cwt.
1¼ " bone-dust,	"	24 "	16 "
On sandy light soil, sown the following year,			
16 tons of farm-yard manure, produced	25 tons	16 cwt.
1 " bone-dust,	"	23 "	18 "
10 cwt. horn-shavings, mixed with one cart-load of hen-dung and 9 ditto coal-ashes,	"	20 "	6 "

It is also remarkable, that although three of the drills were spread unmixed with the horn-shavings, which are considered as a more powerful manure than bone, yet they only produced at the rate of 2 tons 13 cwt. per acre.‡

*Prize Essays of the Highland Society, N. S., vol. i. p. 75, communicated by Mr. G. Sinclair.

†Ibid. p. 77, communicated by Mr. G. Sinclair.

‡Prize Essays of the Highland Society, N. S., vol. i. p. 69.

On Mr. Boswell's farm of Kingcaussie, in Kincardineshire, two acres of Norfolk globe turnips were drilled upon poor high ground, reclaimed from moor, and

20 car-loads, or tons, of dung produced	32 tons	14 cwt.
1¼ ton of bones	"	23 "	13 "

On the same farm, in another year, the season of 1824 being cold and wet operated very much against the turnips which were manured with bones; but in that of 1822, those raised with bones and stable-dung, appeared to be equal.*

Notwithstanding this evident difference against the produce obtained by bones, in point of weight it should not, however, escape remark, that the latter gentleman estimates the value of their return in money as being superior; for the cost of the two manures is, according to his calculation, as follows:—

One acre manured with farm-yard dung—		
20 cart-loads of dung, including carriage, at 10s. per load,		£10 0
33 tons of turnips, at 10s per ton,		16 10
Nett return,		£6 10
One acre manured with bone—		
1¼ ton of bones, at 42s.	£2 12 6	
Breaking and driving ditto,	0 18 0	
		3 10 6
29 tons of turnips, at 10s. per ton,		14 10 0
Nett return,		£10 19 6

Thus leaving a difference in favor of bones of no less than £4. 9s. 6d.—or what we should in this country call a tolerably fair value, if fed off, for the produce of an imperial acre: but although the price of the turnips is far beyond present rates, and the charge of dung, unless carried to a great distance, is too high, we yet leave the account as it stands, as forming a ground for similar comparative calculations.

To this may be added the following particulars of a comparative trial between stable-manure and crushed bones, lately made on the property of Sir William Maxwell, of Calderwood. The field was an old ley, consisting of strong loam, on a retentive clay bottom; but having been completely drained, as well as ploughed and cleared, under favorable circumstances, the condition of the land—from which the previous crop of oats had been taken in 1832—was perfectly satisfactory at the time of preparing it for turnips, with various species of which it was sown in the following spring; and in addition to the quantities of manure stated at foot, 7½ chaldrons of lime were laid per Scotch acre. Where the stable-manure had been applied, the plants sprouted more rapidly and vigorously than was the case with the bones; but ultimately the latter gained ground; and, if any thing, got rather the start of the dung, and no part of the crop suffered in any degree from the fly. The most accurate calculations were made in order to ascertain the produce of the crops per acre, and the following was the result:

Swedish,		
30 cart-loads of stable-dung per Scotch acre, produced		29 tons.
60 bushels of crushed bones	"	24
Dale's Hybrid,		
30 cart-loads of stable-dung	"	33
16 bushels of crushed bones,	"	31
45 ditto,	"	29
Yellow Bullock,		
30 cart-loads of stable-dung	"	29
60 bushels of crushed bones,	"	28

*Prize Essay of the Highland Society, N. S., vol. ii. p. 206.

The quality of the soil is, however, by no means particularly well adapted for the turnip culture, partaking, as it does, rather too much of the clayey character; and although it was divested by drainage of all superfluous moisture, yet there can be little doubt that to that cause the comparatively unfavorable effect of the bones may be chiefly attributed.*

EFFECTS OF BONE-DUST AND BONES.

Bone-dust is the fittest state in which to lay it upon grass, for it will not only take more immediate effect upon the crop, but if laid in pieces, it would interrupt the progress of the scythe. It should, however, be recollected, that fine powder can only be obtained from spent bone which has undergone the process of manufacture. It is, therefore spread as a top-dressing, by hand; but it is also very commonly laid in the drills for turnips, for which purpose many ingenious machines have been contrived for sowing it along with the seed.† It is, however, much to be regretted that these implements cannot be constructed with more simplicity, for their cost is so considerable, that unless a man has a very large quantity of land to drill, their purchase would be imprudent, and the hire is generally unreasonably expensive.

Regarding the *quantity of dust*, the powdered bones are dearer than those which are merely broken small, and although said to be more forcing to the first crop, on account of their being, when in the state of powder, more intimately blended with the soil, and more directly applied to the seed, yet they are not found so durable as when they are laid on in pieces: but it is also true that, in the former case, they are not laid on so largely, for the amount depends entirely on the size of the bones. They have been applied in the rough state, to the extent of 100 bushels per acre; but the average quantity, of all sizes, is stated, in the Doncaster Report, to be 39 bushels.—When the smaller bones are distinguished from the larger, they, however, seldom appear to exceed 30 bushels per acre, and in many cases do not arrive at 20: perhaps it may be assumed, as the most general practice, that half-inch bones are employed at the rate of 25 to 30, and dust at 20 bushels per acre; but a distinction should also be drawn between the quantity of those which are applied after being manufactured, and those which are laid on in a raw state.

The size of the pieces to which the bones should be broken is also an object of some

*Quart. Jour. of Agric., N. S., vol. iv. p. 839.

†A very detailed description of one of these instruments, along with an engraving, may be found in the Quarterly Journal of Agriculture, N. S., vol. ii. p. 719.—Another machine for the same purpose, but with a double hopper, for sowing two drills at one time, is also described, together with a plate, in the Prize Essays of the Highland Society of Scotland: N. S., vol. ii. p. 206.

importance, as the smaller they are the more prompt will be their effect: on which, the following observation has been made by one of the correspondents of the Doncaster Association: "That if he meant to till for early profit, and if he wished to keep his land for good heart, he would use half-inch bones; and in breaking these, he should prefer some remaining considerably larger:" the reason assigned for which is, "that by using bones of a large size, with dust in them, there must be sufficient of the small particles of the dust to set the turnip crop forward, and sufficient of the large particles of the bone left to maintain the land in good condition for the last crop."

Respecting their durability, it has been affirmed, that the effect will not be increased if they be laid on to great amount; for the same produce has been obtained from the comparative application of 50 and 100 bushels; and an experiment has been tried by varying the quantity on different ridges of a large extent of ground under turnips, at the rate of 28, 40, and larger quantities alternately, without creating any visible difference in the crop.* This, however, may be perfectly correct, so far as regards one or two crops, for it has been found that, when used in large quanties, they have rendered the land extraordinarliy productive during a great length of time, of which we find the following instances in the Doncaster Report:

1. On a field, part of which was boned forty years ago, the crops were, on that part, during fifteen or sixteen succeeding years, visibly better than the remainder, although the land was all of the same quality, and the part not boned was manured with farm-yard dung.

2. In another case, about three acres of light, sandy land were dressed, in 1814, with 150 bushels of bones per acre; since which time the land is said to have never forgotten it, but is nearly as good again as the other part, farmed precisely in the same way, with the exception of the one application of bones.†

We learn, also, from experiments at Kew, that although they yield a certain supply of nourishment to plants the moment they are capable of receiving it, yet that is done so gradually as to furnish only a regular and moderate supply: reasoning upon which, it is to be presumed, that as a large quantity does not produce the effect of forcing a crop in proportion to the amount supplied, neither can it be so soon exhausted by the gradual consumption of the smaller quantity. This application may therefore be perfectly consistent with good husbandry, if applied to any amount, however large; though, as regards the farmer's purse, the expenditure of the outlay is a different question. The extent of their fertilizing quality is greater upon grass-land, under cattle, than upon arable. Valuers estimate the allowance to a quitting tenant by supposing the effect of bones upon tillage and meadow-ground to be exhausted within four years; but on grass-land depastured it is considered to last during eight.*

Experience seems to be in favor of laying the manure in *drills*, especially when applied to turnips, although the superiority of the *broad-cast practice* is maintained by some very intelligent farmers, who hold—that the turnip plant receives its support principally from the fibres which it throws out sideways, to a much greater length than people will believe, and derives more nourishment from them than the tap-root; and that the bones being dispersed, the fibres are more likely to meet with them than when they are accumulated round a tap-root, and that method must be the best which occasiens the greater quantity of nourishment to be conveyed to the body of the turnip. In drilling the bones, there is also a difficulty found in the after-ploughing, of mixing them with the soil; and although this may be in some measure obviated by cross-ploughing the ridges, yet that portion of the land on which the manure is thus laid receives more than an equal degree of benefit. A third mode is however acted upon by others, who sow them broad-cast, and gather them into ridges with a mould-plough.

The *time for laying them upon the land*, when applied to grass, whether natural or artificial, is generally recommended to be early in the spring; but if upon meadow, the growth of which has been fed off, then the moment the cattle are removed. Experience, however, varies upon this point; because it has been found to depend materially upon the season and the state of the land, which, if wet, will be more benefitted by delaying the operation until the weather becomes warm and the ground dry.

When applied in the drills of arable land, they are of course deposited along the seed; but when spread broad-cast, then they are not uncommonly either harrowed in immediately previous to the sowing, or with the last ploughing; though, when used in a fresh state, without having been subjected to process of manufacture, they should always be laid in sufficiently long before the sowing, to allow them time to ferment, or they will not take immediate effect upon the rising crop.†

The *soils to which they are best adapted* are those of a light and warm nature; for on wet and cold grounds they have rarely been found to produce any sensible benefit. Their power of contributing to lighten strong land, by their mechanical action upon the soil, and thus rendering it less adhesive, has indeed been vaunted, and, if laid on a very large amount, there can be no doubt that the bones, in pieces, would have some such effect; but the smallness of the quantity in which they are usually applied renders their force for that purpose quite insignificant.

On *heavy loams and clays*, the accounts of their operation have been almost invariably unfavorable; and it may be laid down as a necessary qualification in a soil fit for the application of bones, that it should be dry. This, indeed, has been contradicted by experiments stated in the Doncaster Report, upon what is described as a wet sand soil, with an irony-colored subsoil, upon which two quarters per acre were drilled, and produced an excellent crop, when manure had been previously tried without effect. This, however, having occurred in the years 1826 and 1827, which were unusually dry, may serve to explain the fact, without affecting the principle that bone manure is not geneally beneficial to clay lands.

The same Report states, "*upon very thin sandy land*, the value of bone-manure is not to be estimated; it is not only found to benefit the particular crop to which it is applied, but extends through the whole course of crops; and even in the succeeding courses, its effects are visible in the improved quality of the land, and the efficiency of a smaller quantity than would at first have insured a crop. Upon much of the high land about Babworth, which is a light sandy soil, the crops under ordinary farm management were comparatively unproductive; but since the introduction of bones, after having been dressed for several fallows with sixty or seventy bushels per acre, they have not only become productive, but so much improved in quality as to return an equal crop with a much lighter dressing of manure or bones throughout the next course."

"On the *dry limestone* near Doncaster, the same favorable results have been obtained; and no failures, beyond those attributable to peculiarity of season, are noticed."

On the *Wolds of Yorkshire and Lincolnshire*, it also appears, by the testimony of several extensive farmers, that "before bones were generally used with turnip-seed, many thousand acres were annually sown for that crop without any manure whatever, from the impossibility of getting fold-manure for more than one-third or fourth of their fallows. The turnips upon such unmanured land were consequently very indifferent; and the benefit of sheep feeding upon their tops—for of bottoms they seldom had any—was very trifling. Since the use of bones has, however, become general, the turnip crop has been, in many instances, ten-fold, and in few less than four or five-fold its former bulk. All the suc-

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*Quart. Jour. of Agric., N. S, vol. ii. p. 108.

†About six years ago, a farmer is also said to have obtained a forty-years' lease of a tract of poor land, in a high situation near Rochdale, in Lancashire, on which, after fencing and draining it, he erected a bone mill, and began manuring the ground at the rate of 100 to 130 bushels of bones and dust per acre. The consequence of which was, that in a few years he let off more land than paid the rent of the whole, and retained a large farm in his own hand. The Correspondent of the Quarterly Journal of Agriculture, from whom these details are taken, says 'that one acre would summer a cow of large size, and that some fields were cropped with oats ten or fifteen years in succession; yet that it is surprising to see the herbage which the land still produces, both as to quantity and quality, near one half being white and marl clover.

* Report of the Committe of the Doncaster Agricultural Association, on bone-manure, p. 14.

† Doncaster Report, p. 16.

ceeding crops of grain and seeds have been amazingly increased, and, upon the four or five-shift system, there is no doubt the land will go on progressively improving, requiring a less quantity of bones annually, from its increased fertility and power."

On *light loams*, the return on the Doncaster Committee give bones a preference to farm-yard dung. And we learn that, upon the calcareous soil of the Yorkshire Wolds, heavy crops of turnips have been raised from 16 bushels per acre of bones, while in the same field, and under similar circumstances, but manured from the farm-yard at the rate of from 8 to 10 tons per acre, the turnips have been of the most inferior description.

On *peat soils*, if previously drained and laid dry, their advantages are reported to be so striking, that from fifteen to twenty bushels of dust per acre, drilled, have been also found to very far surpass the ordinary dressing of stable-dung, and even of lime and pigeons' dung.

On *gravels*, the reports are meagre and contradictory, though perhaps reconcilable in principle. as it has been justly observed, that "a gravelly soil may embrace every variety of texture and quality, from the light dry sand to the water-logged yellow clay—preserving in each the necessary admixture of stones and grit." To wet gravel, their application has been found decidedly unfavorable.*

ANALYSIS.

An examination of the component parts of soils, and of the power of bones, when applied to them as manure, would go far to explain the irregularity of their different effects upon various kinds of soil. Bone is known to consist of about equal parts of earthy and animal matter; the former chiefly composed of gypsum—which is of so indistructible a nature as to have been termed, by early chemists, the "earth of bones"—and a small portion of carbonate of lime; from which we may conclude that probably half the weight of bones is in the greater part consumed by plants as direct nourishment in their state of growth, and that the remainder is more gradually absorbed by the soil, as well also as by the plants; for lime, though in small amount, is always present, in greater or less quantity, in all vegetable substances.

"The quantity of earthy matter varies according to the age of the animal; and, in like manner, the quantity of animal matter varies also in proportion to the condition of the animal. In the best kinds of bones for manure, viz., those from fat young animals, perhaps the following proportions may give an approximation to the relative quantities of each in 100 parts:—

Earthy and saline matter,	40	parts.
Cartilage and jelly,	40	
Fatty matter,	20	

The soft parts thus form, in the best bone, about sixty, and upon an average, perhaps, amount to fifty per cent., which are almost entirely constituted of the same elements of plants, and all of them, sooner or later, liable to be dissolved and absorbed by the roots. The cartilage, indeed, when the bones have been buried in a dry situation, is very indestructible; but when exposed to the action of air. water, soil, and vegetation, probably pass into the state of jelly, and be dissolved, or otherwise decomposed, probably at the time when the fatty matter—the decomposition of which begins almost immediately—shall have been nearly exhausted."*

* Doncaster Report, p. 8.

This analysis has been taken from an anonymous essay "on the action of ground bones on plants and soils;" the author of which observes, that "although it be granted that the composition of bones is thus well calculated to afford nourishment to plants, it must be admitted that the amount of their action as a manure still remains in a great measure unexplained. The quantity allowed per acre is not usually more than 10 or 15 cwt., of which not more than a half is efficient as manure; and this is but a small fraction of the weight which we carry off the field in vegetable produce. In these circumstances, we must either leve the matter unresolved, or have recourse to hypothetical explanation, to be confirmed or disproved by future observation." We agree with him in preferring the latter alternative, as best calculated to lead to a discovery of the truth; and as an inquiry into the cause of the different results occasioned by the specific application of bones to every species of soil would only lead us into a wide and probably fruitless discussion, we shall confine ourselves to an account of the analysis given by Mr. G. Sinclair, of the two kinds on which trials are mentioned by him to have been made in Oxfordshire.

That on the land of Sir Charles Throckmorton, on which the bone manure had such beneficial effects, contained in 400 parts:—

Fine siliceous sand, 167 parts. calcareous sand, 43; water of absorption, 99,	309
Decomposing animal and vegetable matter, destructible by fire,	24
Carbonate of lime (impalpable,)	25
Silicia, or the pure earth of flints,	23
Alumina, or the pure matter of clay,	9
Oxide of iron,	3
Soluble animal and vegetable matter principally vegetable extract, with indications of muriate of soda,	5
Moisture and loss,	2
	400

That on the land of Mr. Evans, jun., on which the bone manure appeared to have no beneficial effect, consisted of:—

Calcareous sand and gravel, nearly pure carbonate of lime,	217
Decomposing animal and vegetable matters, destructible by fire,	17
Carbonate of lime (impalpable,)	39
Silicia,	85
Alumina,	20
Oxide of Iron,	5
Soluble matter, principally vegetable extract, with sulphate of lime, or gypsum,	4
Moisture, or loss,	13
	400

On which he remarks, that "the striking and essential point of difference between these two soils consists in the carbonate of lime. In the soil so much benefitted by the bone manure, carbonate of lime is deficient, while in the soil so little benefitted by it, the carbonate of lime is almost in excess; at least, had it not been so much in the form of gravel and sand, the soil would have been what is termed cold. The differences, also, between these two soils, in the coarseness and fineness of their sand and gravel, and the superior quantity of alumina, or clay, in calcareous soil, should not be overlooked."

*Quart. Jour. of Agric., N. S., vol. i. p. 49.

The quantity applied to the siliceous sandy soil, where the bones had such beneficial effects, was 36 bushels per acre, partly supplied from the dog-kennel, and partly purchased. On the calcareous soils, they were applied in a large quantity, and also in a recent state; on which Mr. S. observes, that "animal matter being so much more easily decomposed than vegetable matter, the recent bones must afford nutriment to the soil very speedily;" yet he adds, "that he has always found that both animal and vegetable matter, before they become beneficial to an immediate crop, require a first stage of decomposition, and that this degree of fermentation or decomposition is best effected before these substances are applied to the land."

This accords with the Report of the Doncaster Association, in which it is said "to be acknowledged by their correspondents to be a prevalent opinion among intelligent farmers, that manufactured bones are equal in their effect to raw bones;" in proof of which they instance the following experiments:—

Twenty-four acres having been boned at the rate of 50 bushels per acre, part with bones which had the oil stewed out of them, another part with bones which were full of marrow, and a third part with horses' bones having much flesh upon them. The crop, which was turnips, was all good, but the next crop, where the fleshy bones were laid, was not so good.

Broken bones fresh from dog-kennels were spread on a newly-ploughed clover ley of high sand land, at the rate of 80 bushels per acre, and on the following day sown and harrowed in with wheat; but the crop was bad, and no advantage was observed to be derived from the bones in the succeeding crops. The same experiment was repeated upon a piece of fallow in Blyth Forest, sown with turnips, with similar results; but the same gentleman having sent bones from the dog-kennels to be broken, and then laid upon a heap, and covered with earth, in which state they remained for about a month, after which they were laid upon turnips: their good effects were visible on every yard on which they spread, being the largest and the best turnips in the field, although the other part was manured from the farm-yard, where a considerable quantity of oil-cake had been consumed.

These experiments certainly tend to confirm the fact, that fermentation is requisite to give immediate effect to bones as manure, which is only in accordance with the chemical principles applicable to all animal substances; for we all know, that although flesh, if buried in the earth, will not produce any benefit to the land until it is decom

posed, yet that object once attained, its fertalizing powers are instantly brought into force; but we cannot admit that this warrants the conclusion, "that manufactured bones are equal in their effect to raw bones." They may indeed be superior on a first application; and we make no doubt that when thrown together and rendered putrid, they will become more promptly available than if they had undergone no fermentation whatever. Yet we feel persuaded, both from the nature of animal matter as manure, as well as from much inquiry regarding the practical application of bones, that when deprived by manufacture of the gelatin and oil which they contain, their improvement of the land will not be so durable as when they are laid on raw, or after fermentation when collected in a fresh state.* Many farmers are thus imposed upon by dealers; but the bones are sold to those who are aware of their real value, for much less than the price of those from which the oily substance has been extracted.

COMPOSTS.

The fermentation of bones naturally leads to the consideration of the subject of forming *a compost of bones with earth and other substances*, by a mixture with which they soon become decayed and pulverized—a practice which is stated in the Doncaster Report to have been recommended by several very intelligent farmers, thirteen of whom, solely from the result of their own experience, describe its effects as superior to those of bones used singly. With some of these, it is the practice to mix 50 bushels of bones with 5 loads of burnt clay, or good earth, per acre; by which dressing, the crops between fallow and fallow, excepting clover, appear to have been increased one-fifth in value. Others use forty bushels of bones, broken from two to three inches, in a compost with five loads of farm-yard manure, and a sufficient quantity of earth, the effect of which has been felt on the wheat crop at the end of the four-course system. Many also mix up dung, root, rape dust, and the ashes from weeds and house fires, with the bones, by which great heat, and consequent fermentation, is occasioned.

The most general practice, however, is to form the compost entirely of bones and yard muck, mixed, in various proportions, with

From 50 bushels of bones to	4 or 5	of dung.
20	do.	4	do.
12	do.	8	do.

This, if the heap be well covered, will no doubt decompose the bones very rapidly; and one person states, "that he has used as much as 35 bushels of bone dust, per acre, without manure, in the same field where he laid six loads of fold manure, and ten bushels of bone dust; but the turnips on the part manured with bone dust alone were not so good as those on the part manured with the compost and the succeeding crops were still worse in comparison."

*Besides the various modes already in use of drawing oil and spirits from bones and horn, the cotton manufactures in Lancashire are said to have lately used a glutinous substance, extranted from bones, in the fabrication of the weft of their low-priced cloth; and there are now a number of manufactories of this newly-discovered matter.

As the great amount of bones now actually consumed as manure, besides the quantities applied to other purposes, may reasonably excite an apprehension that the still increasing demand will soon exceed the supply and consequently raise the price, a correspondent of the "Quarterly Journal of Agriculture,"* has suggested the following economical method of employing them, which he has used for the two last years, and by which he states that he has obtained heavy crops of turnips.

He forms a compost, as the manure for one imperial acre, of 8 bushels of coarse bone-dust, with no less than double that quantity of coal-ashes, which may be generally procured for about 5s. per ton. The ashes should be carefully collected in dry weather and placed under cover, in order that they may be kept free of moisture, or, if that be difficult, they may be strewed with a dusting of quick-lime; after which they are to be riddled as small as the dust itself, for otherwise, if sown with a drilling-machine, they will not pass easily through the hopper. The bones are then mixed with the ashes; the mass ferments, and evolves a considerable degree of heat, when they soon become fit for use.

Turnips raised with this compost, he affirms to have always possessed the same characters of a close crop, from root, and hardiness to resist the rigors of winter, that turnips raised with bone-dust alone evince; in proof of which, he has sold them for 7 per acre, to be eaten off by sheep. He however, supposes that it is the bone-dust alone which secures to the crop whatever nourishment may be imparted to it at the future stages of its growth, in which he is doubtless correct; but in imagining that he has thus discovered a more economical mode of their application in their effect upon succeeding crops, we imagine that his further experience will show him that he has been deceived; for although the fermentation of the bones, occasioned by the application of the ashes, may increase their power upon the actual crop, it will be proportionably diminished in those which follow, and we think that the instances which we have already stated must convince practical men that the durability of their influence upon the soil depends on the quantity in which they are applied.

APPLICATION.

Independently of the decided fertalizing properties of bones, when applied to dry and light soils, they have the great advantage of being procurable at a small expense of carriage, which diminishes the labor of teams to a great extent; for one wagon-load of 100 bushels, broken small, will in most cases be found equal to 40 cart-loads of yard manure. They are also capable of being preserved during a long time, when farm business is not pressing; added to which, they leave the land freer from weeds than when it is manured with dung. This and their suitableness to the drill husbandry, renders them peculiarly adapted to the cultivation of turnips—to which, indeed, they have been the most universally applied; and we need not remind our readers, that on the success of that crop generally depends those of the whole succeeding course.—The instances are also numerous, upon all soils, of turnips being destroyed by the fly when sown in drills, having had the manure placed directly under them; when turnips sown in the same field, and on the same day, with bone-dust, have entirely escaped their ravages. Their value to the holders of light soils, in thus enabling them to procure the certain means of improving the returns from their land, by this increase of their quantity of nutritive manure, may therefore be considered inappreciable. It has been stated as the comparative result of some experiments, that bone-dust acts in the cultivation of grain, as compared to the best stable manure, in the following proportions:—namely,

In respect to the quality of the corn, as	7 to 5
In respect to the quantity, as	5 to 4
In respect to the durability of its effects on the soil, as	3 to 2*

We cannot indeed agree altogether in this estimate of its powers, but it requires no further arguments to press its application upon the attention of every farmer, who is in possession of ground to which it is suitable. We shall, therefore, only add the following summary of the rules for its application, as recommended by the members of the Doncaster Agricultural Association, from which it appears—

That on dry sands, limestone, chalk, light loams, and peat, bones are a very highly valuable manure.

That they may be applied to grass with great good effect.

That on arable lands, they may be laid on fallow for turnips, or used for any of the subsequent crops.

That the best method of using them, when broad-cast, is previously to mix them up in a compost with earth, dung, or other manures, and let them lie to ferment.

That if used alone, they may either be drilled with the seed, or sown broad-cast.

That bones which have undergone the process of fermentation are decidedly superior, (in their immediate effects) to those which have not done so.

That the quantity should be about twenty bushels of dust, or forty bushels of large, increasing the quantity if the land be impoverished: and, also, according to our opinion, if the bones have been already manufactured.

That upon clays and heavy loams, it does not yet appear that bones will answer.

On this latter observation, however, a farmer near Nantwich, Cheshire, remarks, that he "occupies a farm in the township of Pickmore, the soil of which is a clay loam, scarcely twelve inches deep, the subsoil a grey sand, mixed with coarse clay—which the farmers call *rammel*—on a bed of

* N. S. Vol. ii. No. 20. p. 258.

* Repertory of Inventions, No. 86.

good clay marl. Two years ago, he covered the field with bone-manure; previous to which the grass was so sour, as not to be worth ten shillings per acre; but is now full of most excellent herbage, consisting of white clover and trefoil;" to which he adds, that "in another of his fields, with a clay soil, a small portion of it was manured, thirty-two years ago, by a former tenant, with bones, and that, although it has been twenty years in tillage, yet that part still shows a superiority over the rest."*

From the Genesee Farmer.

DURABILITY OF WOOD.

The subject of the durability of different kinds of wood when exposed to the action of air and moisture, though one of great importance to the farmer, and the public at large, does not seem to have received that degree of attention and elucidation it deserves. The Teak tree (*Tectona grandis*) of the East Indies, and the Live Oak (*Quercus virens*) of our southern forests, appear to be nearly indistructable when employed as timber, and in naval architecture. But these from their natures cannot be cultivated in the northern States, and we must seek in our forests trees which shall approach or rival the above in excellence and durability. Fortunately these qualities are found nearly in perfection in the Yellow Locust, (*Robinia pseudacacia*,) and the Red Ceder, (*Juniperus virginiana*,) and in a lesser degree in many others, a knowledge of the comparative durability of which, properly ascertained, would be of essential service to the public.

Thirty-two years since, in enclosing some newly cleared field, we had occasion to set some bar posts, and at a point where four fields cornered we placed one so that it served for four pair of bars, one to each field. The post was the common white ceder, (*Cupressus thuyoides*,) cut from a thrifty tree fourteen inches in diameter, the holes on the four sides cut in the usual manner with a narrow axe, the bark stripped from the whole, and the large end set two feet in the earth, which at that place was rather moist. After standing more than twenty years, or until the basswood fences with which it was connected had rotted down, it was removed to another position, where it has since served for two pair of bars and one gate. At the time of removal it appeared quite sound, and present appearances indicate a duration of another twenty years at least. From our experiments we are convinced that large posts are far more durable than small ones, and that those which occupy the whole diameter of the tree, are better than sawed or quartered trees of equal size.

In the Railroad Journal, in an article on the advantages of lime as a preservation of timber, the following instance of its effect on the durability of the White Pine, (*Pinus abies*,) is given. The planks were a parcel of pine planks used as a platform on the ground, on which to make live morter.—This platform was laid by the informant's grandfather in a corner of the yard, and used every year more or less for the purpose of a mortar bed. His father continued it in the same use; himself, the grandson, continued it for a time, as long as he had occasion, after which it lay some years unused, and overgrown with grass and weeds. At length wanting the ground for another purpose, he had it torn up and removed, expecting to find the planks entirely rotted, but to his surprise found them sound, and, to use his own forcible expression, "as hard as a bull's horn." This was after they had lain exposed to all the vicissitudes of the atmosphere, and in contact with the surface of the earth, about sixty years.

In the year 1800, a Mr. Atkinson, in the employ of the Hudson's Bay Fur Company, discovered on old Factory Island, in James's Bay, a Branch of the Hudson's Bay, a ceder post, about a foot square and five feet high, on which the following inscription had been cut, and all the letters of which were distinctly visible: "In the year 1692 wintered three ships at this Island, with one hundred and twenty-seven men, under the government of Captain Ganes Knight. Then we erected this monument in remembrance of it."

This furnishes the greatest instance of duration of timber set in the earth, and constantly exposed to atmospheric influences, we have any where noticed, and we believe there are few kinds of timber which would endure so long. This notice does not state the kind of ceder employed, but from its frequency on those islands and coasts, there can be no doubt of its being the red ceder, a kind which, as stated above, is almost imperishable.

Next to the kinds above stated, rank in durability the various kinds of pine and spruce; the white oak, chestnut, red elm, black walnut, and red beach; all furnishing timber of good quality, but not such as will, like the above, resist for a long period the attacks of time. In purchasing timber, price should not be so much regarded as quality and durability, as a rail or a post that will last fifty or sixty years, is worth far more than the usual difference charged between such, and those which will endure only twenty-five or thirty.

*New Farmes's Magazine, No. 82, December, 1833.

MANUFACTURE OF BEET-ROOT SUGAR IN RUSSIA.

SIR.—The manufacture of beet-root into sugar in the Russian empire has of late become very extensive; there are already no less than twenty-five large establishments for this purpose in different parts. Thinking that the following account of one of the principal of these establishments, viz. Micharlofsky Sugar-works in the government of Tula, the property of Count Bobrinsky, may be interesting to the English public, I send it for insertion in your widely circulated Journal:—

The quantity of beet worked in the year 1835 was 260,000 poods=to 85,357 cwt. 0 qr. 16 lbs.; the sugar produced from it, 15,600 poods=5014 cwt. 1 qr. 4 lbs.

Price of a pood of beet	15 copecks.
Expense in working do.	35 do.

Produce of one pood of beet $2\frac{3}{5}$ lbs., of raw sugar at 1 ro. 10 co. per lb.

The number of men employed 250.

The quantity of land required to produce the beet 350 deciatines=945 acres.

The beet is generally taken from the peasentry instead of the obrok or fine they, as serfs, would have to pay their baren.

The proprietor of this manufactory is an accomplished and amiable nobleman; his experiment in this case has been highly successful.

One great evil is the impossibility hitherto experienced of keeping the roots any length of time, which makes it expedient they should be worked as soon as possible after they are taken from the ground.

I have been favored with a specimen of raw and refined sugar from these works, of which I send you a small sample, and am only sorry the distance does not allow me to send a larger one.

The Russian lb. is equal to $14\frac{1}{4}$ oz. English; a pood 40 lbs. Russia=36 lbs. English; a rouble=100 copecks; sterling value $10\frac{1}{2}$d.

Your constant reader,

J. K.

PETERSBURG, June, 25, 1836.

[The samples sent are excellent; the raw sugar not quite so good as that from the cane, but the refined equal to the best products of our refineries ED. M. M.]

FRAME BRIDGES.

The subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq., (Civil Engineer,)	Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tilison,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.
Rochester, May 22d, 1836. 19y-tf.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings o every description.

The collection of Patterns for Machinery, is no equalled in the United States. 9—1y

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
New-York, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that th y are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron 4—ytf

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Bray's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Dechertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at No. 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is $500,000 with liberty to increase to $800,000, divided into shares of $100 each.

The sum of $5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I. BLAIR,
JOSEPH E. EDSALL,
COMMISSIONERS

Dated Oct. 3rd, 1836 41—9t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County. State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf.

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

										lbs.	
350	tons	$2\frac{1}{4}$	by	$\frac{5}{8}$,	15 ft in length,		weighing			$4\frac{68}{100}$	per ft.
280	"	2	"	$\frac{1}{2}$,	"		"		"	$3\frac{50}{100}$	"
70	"	$1\frac{1}{2}$	"	$\frac{3}{8}$,	"		"		"	$2\frac{1}{2}$	"
80	"	$1\frac{1}{4}$	"	$\frac{3}{8}$,	"		"		"	$1\frac{25}{100}$	"
90	"	1	"	$\frac{3}{8}$,	"		"		"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½, 3, 3¼, 3½, 3½, and 3¾ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.
28-tf Philadelphia, No. 4, South Front st.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS
Also, Flange Tires, turned complete
18 ROGERS, KETCHUM & GROSVENOR

TO RAILROAD CONTRACTORS.

PROPOSALS will be received at the town of Lindon, until the 20th day of December next, for the graduation of the Lindon Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Lindon, for ten days previous to the letting, and all other information given on application to the subscriber, or the Assistant Engineer.

PROPOSALS will also be received at the same time and place, for furnishing and delivering at Beckley's Landing, 95,000 feet (L. M.) of long leaf pine or cypress scantling, sawed 5 by 9 inches, to be free from sap, knots or wind shakes, and 20, 25 and 30 feet long. Also 60,000 feet, or more, (L. M.) of white, or post oak scantling, sawed 5 by 7 inches, length to be specified hereafter, and 60,000 feet (L. M.) of white or post oak plank, 2 inches thick, 1 foot wide and 15 feet long.

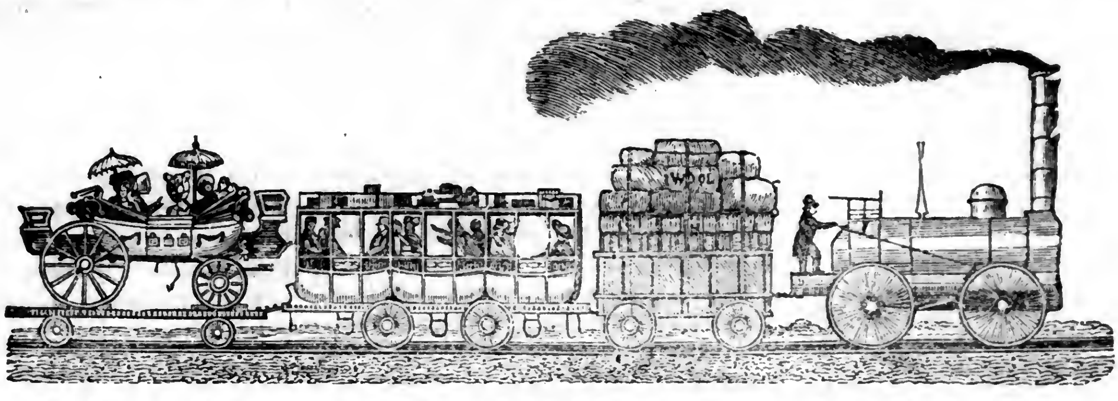
Also for furnishing and delivering on the line of the road 10,500 undressed post oak logs, 8 feet long, and 10 to 15 inches in diameter.

Also for furnishing and delivering 3,160 post oak caps, dressed 8 by 10 inches, 8 feet long, and 6,320 post oak posts, dressed 10 inches square and of lengths hereafter to be specified.

Recommendations will be expected in all cases, of persons not known to the officers of the Company, or to the Engineer. For the information of persons at a distance, I would state, that the Lindon Railroad commences at Beckley's Landing on the Tombeckby River, a stream navigated by Steamboats the greater portion of the year;—and having a direct communication with Mobile and New-Orleans will afford the facility of procuring supplies and implements necessary for the hands employed on the work, or their ready conveyance hither, if procured at a distance.

Persons having mills on the river and disposed to contract for furnishing timber, will have the facility of delivering it by water communication. The country through which the road passes, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season, renders the contract peculiarly desirable to those wanting winter employment

D. H. BINGHAM, C. E.
Lindon, Ala., Sept. 17, 1836. 41—3t



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, NOVEMBER 12, 1836. [VOLUME V.—No. 45.

CONTENTS:

Our items of foreign Scientific Intelligence are of unusual interest.

Among others we regret the death of Dr. Henry one of the most able chemists of our day.

For the American Railroad Journal.

MOUNT CARMEL AND ALTON RAILROAD.

A meeting of the Stockholders of the Mount Carmel and Alton Railroad Company, was holden at Carlyle, Clinton county, Illinois, on the 10th Oct. last. The commissioners from the respective counties, having declared that one thousand shares of the stock had been taken up, the meeting proceeded to elect the following gentlemen to fill the Board of Directors. Thos. S. Hinde and Scoby Stewart, Esqrs. of Wabash county; George Howes, Esqr. of Edwards county,—Samuel Leech and R. B. Slocumb, Esqrs. of Wayne county, M. M. Pace, Esq. of Marion county, Zophat Case, Esq. of Clinton county, B. F. Edwards and Calvin Reiley, Esq. of Madison county. At the first meeting of Directors, George Flower, Esq. was chosen President of the Board.

The utmost unanimity and harmony prevailed in the meeting; no jealousies arising from local interests were apparent; each county seemed to vie with the rest in a display of courtesy and liberality, and all evince sentiments of mutual respect and confidence. This may be hailed as an auspicious commencement of this great work of Internal Improvement, and it may confidently be anticipated that it will be prosecuted with a spirit and vigor, proportionate to its immense importance.

The organization of this company may be considered as the foundation stone of a Railroad, to connect the Ohio at Louisville, with the Mississippi at Alton, and St. Louis. At or near the meridian line it will intersect the central Railroad, running north and south from the junction of the Michigan canal with the Illinois river, to the mouth of the Ohio. Those beautiful, fertile, and healthy Prairies, intersected with belts of rich woodlands, hitherto overlooked and neglected, because remote from navigation; being traversed by this road, will be brought into immediate requisition, a Railroad being preferable to a navigable river; inasmuch as it affords equal facilities for the transportation of produce and merchandize without being to so great inconvenience and risk; to say nothing of the sickness that is almost uniformly experienced by those who locate themselves in the immediate vicinity of our navigable streams. It may also be remarked, that the want of timber, an objection commonly urged against the Prairie country, will be obviated by this road—for as distance may figuratively be said to be annihilated by railroad facilities—as the country is said to be brought into immediate connection with the city, so will timber be placed within reach of the settler in the centre of a Prairie, however isolated his location may be.

The general appearance of these extensive Prairies, lavishly embellished with all the beauties that nature has to display, and far exceeding the effect of any imitation that art, aided by unbounded wealth, has ever produced, has been already noticed by different writers, and sufficiently enlarged upon; but the exhilerating—the enchanting effect upon the spirits, and upon the imagination of the traveller, as he rides through them, cannot be described—it can only be experienced.

But the ultimate importance of this road should not be estimated merely by its effects upon the agriculture and commerce of the two flourishing States through which it will run, nor by the extensive commerce that is now carried on between the important cities upon the Ohio and Mississippi which it will connect. This road may be regarded as a branch of the Charleston and Cincinnati Railroad, forming a portion of the great highway, leading through the very centre of the United States; from the shores of the Atlantic, and even from those of Lake Erie to the Mississippi; crossing the Wabash at the foot of the Grand Rapids immediately below the mouth of white river, where the rapidly increasing town of Mount Carmel stands; and where the unlimited water power may be presumed of itself sufficient to afford a valuable portion of business for this road; diverging north and south in the centre of Illinois by the central Railroad, again communicating with the northeast, north and northwest, up the Illinois, Mississippi, and Missouri rivers, with the south, down the Mississippi; and extending its advantages to the vast and fertile regions west of that river.

As we contemplate the settlement and improvement of this State—of the State, and Territory of Missouri, and of the Territory of Oregon; so may we contemplate the endlessly increasing traffic that must be carried on upon this road! But if we take

a prospective view of the continuation of this great work, the prospect almost bewilders the imagination—it extends to the shores of the Pacific Ocean !!

Little need be said to demonstrate the superiority of inland communication, by means of Railroads, over steamboat conveyance upon the rivers; it is sufficient to point at the saving in point of time—at the diminished price of transportation—at the diminished risk—and more particularly at the number of months in every year, when the navigation of our rivers is obstructed by shoals, by sand-bars, and by ice.

The advantage that this route will enjoy over the northern route by way of the Lakes is equally apparent. The inconveniences arising from protracted winters, and from the dangers of the Lake navigation, are sufficiently attested by the preference given by New-York forwarding merchants to the southern route, by way of the Columbia Railroad and Pennsylvania canal.

The face of the country upon the greater part of the line that the road will take through this State, is peculiarly favorable to the construction of a Railroad, as upon no part of it can any serious difficulty be discovered. The same remark will apply to the greater part of the route through Indiana. It may indeed safely be asserted, that fewer difficulties present themselves upon the line of this road; than would be met with upon any route that can be pointed out, running the same number of miles through any other portion of the United States. H. R.

Albion, October 24, 1835.

We lay before our readers the cut and description of the improved wheel for Railroad Cars invented by Dr. Plantou of Baltimore.

The simplicity of its arrangement and the advantages proposed to be gained therefrom are so obvious as hardly to require further explanation.

The intention of the inventor is to dispense with the axletree and thus remove the cause of a long train of accidents consequent upon the breaking of this part of the Car. By this means he considers that in adding to the safety of railroad transit he has removed one of the greatest objections to this mode of conveyance.

The inventor also considers that the situation of the center of gravity in relation to the point of support, is another advantage in the machine.

He also considers that the liability of a car to be thrown from the track is greatly diminished in this form of car, that the wheels have a tendency to counteract the effect of any obstacle, to throw them off, at the same time that their freedom of motion corrects the swinging motion produced by any inequality in the rail.

This leads us to another advantage claimed by the inventor, and one, too, of first importance.

It is the superior capacity for turning short curves which this wheel possesses over every other, adapting itself to every degree of curvature in the rails with the greatest ease and having no tendency to fly from the track.

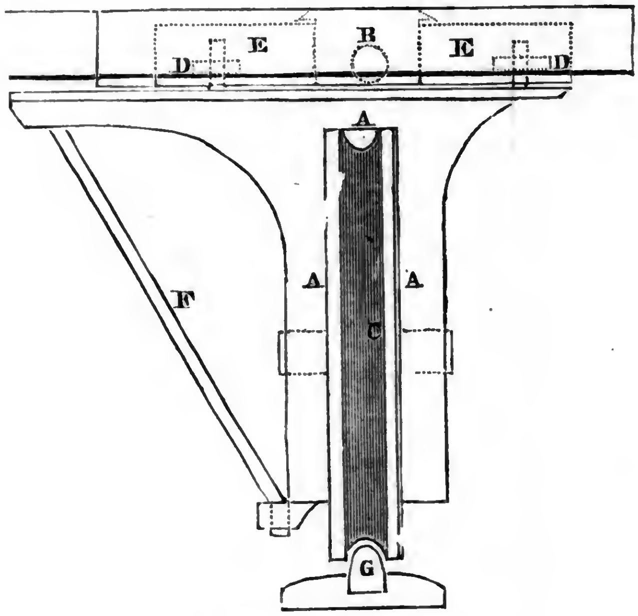
We have seen testimonials from gentlemen of much experience in the profession, giving great credit to the inventor for his ingenuity.

The advantages proposed, are such as to render the plan worthy of serious examination, as any guarantee for safety is deserving of the highest credit.

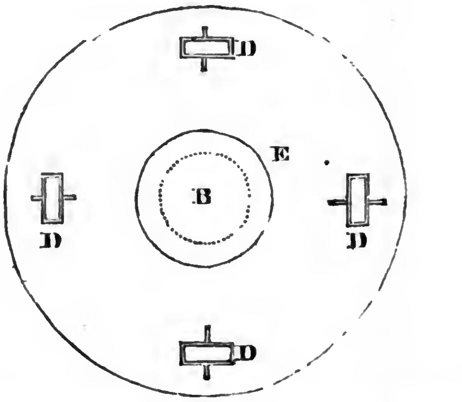
Dr. Plantou has placed his model in the rooms of the American Institute where he would be happy to give any information respecting his invention.

DESCRIPTION OF THE ENGRAVINGS.

A The standard for the Wheel.
B Neck of ditto acting as a Pivot.
C Grooved Wheel working in the fork A.
E Metal plate at the bottom of the Cars.
D Friction rollers in the metal Plate.
F Side braces to steady A.
G Rail with rounded edges.



Top view of the metal plate E.



AVERY'S ROTARY ENGINE.

The numerous inquiries, from every part of the country, in relation to this simple, yet extraordinary engine, require me to publish such facts as have come to my knowledge, testing its wonderful power,—and establishing its value both in relation to its *original cost*, and the cost of *fuel* to keep it in operation.

This engine works *without* a *piston*, and with a constant flow of steam, and therefore, say those who do *not* understand it, without the benefit of its *expansion* and of course with a great *waste* of steam. In reply to this objection I will observe that the construction of this engine is such as to avoid, probably, nine tenths of the friction of the *piston* engine, as it has only to overcome the friction of *two* journals (of $1\frac{1}{4}$ in. diameter) and the resistance to the *arms* of a highly rarefied atmosphere as they re

volve within the case. There is no *fly-wheel* to carry, and no crank to pass the center, as in the piston engine, but a *constant* and *perfect* application of power, at the *end of a Lever,* the end of which moves through the space of eight to twelve miles per minute; or to express it in a different manner, with a lever—the arms of the engine—30 inches in length, having apertures equal to $\frac{1}{16}$th of a square inch and working steam at 120lbs to the square inch, we have a *pressure* at the aperture, or at the end of the lever, equal to 12lbs; and this *pressure,* or *weight* revolves through the space of 8 to 12 miles in a minute, giving us power, less the friction, equal to that of a canon ball of 12lbs. projected at an equal velocity, and this power may, I have no doubt, be increased as the *length* of the arm, the size of the *aperture,* and the *pressure* of steam on the boiler shall be increased.

Having the power we have only to apply it to useful purposes, and this *has* been, and is *now* done in various ways, in different parts of the country.

This engine is peculiarly appropriate for all purposes which require rapid, and uniform motion, and it will be found highly economical both in its first cost and the *cost* of *fuel.*

One of its great advantages may be said to consist in the perfection, and high velocity, of its motion—as we have *in all* cases to geer *down,* instead of *up,* to the work—which may almost be said to give us the power of gravity, in addition to that of steam. Another important recommendation is its *simplicity.* It consists only of a shaft of 1 to $1\frac{1}{2}$ inches in diameter, about 30 inches in length, with two *bearings,* or journals, and at right angles to this shaft the *two arms,* or a flat bar of cast steel 5 feet in length and 4 inches in width, one inch thick in the centre and $\frac{3}{8}$ thick at the ends. The shaft passes through the centre of the arms, which are made fast to, and revolve with the shaft, which is also hollow at one end, or as far as the arms—receiving the steam through $1\frac{1}{4}$ inch pipe, from the Boiler, and passing it into the arms. The shaft passes at right angles through the centre of, and the arms revolve *within,* a cast iron case—which may be represented by two large earthen plates turned inside together and standing up edgewise. On the shaft at the end, opposite to where the steam is received, is a pulley 5 inches in diameter, from which the *band* passes to a large pulley on the line shaft and from which the *power* is applied to any machinery, with any velocity that may be required. A 25 horse engine consists of the shaft and arms, made of cast steel, weighing 65 or 70 lbs—and of a cast iron case weighing about five or six hundred lbs—of course there is very little to get out of order, or to require an *Engineer* to superintend, consequently the expense of *attendance* and *repairs* will be materially reduced, as well as those of *first cost* and *fuel.*

There is no power probably so perfect for *Cotton* and silk, spinning and weaving, or for *Flouring,* and Saw-mills, for machine shops or for Sugar and Rolling mills, and indeed for *any* purpose where a rapid and perfect motion is required as AVERY'S ROTARY ENGINE; and those who have used both, the Piston and the Rotary Engine, as well as those who have examined both with a view of using *one,* or the *other* as they should become satisfied of its superiority, or economy in fuel, have given a *decided preference to the Rotary*—and others who are now, and have been for many years, using the Piston Engine are satisfied of the economy, both in the cost of fuel and *Engine,* of the Rotary; and one such, at least, who is now using a first rate *Piston* Engine in a *saw-mill,* has ordered a *Rotary,* to be used in its stead, because he is satisfied that he can save the cost of the Engine out of *one years* fuel.

The expense of a Rotary Engine of *twenty* horse power *without* Boilers and gearing, is *six hundred* dollars at the shop—and with *Boilers, pumps, pipes, gearing and machinery* for a saw mill with *two saws* up to the cranks to which the saws are attached is from $2000, to $2200,—and such a mill will saw from *four to five* thousand feet pine to each saw, *every twelve* hours. A mill of this description on the St Clair river, in Michigan, *averaged over 4000 feet to a saw,* for *every day,* except Sundays, *from the middle of April to the 1st of August, without any other fuel than its slabs and saw dust.*

In reply to the objection raised by those who say it requires *more* steam than a piston engine, it is sufficient to say that *one hundred* lbs., of *Pea coal per hour* is all that is required to drive a *twenty horse* Engine—and that even a *less* quantity than that is used in a Saw mill in constant use in this city.

The following statement is from John Harris, Esq., the Engineer and Agent of a Goldmine at Mecklenburgh, North Carolina. Mr. Harris was much opposed to having it put up, as he had no confidence in it—but after using it for nearly a year he speaks of it as follows—

"The estimated capacity or power, of this Engine was considered by the maker to be equal to twenty horses, which power it has generally performed since it has been in full operation, so considered by myself as well as others employed at the establishment.

The Engine, since its erection, has been kept in constant operation, Sundays and accidents excepted.

When in full operation, as all the machinery has been for four months past, 3 cords of wood has been found sufficient to raise steam enough to carry the whole machinery 24 hours.

The quantity of water evaporated *per hour,* as near as I could ascertain, when in full operation, has been about 60 gallons, or *three* gallons to *each horse power.*

The Engine was first started about the beginning of Sept. 1835, and continued to work the pump and four mills only, until March, 1836, at which time the whole machinery was attached, making altogether nearly 10 months.

The cost of repairs has been very trifling. The whole expense of repairs, that could properly be said to belong to the engine during the whole time, will not exceed ten dollars.

With careful attention it is not liable to get out of order.

The cost compared with a Piston engine of equal power will not, I presume, much exceed one half that of the Piston engine.

If I were in want of another engine of about 20 horse power I would certainly prefer the Rotary to the Piston engine.

In conclusion sir, after answering your several questions, permit me to state that *in my opinion, the Rotary is preferable in many respects to the Piston Engine. It can be attended by persons of less skill, is less expensive in transportation, and less expensive in erection than engines generally of the piston kind.* I am sir, very respectfully, Yours' &c.

JOHN HARRIS.

The following letter is from gentlemen who have a Saw Mill in the town of Clay, Onondaga Co.

Clay, June 11, 1836.

GENTLEMEN.—We give it as our opinion from what knowledge we have of the Rotary Engine, that it is preferable to the Piston.

The slabs and saw dust during the summer will nearly keep the Mill in operation.

The average business of the Mill in sawing custom logs is about four thousand feet, and the Mill has cut over seven thousand feet out of a choice lot of logs.

J. FREEMAN,
E. L. SAWER,
J. W. SCHROEPPEL.

Messrs. E. LYNDS & SON. and
W. AVERY.

The following statement shows the work done by Isaac Pierce's *Mahogany* Sawmill at 91 Attorney Street, N. Y.

"The arms of the engine are 30 inches long from the centre of the shaft to the apertures, and the apertures are each the $\frac{1}{16}$ of a square inch.

"The following machines are all attached to, and operated by it, viz.:—

"1 upright saw with 30 inch stroke, or 15 inch crank.

"1 buzz saw, 24 inch, cutting a kerf of $\frac{3}{16}$ of an inch, with 22 to 2400 revolutions per minute.

"3-24 inch circular veneering saws.
"1-26 " " "
"1-27 " " " " varying from 12 to 1500 revolutions per minute

"1-15 inch bus saw, with 1200 revolutions per minute, and

"1 wrap saw for curves, with 9 inch sweep and 250 strokes per minute.

"1 grindstone.

"1 blower for the furnace.

"And the pump raising water 30 feet into a reservoir for its own use.

"The boiler now in use was made for a piston engine, and was intended for 15 horse power.

The following letter is written by Professor James Renwick of Columbia College, who has examined the engine and its performance.

To D. K. Minor.—I have seen the engine upon Avery's principle which is employed in the Saw mill in Attorney street, and witnessed its operation. Its performance appears to be fairly set forth and not over estimated in the article from the Mechanics Magazine for April, page 244. In comparing this engine with those of other forms, it is obvious that there is a very great saving in the original cost of the apparatus working with equal power. In respect to the saving of fuel, this is also great, when compared with that expended in engines as they are most generally employed; and the quantity consumed does not exceed that used in the most advantageous application of the condensing engine, where the work performed, by a given quantity of coal, has been quadrupled. Compared with the ordinary high pressure engines, the fuel employed appears to be reduced in the proportion of one to three. I cannot but believe, that the engine of Avery will, in many cases, be found more economic and efficient, than any other form which has hitherto been used.

Jas. Renwick.

Columbia College, 11th July, 1836.

☞ With the above statement of facts within my own knowledge, and the statement of those who have used them, and examined them with care, I ask the attention of those who are in want of Engines, to AVERY'S ROTARY ENGINE — and for more definite information refer them to Mr. Joseph Curtis, who is now ready to receive and execute orders at the "Novelty Works," N. Y.

D. K. Minor, 132 Nassau-st.

November 1st, 1836.

We lay before our readers the proceedings of the British Scientific Association, convinced that they will be perused with no ordinary interest.

The account of the Clifton Suspension Bridge will be carefully considered as we are now about to make a similar attempt.

The experiments of Mr. Cross have *electrified* the Scientific world. His discoveries are moved abroad with an activity that designates them as the most curious of modern times.

The results of the labors of this Association are pregnant with instruction to us and our Lyceums. We shall dwell upon this on another occasion.

BRITISH SCIENTIFIC ASSOCIATION.

Clifton suspension bridge.—As soon as the time for holding the meeting of the Association was definitively fixed, the Trustees and Committee for building this bridge determined to take advantage of so great and interesting an occasion to lay the first stone of this structure, and this (Saturday) was the day chosen for the ceremony. On account of the tide it was necessary to appoint so early an hour as eight o'clock. In the absence of the Marquis of Lansdowne, the President of the Association, the Marquis of Northampton, who had officiated for that nobleman, during the meeting, consented to lay this stone. The morning was brilliant, and at six o'clock persons began to assemble on the rocks, and down from which any prospect of what was going on could be obtained. The ferry-boats were also put in requisition, and a fine harvest they must have had. It had been appointed that the Trustees and Committee, and those gentlemen who intended forming a part of the procession, should meet at the ferry-house on the Leigh-wood side at 8 o'clock; and tickets were issued for the purpose of admitting those gentlemen within the enclosure. The scene at half-past seven was very pleasing. There were a great number of steam-vessels in Cumberland-basin, and they all covered their ropes with colors of every kind. The gentlemen who intended to see the stone deposited now arrived very quickly, and a procession was immediately formed under the direction of Captain Claxton, who is certainly the most active man in Bristol, for we have seen him acting, and well too, as grand manager of almost every thing. The procession was formed in the following order, first—an immense number of flags, then a band of music, the Architect carrying the inscribed-plate, the trowel, and the mallet, after which the Trustees, the Committee, and the general friends of the present undertaking.—The Marquis of Northampton now approached in a carriage with six grays. As we ascended the steep hill the scene was most animated. On the opposite bank every window was filled, and an immense crowd lined the shore. On arriving at the entrance to the wood his Lordship descended from his carriage, and followed the architect Mr. Brunel, Jr., being close behind him.—From the trees in every direction were hung innumerable flags, belonging to the different ships in the harbor, and these continued until we came to an opening in the wood, which gave us a glimpse of such a sight as could no where else be seen. The beautiful down and rocks of Clifton were before us, and wherever a human being could stand that place was occupied. We here descended a long flight of steps, made sufficiently wide to carry four persons abreast, until we came to the stone itself. Around and above this were platforms and galleries, formed in so excellent a manner as to accommodate with comfort and safety all those who had obtained tickets of admission. We now had the full view of that which we had before only seen imperfectly. The height was such that we had a most expansive view, and so far as the eye could reach on either side, the ground, so far as was practicable, was covered by human beings, and we should think that all the respectable portion of the inhabitants graced the scene with their presence. The river was also covered with boats, the rowers being dressed in their regatta dresses. A number of coins, comprising every coin now circulated, from the double sovereign to the farthing, were deposited in an aperture made for them by the Noble Marquis.—His Lordship then placed the inscription-plate under the stone; on this stone the following were given as the dimensions of the bridge:—

Distance between the two points of suspension, - -	700 feet.
Length of suspended roadway,	630
Height of roadway, - -	230
Total width of floor, - -	34

His Lordship then covered this with mortar, and put the Act of Parliament for making the bridge, and a plate, being one of a breakfast set which Mr. Ivatt, of the Gloucester Hotel, had had manufactured for the public breakfast at his house this morning, having a representation of the bridge upon it, under the stone, which was then lowered to its ultimate place of destination. A trumpet was then blown, and the people on the Leigh-wood side gave three hearty cheers. The trumpet was blown again, and the cheers were responded from the opposite shore. A third blast, and the vessels below cheered. The Marquis then said, that it was his great pride and pleasure to come and lay the first stone of this magnificent edifice. In coming there he felt that the compliment had been paid not to him as an individual, but to the association of which he was now the humble representative, and he hoped the present moment would be the union of science and commerce. He would express a hope that that association might last as long as that edifice, and he trusted both would last to the end of the world. (Loud cheers.)—He would not conclude without proposing three cheers for Mr. Vick for his legacy; three cheers for Mr. Miles, for his gift of the stone; and three cheers for Mr. J. A. Gordon for his munificent donation. (Three cheers were given with great enthusiasm.) The procession then returned to Ivatt's Hotel, where a splendid breakfast was laid out, and where were met upwards of 300 friends to science, among whom we noticed the head of the association. Mr. Brunel did not cross the chasm on the iron bar as was anticipated, owing, as it was supposed, to the bar having been considerably twisted by its fall. A new bar is being made. Several votes of thanks were agreed to.

At the Meeting of the Association the same day, Professor Henslow and Mr. Davies Gilbert returned thanks to the various proprietors of manufactories who had so liberally thrown them open to the inspection of the members, the latter remarking that hitherto the prevalent and principal defect of such establishments was, that they were kept secret, whereas by the admission of men of science, he felt persuaded that suggestions would frequently be thrown out which might practically be acted upon with the best advantage. The Rev, Vernon Harcourt proposed, and Dr. Roget

seconded, a resolution of thanks to the various distinguished foreigners who had honored the Association by their presence on this occasion. Baron Charles Dupin, of the Academie des Science, in acknowledging the above, expressed his gratification at that cordial feeling which existed between Great Britain and France in scientific objects. During the period of war with this country, whenever Sir Joseph Banks made an application to the French Government for the restoration of any man of science or Fellow of the Royal Society, he was always liberated. At the height of the war, likewise, the medal of the Royal Society had been voted to M. Maleshe̱rbes, one of his countrymen. He had paid a visit to Bristol about 18 years ago, and congratulated the meeting on the improvements which since that time had taken place, and in those efforts which she was the first to undertake of establishing a steam communication with America. The resolution was likewise acknowledged by Professor Hare, of Philadelphia, and Dr. Simon.—Various other resolutions were proposed, and after three cheers had been given to the President, the meeting adjourned.—[Times.]

Bristol, Aug. 24.—At an early hour this morning the number of members who had entered their names was 1,287, and which, from the advanced period of the week, may be considered nearly the total number of those who will visit the Association on the present occasion. The sectional rooms were all well attended, and several contributions of great interest were made. The interest to many of the ceremony of laying the foundation of the suspension bridge at Clifton, on Saturday, will be diminished by an unfortunate accident which occurred to the iron bar this morning. This gigantic rod had been safely drawn across the immense chasm over the river; but whilst the workmen were engaged in placing the end in its position, it fell down into the bed of the river, obstructing the passage, and the whole being so much bent as to render its restoration for the present almost impossible. This accident was occasioned by the rope which was attached to it being cut through and giving way, and in its fall knocked down a scaffolding, by which one man was severely injured.

At the statistical section this morning, after a communication had been made by Mr. W. Creig on statistical desiderata, and on the deficiencies and errors of such reports in general, Dr. Lardner made some remarks on the effects of railroads in internal communications. The average of such as are in present operation, namely, Liverpool and Manchester, Newcastle and Hexham, and Dublin and Kingstown, showed an increase in the number of passengers of at least four to one. This great increase was to be attributed not so much to economy of expense, as of time and exemption from fatigue as was shown in one instance, in which the cost was actually greater than before. A coincidence was exhibited in the canal boats between Edinburgh and Glasgow, in which the speed attained was ten miles an hour, and the cost had been reduced to one quarter of that of other modes of conveyance, but in which, the journey lasting longer, the passengers were proportionably few. On the Liverpool and Manchester Railway the expence of conveyance to each passenger, in the supply and repair of engines, average one penny per mile, whilst an experienced engineer has made a contract for four years to supply and maintain the carriages on the London and Birmingham line for one farthing per mile for each passenger. On the line now in progress between this city and the metropolis it was proposed to employ three separate trains; that for heavy goods to proceed at night; one for the conveyance of mails and a select number of passengers, in which it was not impossible that a speed of 50 miles per hour might be maintained; and the third for ordinary conveyance, at a speed of about 30 miles. Dr. Lardner also mentioned a fact respecting the employment of railroads in America, that notwithstanding all the navigable resources of the Hudson, it was in contemplation to establish a line of railroad on the banks of that river. Mr. J. Taylor read a paper replete with interesting facts on the statistics of mining in England, and Europe generally.

The evening meeting held at the theatre, was equally well attended with that of the preceding Monday. The Rev. W. F. Coneybeare, V.P., was in the chair. A letter was read from Sir J. Hershell, addressed to Sir W. Hamilton, giving a detail of some of his observations on the nebulæ, since his arrival at the Cape of Good Hope, which communication was forwarded by him for the purpose of being read at the meeting. Since his arrival in the country he had discovered a large collection of nebulæ of all sorts, descriptions of which he had forwarded to Professor Schumacker for insertion in his annual Ephemeris. The general aspect of the southern region he described to be of a high degree of richness and brilliancy from Orion to Antinous, presenting a blaze of light, with, however, a few patches which were destitute of stars. It was impossible to view this zone with the surrounding stars without an impression that the milky way was but an *annulus*, and that our own system was placed in the most desolate part. The Magellanic clouds presented curious objects, appearing as if they differed from other celestial phenomena, in a different degree of condensation in the stars of which they were composed. The great nebula in Orion was much more bright than when seen in our own latitudes, and the planetary nebulæ were numerous and highly characteristic, five of them being as sharply terminated as any planetary bodies, and it was not until after he had submitted one to many careful examinations that he was convinced it was not a new discovery. The clearness of the climate was shown by the fact that in 43 days there were only three in which Venus was not seen in broad daylight by an ordinary observer. Dr. Apjohn next read an abstract of the papers that had been read in the morning at the section for chemistry, one of which, by Professor Daubeny, on the nature and origin of thermal springs, elicited a considerable discussion, the former giving it as his opinion that they were always produced by latent or dormant volcanic action, and adducing the geological characteristics of those in this vicinity in support of the theory, and likewise advancing views respecting the productions of subterranean heat from chemical changes below the surface of the earth. In reply to these observations, and in support of the ordinarily received views of central heat, Professor Philips gave several instances of investigations recently made on the subject at various depths, and with instruments provided for the purpose by the Association. In a mine at Newcastle, 280 yards below the surface, the external atmosphere averaging 47½ deg., the thermometer stood at 64 deg., being an augmentation of nearly 1 deg., for every fifteen yards, a proportionate average which in a variety of other cases was almost the same. In a mine at Manchester, 337 yards below the surface, the external atmosphere being 49, the thermometer stood at 62; in a salt mine, 112 feet deep, 52 deg., whilst on the surface it was 47; and in a mine near Bristol, within the last few days, 170 yards below the surface, the external atmosphere being 42 deg. it stood at 64 deg. Mr. Taylor in support of these views, gave a recent instance of examination in a pit, 1,740 yards deep, in which the temperature was 97 deg. At the conclusion of the discussion, the arrangements for the ensuing day were announced and the meeting adjourned until Friday.

Aug. 25.—The varied engagements which have occupied the attention of the members throughout the whole of the week do not appear in the slightest degree to have weakened their interest, as was displayed in the continued full attendance at the sectional meetings this morning. In consequence of a contemplated botanical excursion to-morrow—one to Portshead in a steamer provided gratuitously for the occasion—this section prolonged its sitting this afternoon, and terminated its proceedings for the present session.

At the statistical section an interesting communication was made by Prof. Forbes on the relative height, weight, and strength of the Belgian, English, Scotch, and Irish nations, the comparison being the least favorable to the former, and the most so to the latter. The experiments from which these deductions were made were conducted from those made by Professor Quteler at the meeting of the Association in Cambridge, the average height of the Belgian was stated at 5 feet 7 $\frac{8}{10}$ inches; English, 5 feet 9 inches; Scotch, 5 feet 9 $\frac{3}{10}$ inches; and Irish, 5 feet 10 $\frac{1}{10}$ inches. [These proportions seems to us considerably exaggerated.] The strength of the Belgian was also less than that of the English by 50 lb.; in every case of experiment, 25 years being taken as the age of maturity. Baron C. Dupin whose name has so long been known in connection with English statistical inquiries, next exhibited two maps of this kingdom, in which the several counties were shaded according to the denstity of population and proportionate criminality. The deductions formed from his inquiries into

the latter were as follows:—He calculated six different degrees of density of population to 1,000 acres.—Firstly, 100 inhabitants to 1,000 acres; secondly, 218; thirdly, 465; fourthly, 555; fifthly, 1,100; and sixthly, which is in highly populated counties, such as Middlesex, 7,000 inhabitants to the 1,000 acres. In the first district, the proportion of offenders to the population would be 1 to 2,963: in the second, 1 to 1,427; in the third, 1 to 593; in the fourth, 1 to 550; in the fifth, 1 to 498; and in the sixth, 1 to 558. In Irelan l the same proportionate regularity did not exist, as there society was not in such a state as to allow the laws to be fully developed; and although the population was more condensed there was less crime in the north than in the south, owing to the more industrious habits, the greater degree of education, and comfort of the inhabitants. Some curious comparisons were next given of the relative ages, of criminals in England and France, in which the proportion of juvenile offenders was much greater in this country.—Some curious facts were also stated respecting *the relative proportion of crime in the sexes of different ages*, which exhibited the following ratio. Before the age of 12, the proportion of males to females was 1,869 to 1,000; from 12 to 16—1,600 to 1,000; 16 to 21—1,560 to 1,000; 20 to 30—1,623 to 1,000; 30 to 40—2,400 to 1,000; 40 to 50—2,712 to 1,000; and 50 to 60—2,822 to 1,000, whilst above that age again it became less, being 2,267 to 1,000. In the different degrees of crime, likewise, averages had been made which were in favor of the female sex, the number in proportion being 2,836, to 10,000; assaults, 2,204; manslaughter, 890; robbery on the person, 800; and robbery attended with violence, 511. *The influence of instruction on the mass of the people* he considered to be a term which was often misapplied, as when moral it could not but have a good effect, but if physical it was alike hurtful to the bad character, as it was beneficial to the good. Some curious returns were also made, exhibiting the proportion of criminals at different ages in this country and France; in Great Britain, this being greater in the juvenile and less in the ages above maturity, which might be attributed to the operation of several causes.—Whilst in England a great proportion of the younger criminals were transported from the country to settlements where the majority remained for life, in France, after some years confinement and restriction, they were thrown again upon the community as professors of criminality. Another point was urged in favor of the morality of the youthful criminals of this country, though decidedly not so in favor of the parents, that many children being sent out by them to pilfer when young, returned to habits of honest industry when their age placed them without their control. The various facts elicited showed that a very favorable change had taken place in the late improvements of the English Criminal Law, by which many penalties were altered, and that of death was in many instances taken away. The proportion of convictions to acquittals had also latterly been greater, which demonstrated that the laws were administered with more propriety and greater discrimination. Thanks were voted to Baron Dupin by acclamation for his information.

The Geological Section has, as usual, been an object of atttracion to-day. Much was expected from a paper of Mr. Fox of Penzance, on the change of mineral substances by galvanic action, as results of long observation and experiment; and Mr. Fox produced an experiment, of materials coarsely put together but yesterday, in which, with sulphate of copper and sulphuric acid, he gave new characters to some lumps of metal by the galvanic arrangement. Dr. Buckland, the President, referred with exultation to Mr. Fox's apparatus, which consisted only of a blacking-pot, 1½d., a partition between the fluids of clay, and a pennyworth of sulphate of copper and sulphuric acid; and then, turning to a plain country person, he stated that he should now astonish the whole world by bringing forward the unparalled discovery made by him with a pail of water and a brick with a hole in it. He then handed to the table Mr. Cross, a resident of the Quantock Hills, whose name is consecrated to future fame as the author of the greatest discoveries ever made in chemical and mineralogical science—discoveries which will create an entire revolution in the pursuits of science. Mr. Cross presented himself with evident embarrassment, and then stated that for many years he had been a devotee to experiments in electricity and galvanism. That he had generated galvanic action in hundreds of different ways, and with all sorts of materials. That he now discarded acids from his combinations as rubbish, and, to use his own expression, produced his most perfect results and mutations of the products of nature, with the clean material of water, combined with sufficient lime. The multitude of his combinations, and the months and years in which he left them to work, his disappointments, and often their "spiteful results," formed a most diverting narrative. But when he described his production of regular crystals, his quartz which scratches glass, and his germs of various metals from powdered stones, the bursts of applause rent the air. Many distinguished men of science expressed their delight with acclamations, and the President was the most rapturous in his gesticulations. It appeared that his happiest creations are made in the dark, and that the action of light disturbed the delicate means by which nature works under groued. He also stated, as a general fact, that the intensity of all electrical action is a maximum, or high degree, from 7 to 10 in the morning, and at a minimum from 7 to 10 in the evening, the one ten times greater than the other. It would be tedious to follow honest Cross any farther, since, in a few days, large numbers of the Association propose to visit him, to see his apparatus and the results. The distance is 42 miles, but this will be no obstacle to hundreds now in Bristol. Professor Sedgwick, and a foreigner present who spoke English admirably, had, it appeared, visited Cross, and their accounts increased the interest of his narrative, and confirmed the veracity of his statements. Seventeen years ago, the Professor visited him, on a geological ramble, and found electrical apparatus of an extent and variety which filled him with astonishment. Many of the wires, etc., extended twenty miles in length, and the terror of his machinations in the neighborhood has been, for years, a security for rabbits, birds, game, etc. Cross's announcements have eclipsed all other business of the day in the other sections, though the same activity has prevailed in all of them. There were some fine experiments on Electric Magnetism in the Philosophical Section, but all past electricity sinks in interest before the new modes of generation, and the results, by Cross.

In addition to that from Liverpool, a deputation from Norwich is in the city, in order to invite the association to pay a visit to that place next year, and, to give strength to its appeals, is accompanied by a Prebendary, who brings with him the cordial wishes and sympathy of the Venerable Diocesan. This, along with the various other matters, will be decided on Monday night.

The iron bar across the Avon has today been replaced in its position, but has been so much twisted in its fall as to render the anticipated flight across the river scarcely possible. Among those present were Mr. S. Rice and his son.—[Chronicle.]

A meeting, which was very numerously attended by members of the Association, was held this morning at the Theatre of the Institution in Park street, T. Wyse, Esq., M. P., in the chair, for the purpose of forming an educational section, which, although not connected with the Association, should hold its meetings at the same time and place as the latter. Resolutions were passed in favor of the proposal, and observations made in furtherance of the objects by the Rev. Dr. L. Carpenter, Rev. E. Stanleys, Dr. Jerrard (the Principal of Bristol College,) Dr. Taylor, etc. The committee was also formed, and it was decided that the first meeting should be held in Liverpool on the Saturday preceding the commencement of the next meeting of the British Association in that town.

The following is a list of the various grants of money, etc., for the advancement of particular branches and objects of science, which were awarded on Saturday, as also of the various recommenlations made by the several sectional committees, and approved by the committee of record:—

Section A.—Mathematical and Physical Science:—£50 for the discussion of observations on the tides, at the disposal of J. W. Lubbock, Esq.—£150 for observations on the tides in the port of Bristol, to Rev. Mr. Whewell.—£70 for the deduction of the constants of lunar notation, under the direction of Sir T. Bris-

bane, Dr. Robinson, and Mr. Bailey.—£30 for hourly observations of the barometer and lock bull hygrometer. Mr. S. Harris.—£100 for the establishment of meteorological observations on a uniform plan, and experiments on subterranean temperatures, under the direction of the Committee of last year, reduced to Rev. Professor Powell, W. S. Harris, Colonel Sykes, and Professor Phillips.—£500 for the procurement of data depending on very accurate measurements of points situate in two straight lines at right angles to each other, for the exact determination of the question of the permanence or variability of the relative level of land and sea. Committee—Messrs. Greenhough, Lubbock, Mackenzie, Whewell, Sedgwick, Stevenson, Robinson, Bayley, Griffith, Colly, Cubitt, Portlock, and De la Beche.—£100 for experimental observations of the form of wave, as influenced by the effect of winds, and the effect of the form of a canal, and the manner in which the wave is produced. J. Robinson, Esq., Secretary; R. S. Edin, and Mr. J. J. Russel.—£500 for reductions of the observations in the Histoire Celeste, and vol. 9 Acad. des Sciences, 1789 and 90. Messrs. Lubbock, Airey, Baily, and Dr. Robinson.—£100 for experiments on vitrification. Drs Turner, Farraday, and Rev. V. Harcout.—£80 for the construction of a rock salt lens. Sir D. Brewster.

Section B.—Chemical and Mineralogical Science:—£50 for researches on the speficic gravity of gasses. Drs. Henry, C. Henry, and Dalton.—£15 for researches on the components of atmospheric air, Dr. Dalton.—£30 for researches on the quantity of heat developed in combustion and other chemical combinations.—£24 13s. for the publication of tables of chemical constants. Professor Johnston.—£60 for researches on the strength of iron made with hot and cold blasts. Messrs. Fairbairn and Hodgkinson.

Section C.—Geology and Geography:—£20 for experiments on the quantity of mud suspended in the waters of rivers. Rev. J. Yates, Messrs. De la Beche, and G. Rennie.—£30 for special researches on subterranean temperature and electricity. Mr. R. W. Fox.—£50 for researches on the nature and origin of peat mosses in Ireland. Col. Coleby.

Section D.—Zoology and Botany:—£25 for experimental observations on the growth of plants under glass, and excluded from the air, according to the plans of Mr. Ward. Professor Henslow.

Section E.—Medicine:—£50, renewed grant to the committees appointed to investigate the subject of the anatomical relations of veins and absorbents.—£50, renewal of a grant to the committees appointed to investigate the subject of the motions and sounds of the heart.—£25 for researches into the chemical constitution of the secreting organs. Drs. Rogot, Hodgkins, and Turner, and G. O. Rees, Esq.—£25 for investigations on the phisiological influence of cold on man and animals in the Artic regions. Mr. B. King.—£25 renewed grant for the investigation of the effects of prisons on the animal economy. Drs. Roupell and Hodgkin.—£25 renewed grant for the investigation of the pathology of the brain and nervous system. Drs. O'Beirne, Green, Macdonald, Messrs. R. Carmichael, Adams, and O'Smith.—£25 for the investigation of the phisiology of the spinal nerves. Drs. Harpey and Broughton, and E. Cock, Esq.

Section F.—Statistics:—£50 for inquiries into the actual state of schools in England, considered merely as to numerical analysis. Colonel Sykes, and Messrs. Hallam and Porter.

Section G.—Mechanical Science:—£50 for an analysis of the reports of the duty of steam-engines in Cornwall.—Messrs. J. Taylor, G. Rennie, and Cubitt.

Reports in Science.—Section A.—Captain Sabine to communicate a continuation of his report on the magnetism of the earth.—Mr. Lubbock to report to the next meeting the result of the deliberations of a committee appointed to consider his proposition for the construction of a new empirical lunar table. The committee appointed being the Astronomer Royal, Professors Rigaud, Challis, and Sir W. Hamilton; F. W. Bailey, and J. W. Lubbock, Esqrs.

Section B.—Professor Johnston to report on the present state of knowledge of the chemical and physical properties of some peculiar bodies.

Section C.—J. Taylor, Esq., to report on the mineral riches of Great Britain and Ireland.

Section D.—Mr. Yarrell to report on the present state of knowledge of ichthyology.

Section E.—Rev. Mr. Taylor, of York, to report on the various methods of printing which have been proposed for the use of the blind.

Recommendations of Researches, etc.—Section A.—That Captain Sabine's magnetical observations on the west coast of Scotland form part of the next volume.—That application be made to the French Government for a copy of the best tide observations.

Section B.—That experiments be made on the effects of long continued heat upon different bodies.—That the various products escaping from the chimneys of foundries and manufactories be examined.

Section C.—That the attention of the members be called to the discovery of plants of any kind in the late rocks of any age, older than the coal formation.—[Times.]

British Scientific Association.

Bristol, Aug. 29.—Although the majority of the members who have attended during the past week are now hurrying away from the scene of their activity, there were many remaining to-day to participate in the entertainments which had been got up expressly for them—the one being a grand horticultural show, provided by the Horticultural and Botanical Society; and the other a grand regatta, under the patronage of the mayor and corporation, in which the races continued from 11 o'clock in the morning until 7 in the evening. The former, which was of an interesting character, considering the time of year, was a very fashionable promenade, at which most of the botanical members were present; and the latter was made the opportunity of a grand gala day by the citizens at large. A steamer sailed this morning for Cornwall, with many geologists on board, who received an invitation from Sir. C. Lemon, Bart., to pass some time at his seat, which is in the vicinity of the places of meeting.

Foreign Intelligence.

It is with the most poignant regret, says the *Manchester Guardian*, that we announce the death of one of our fellow townsmen. Dr. Henry, whose name must be familiar to all our readers, died by his own hand yesterday, at his residence in Pendlebury, near this town. For some time past, we understand, he had been in a very indifferent state of health, and had occasionally labored under great nervous irratibility. His indisposition seems to have been considerably increased by the excitement consequent upon his attendance last week at the meeting of the British Scientific Association at Bristol, from which he returned with a considerable aggravation of the symptoms he had previously exhibited, and we understand that he suffered under an almost total privation of sleep, which appears to have finally overpowered his faculties. Yesterday (Friday) morning, about five o'clock, he left his bed and went into his dressing-room, and he was at length found in the private chapel, attached to his house, quite dead, having shot himself with a pistol, the report of which had not been heard by any of the family.—(Globe.)

Amongst the railways connected with the metropolis, the Birmingham, Bristol, and Thames Junction railroad is the only one that communicates directly with the western parts of London, branching off from the London and Birmingham railway, at about 5 miles N. W. of its terminus at Somer's Town. It will convey passengers and parcels by a direct and short cut to Kensington, Chelsea, Westminster, and all the West end. Also, to Lambett, Southwark, etc., whilst the heavy goods will be taken by barges to all the wharfs and warehouses on the Thames, from Chelsea to the London Docks, by means of the Kensington Canal, which has been purchased. The Act of Parliament is obtained, the direction is appointed and organised, the line of road is staked out, most of the lands purchased; and it is expected that such progress may be made in the works during the ensuing winter, as will enable the Directors to commence business simultaneously with the London and Birmingham

and Great Western Railway Companies. It is also proposed to apply to Parliament in the ensuing Session for an Act to extend the line of railway from the Hammersmith Road to Knightsbridge, near Hyde Park Corner, for which purpose surveys and estimates have been made, and the project has the concurrence of several of the principal proprietors on the line.—(Sun.)

M. de Gerstner, an engineer who recently visited England and Belgium with the view to study the iron railroad systems, he being charged to execute two lines of road from St. Petersburgh to the Royal Palaces in the environs, published on his return a report in four different languages to the number of 25,000 copies. He proposes to make an innovation in the construction of the steam-carriages, which consists in placing an apparatus in front of the engine, which will clear the rails in case they are obstructed by stones, snow, or ice.

At the works of R. Stephenson and Co., at Newcastle, there is now constructing a locomotive engine for the Emperor of Russia, for a railway six feet in width, and the wheels of which engine are six feet in diameter, and the speed is guaranteed to be 40 miles per hour. The engine is destined to travel between St. Petersburgh and the Emperor's country palace.—(Standard.)

A gentleman exhibited on Saturday a novel description of boat on the Serpentine. It consisted of oil cloth, and, upon being opened, assumed the form of a very beautiful boat. He crossed the water, and afterwards rowed up and down with astonishing rapidity.—(Herald.)

The subterranean passage for the Saint-Germain iron railroad under the village of the Batignolles, to the plain of Clichy, is complete, and the wagons now pass through it.

It is stated that a land proprietor of the province New Russia has sent, as a present to the Emperor Nicholas, an amethyst, found in the mines of Siberia, weighing 7 pouds, or 280 lbs. It is the largest that has ever been seen in Russia.

The great bell at Moscow, which has lain embedded in the earth for upwards of a century, has been lately raised, repaired, and placed on a pedestal, after receiving a fresh benediction in the presence of an immense concourse of people. It was founded by order of the Empress Anna Joannowa, and is the largest in the world, its diameter being 23 feet, its height 21 feet, and its weight 12,000 Russian *pouds*, or 480,-000 lbs. French.

We long since stated that a commission had been sent to England and Scotland with a view to examine the superiority of the iron cannon manufactered there over the brass ones at present used in the French service. The report was, we learn, favorable, but the Government have resolved not to determine the question until after a course of experiments made under the direction of a commission appointed for that purpose. They have invited the Swedes and English to the trial, with nine cannon of different dimensions cast after patterns sent from France. The Belgian Government having judged that Belgian iron would well bear the competition with that of England and Sweden, has also entered the field as a competitor, and several cannons cast at Liege have been sent to La Fere, where they are to be proved.

Much curiosity has been excited in Oxford by repeated trials of an invention intended to regulate the speed of carriages when descending a hill, by means of which the coachman can instantaneously or progressively lock both the hind wheels. The apparatus was applied to a four horse stage, which was loaded with passengers, and, on ascending and descending a hill, was found to answer all the purposes intended. The inventor then proposed that the coach should be taken down the hill without the horses, and it was frequently stopped while proceeding at the rate of twelve miles an hour. Many practical gentlemen had ample proofs of the principle of the invention by having the coach lifted up, and the two hind wheels allowed to turn free on the axle, when it was found that a two-pound weight, placed on the extremity of the wheel, would gently bring it round, but when the first degree of retarding power was applied, it took a weight, so placed, of fifteen pounds to bring it gently round ; the second degree thirty-six pounds ; the third degree fifty-six pounds ; and the fourth degree three-quarters of a hundred ; but with this weight no one person was capable of moving either wheel on its axle. Mr. Pearson, organist, of this city, is the inventor.—(Oxford Herald.)

The annual meeting of the Polytechnic Society was held on Tuesday in the Great Hall, Falmouth. Valuable specimens, both of science and art, were exhibited at this meeting. Sir C. Lemon, the Member for the county, who had announced the day of the meeting at Bristol, and courteously offered hospitality to any of the members of the British Association, who might feel inclined to attend, he did not take the chair ; he insisted on that honor being bestowed on our revered fellow-townsman, Davies Gilbert, Esq , late President of the Royal Society. He also took the chair at the dinner, to which all the strangers in the town, and all the members of the learned societies in Edinburgh, Manchester, and London were invited. Amongst the visitors present we noticed Mr. Enys, of Pop man Castle ; Rev. Messrs. Buckland, Mackie, Stanley, Macauley, Punnett, and Cox ; Col. Sykes ; Professor Powell, of Oxford ; Dr. Fowler, of Salisbury ; Mr. Delabeche (the illustrious geologist) ; Mr. Fox (whose discoveries by the action of the voltaic battery, created so intense an interest at Bristol); Messrs. Denton, Thackeray, Meadows, Hay, Maddock, Dickinson, Ellis, Doyle, Wilson, etc.—(Falmouth Herald.)

An eminent London firm of engineers has received orders for the execution of two steam-engines of 200 horse power, for the huge steam-vessel now building in Bristol for trans-Atlantic communication, and which, it is expected, will be completed in the course of the ensuing summer. That now executing at Liverpool for the same voyage will only contain one of 270 horse power.—(Herald.)

One of the last analyses of the celebrated chemist, Vauquelin, proved the existence of a considerable portion of iodine in silver ore. This excited the astonishment of the chemists and mineralogists, who had no notion of this mineral being imbedded in ore, though they believed that it came from Mexico. M. Arago has applied to some young Mexican officers, who have lately arrived in Paris, for information on the subject, and has learnt, more particularly from M. Yniestra, that it is a well known fact in Mexico that the mineral in question comes from the mine of Albarados, in the mountains called Cetto-Temerosa, and that iodine is also found connected with the ore of carbonated lead ; and, moreover, it has been discovered in two plants which grow far from the sea, namely in an aloe, called in that country *Sebi'a*, of the genus *Magrey*, and in a species of barilla, which grows in the floating islands of the fresh water lakes near Mexico, which the inhabitants eat as a salad.

M. d'Averat has announced to the Geographical society, that a French traveller is on the point of setting off to explore the antiquities of Mexico.

Extract of a letter from Boulogne, dated Aug. 31 :—" For the last month this town has been the scene of continual amusements, in consequence of the number of visitors who daily resort here from England by the General Steam Navigation Company's vessels, who have reduced their fares from London to Calais and this port to five and four shillings, and on board of which they are sure of meeting with every accommodation, and the greatest civility, a rather rare article for travellers. All the hotels and lodging-houses will reap a good harvest this season, as they are well filled, and many private families who have hitherto never let out an apartment have now up at their windows " *Des jolies appartements a louer.*" Balls and private musical parties, or *converzasiones*, are given every evening by the most fashionable residents. Those of Mr. Hamilton, the British Consul, have been very fully attended. We have twice or thrice a-week a sailing or rowing match between the 'young sparks' to Calais and back, which is rather a novel scene to the French inhabitants, as in this country they have no idea of regattas or rowing matches, aquatic sports not being their *forte*. The following is about the number of English over in France, viz :—

Paris, Versailles, St. Cloud, St. Germain, and environs - - -	20,000 to 25,000
Boulogne-sur-Mer and environs - - -	10,000 to 12,000
Calais, the Basse Ville, and environs - -	5,000 to 7,000
St Omer, Cassel, and environs - - -	1,300 to 1,700
Dunkerque, Bergues, and environs - -	1,500 to 2,000
Dieppe, Havre, Rouen,	

Caen, Tours, Marseilles, Bordeaux, etc.	6,000 to 7,000
Total about	54,500

Admitting that each person spends, on an average, 5s. per diem for board and lodging, etc., it would be £12,625, and the annual sum spent in this country by the English alone would be about £4,608,125. This does not include the number of Continental, tourists who pass annually through France to Italy, Switzerland, Germany, the Rhine, Belgium, and other parts, of which no official return is published.—(Post.)

Antiquities and Curiosities.—The collectors of relics will perhaps feel interested in the subjoined statement of the prices paid within the last few years for various objects of historical curiosty :—The *ivory-arm-chair*, presented by the city of Lubeck to Gustavus Vasa, was sold, in 1825, to the Swedish Chamberlain, M. Schmekel, for the sum of 58,000 florins.—The *prayer-book* used by King Charles I., when on the scaffold, was sold in London, in 1825, for 100 gnineas. The *coat* worn by Charles XII., at the battle of Pultawa, and which was preserved by Colonel Roson, who followed the King to Bender, was sold, in 1825, for the sum of 561,000 francs. A fragment of the coat worn by Louis XVI. at the alter, was announced in the catalogue of a sale in 1829, and would probably have fetched a very high price but it was withdrawn. The Abbe de Tersan paid a very high price for *a pair of white satin shoes* which had belonged to Louis XIV. A *tooth* of Sir Isaac Newton was sold in 1816 for the sum of £730. The Nobleman by whom it was purchased had it set in a ring, which he constantly wears. Apropos of teeth, it may be mentioned, that at the time when the bodies of Heloisa and Abelard were removed to the Petits-Augustins, an English gentleman offered 100,000 francs for one of Heloisa's teeth. At the sale of the library of Dr. Soarman, at Stockholm, in 1820, the *skull* of Descartes sold for a considerable sum. Voltaire's *cane* was some time ago sold in Paris for 500 francs. An *old wig*, which had belonged to Kant, the German philosopher, was sold, after his death in 1804, for 200 francs. A *waistcoat* belonging to J. J. Rousseau was sold for 950 francs, and his metal watch for 500 francs. In 1822, Sterne's *wig* was sold at public auction in London, for 200 guineas. In 1825, the *two pens* employed in signing the Treaty of Amiens were sold for £500. The *hat* worn by Napoleon at the battle of Eylau was sold in Paris, in 1835, for 1,920 francs. It was put up for sale at 500 francs, and there were thirty two bidders. There was at Pezenas an *arm chair*, which is said to have belonged to Moliere, and to which tradition has given the name of the *Fauteuil a la Moliere*. Its form bears evidence of its antiquity. When Moliere was living at Pezenas, he was accustomed every Saturday afternoon to repair to the shop of a barber, named Gely. This shop was the resort of all the idlers and gossips of the town. There politics were discussed, and the *historiette* of the day repeated from mouth to mouth. The large wooden armchair above alluded to stood in one corner of the shop, and it was a sort of observatory to Moliere, who, when seated in it, attentively watched all that was passing around him. This old chair is now about to be sold in Paris, and will, no doubt, soon fill a place in some collection of curiosities.—(Court Journal.)

The following is the greatest experiment in Ballooning that we recollect.

Not much is to be gained by increasing the sise of a balloon, but we are not among those who would discourage experiments in this line.

When skilfully conducted there must result some benefit to science.

THE STUPENDOUS BALLOON.

On no previous occasion in the annals of aerostation has public curiosity been so strongly excited as on that of the ascent of this "Great Leviathan of the Air," which took place yesterday afternoon from Vauxhall-gardens. Long before the doors were opened a large number of persons were in waiting for admission, while every avenue to the surrounding neighborhood poured forth its hundreds, anxious to catch a view of this unparalleled wonder. Of the size of this balloon our regular readers are already aware ; but for the benefit of those who may not recollect it we reprint the following from the prospectus issued on the occasion :—"The balloon is 157 feet in circumference ; and the extreme height of the whole, when inflated, and with the car attached, is 80 feet. It is formed of 2,000 yards of crimson and white silk, imported in a raw state from Italy expressly for the purpose. It contains 70,000 cubic feet of gas. As a matter of curiosity, it may be stated, that the inflated silk will sustain an atmospheric pressure of 20,433,600lbs., or 9,122 tons. The network which envelopes the silk is of hemp, and the car of basket-work ; the grapple, or anchor, is of wrought iron, and will be attached to an elastic Indian rubber cord, from the factory of Mr. Sievier. This will prevent in a great measure, any sudden jerk in stopping the balloon in rough weather, whereby so many accidents have occurred." We may add, that the silk is exceedingly thick in the fabric, and wove in a peculiar manner. The gores are united by a cement of a nature so tenacious as to prevent all chance of separation. On the doors being thrown open, the balloon was found to be already one-half inflated, the process, from the extraordinary size of the machine, having commenced as early as ten o'clock. About two a sudden change took place in the weather, and from that hour until past four it rained incessantly ; but the ardour of the lovers of aerostatics appeared to be nothing daunted by the untoward occurrence, for they flocked into the gardens regardless of the "pelting of the pitiless storm," many elegantly dressed women not even opening their parasols to shield them from the rain, for fear of obscuring their view of the balloon. By a little after two o'clock the balloon was nearly two-thirds filled, and raising its enormous crown, waving gracefully amidst the foilage of the surrounding trees, began to exhibit its extraordinary dimensions to the view of the spectators, who were loud and unanimous in their expressions of admiration at the magnificent spectacle which it presented. Shortly after four o'clock a favorable change appeared on the face of the heavens, at which time it became apparent the inflation was nearly completed, the balloon having assumed the form of an immense pear. About half-past four o'clock, the rain having subsided, preparations for the ascent were commenced ; they however, occupied nearly two hours, the power of the balloon several times raising a large party of the L division of police, who had hold of the netting, from the ground, and notwithstanding near 30 half hundred weights were also attached by ropes to the stupendous machine. The inflation was under the direction of Mr. Hutchinson. The peculiarly heavy state of the atmosphere produced a weight of condensed air upon the surface of the balf loon of nearly half a ton, but so excellently had every thing been arranged, and so highly rarified was the gas, that the balloon was sufficiently buoyant to have taken up 20 people.

At five o'clock a large party of the nobility and gentry were admitted by tickets within the arena, where the inflation took place. Among them were the Duke and Duchess of Beaufort, Lord Worcester, Sir W. Abdy, Col. Stanhope, Pembroke-house; Lord H. Chichester, Captain Phillips, Lord Graham, Mr. Cosby, Lord Coventry, Rear-Admiral Sir Tremayne Rodd, Mr. R. Trever, Mr. J. J. Clarke, Mr. Rice, Captain Hall, Lord Palmerston, Lady Codrington, Eaton-square, and party ; Count d'Orsay, Lord Sunderland, Lord George Lennox, Lady Pellew, Mr. Joseph Jennings, King-street, Portman-square ; Mr. Collet, Capt. Beauford, Admiralty ; Mr. Wrottesley, Blackheath ; Mr. H. F. Downes, Muswell-hill ; Viscount Exmouth, George-street, Pall-mall, Mrs. Groves, Hyde-Park-terrace, Cumberland-gate ; Mrs. W. Snoxell, Earl and Countess of Charleville, Prince Lieven, Count Tobstoy, etc. Shortly afterwards the car, which on account of the weather had been stripped of its splendid purple velvet covering and gilded eagles' heads, was brought forward with only a covering of scarlet cloth, and attached to the ring to which the ropes of the netting had been previously fastened. Twenty-four bags of ballast, each weghing fourteen pounds, were put within it, as were also six carrier pigeons and a number of other articles. Notwithstanding some trifling delays, the work of inflation was complete by five, and preparations commenced for attaching the splendid car to the balloon ; some further delay occurred in this part of the operations, owing to the shower which had fallen previously having caused the netting by which the car was suspended to the balloon to contract, so that there was considerable difficulty in making the car hang level ; this, however, was at length effected, and the adventurous aeronauts, under the directions of Mr. Green, sen., the veteran aerial navigator, who on

this occasion made his 221st voyage, proceeded to take their seats in the car. It was then found that there were more candidates for the passage than there were berths in the ship, and the selection of his fellow-voyagers was, as a matter of course, left to the discretion of the commander, who issued his orders for the following persons to come on board—namely, Mrs. Green, Mr. E. Gye and Mr. Hughes, jun., sons of the proprietors of the gardens, Captain Currie, the gentleman who had so frequently been the companion of the unfortunate Mrs. Graham, a gentleman a friend of Lord Coventry, whose name was understood to be Williams, Mr. Green, jun. and Mr. Holland, who had so earnestly solicited a passage, and offered to pay so liberally for the accommodation, that his application became irresistible, and he was consequently entered on the ship's books, and took his station on the deck. The full complement of eight able-bodied was thus made up, when a voice was heard, exclaiming in urgent but at the same time tuneful accents, "Take me: I will not be left behind:" when it was discovered that Miss Green was the supplicant who thus urged her petition. Some objections were urged by those who had already been admitted on board; but Mr. Green, on discovering that it was his favorite niece who was thus excluded, declared that "Mary Ann" should accompany him. This had nearly bred a mutiny in the ship, when the Hon. Col. Stanhope, who was on the ground, called out "Five to one on Mary Ann." This opportune declaration of opinion had the desired effect, and the lady was immediately admitted to the honour of the sitting, a place, though not without difficulty, being found for her. This point settled, all that remained to be done was to try the power of the machine to perform the task assigned to it, when it was discovered that so predominant was its buoyancy that had the car been capacious enough to have afforded the accommodation, the balloon would, with ease, have sustained the burthen of several additional passengers; and previous to its being loosened from the ropes, by which it was apparently most reluctantly confined to our lower region, Mr. Green felt it prudent to permit a considerable quantity of gas to escape, and thus to reduce its power of ascension. All things thus prepared, the interest became intense; every spectator showed by his countenance the anxiety which he felt for the situation of the aeronauts. No praise can be too great for the coolness and presence of mind displayed by Mr. Green in this somewhat trying situation. He gave his directions in a manner which inspired the crew of his comparatively frail vessel with confidence in his management, and, as it were, anticipated their security from accidents and dangers. The ascent was most magnificent; directly the word was given to cast off the last rope by which the balloon was restrained, it shot with velocity from the earth, and mounted high in mid air, in the direction towards Tunbridge, shifting its course from east to south east. The shouts of the multitude, and the clang of the instruments of the military band which was stationed in the grounds, accompanied its flight. The aeronauts waved their hats and flags, and continued rapidly to rise. A grander sight can hardly be conceived. At least from 6,000, to 7,000 persons were present in the Gardens, in defiance of colds and rheumatism. This is certainly the most surprising ascent of a balloon that ever took place, whether the dimensions of the machine, the number of persons ascending, or the excellent manner in which every thing was arranged, be considered. It is the largest machine of the kind that has ever been constructed, and the only one, with a single exception, in which more than two or three persons have ventured to elevate themselves *in nubibus* from *terra firma*. The balloon in which the Duke of Chartres and three other individuals (two of whom were brothers, named Roberts) ascended, on the 15th of July, 1784, from the Park of St. Cloud, measured 55½ feet in length, and 34 in diameter; but this balloon is 157 feet in circumference, and between 70 and 80 in perpendicular height. Had it not been for the extreme wet, there is every reason for believing the ascent would have taken place much earlier than it did, and that the balloon would have started at four, the hour fixed for the purpose, instead of a quarter-past six. The balloon, with its nine passengars, descended near Cliffe, in Kent, at half-past seven. Mr. E. Gye, with Mr. Holland, immediately proceeded to Gravesend in a cart, and having despatched a man to the spot where the machine lay, came up to town in a post-chaise without delay, leaving Mr. Green, with the other passengers, in charge of the balloon. On the outside of the gardens, long before the hour appointed in the bills for the ascent, an immense number, amounting, we should suppose, to 50,000 persons, had collected. Millbank, the bridges, the parks, and almost every elevated spot throughout the metropolis, from which a view of the balloon, on its rising from the earth, could be obtained, were crowded by persons anxious to witness the novel spectacle of so large a number of persons traversing the aerial regions in a bark so fragile as a wicker-work car. The inflation is said to have cost the proprietors £70, though before the ascent Mr. Green found it necessary to let at least a fourth of it escape. When fully inflated, this stupendous machine had a graceful and magnificent appearance, to which its gay colors and splendid car added not a little.—(Globe.)

CORTLAND, AUGUST 1st. 1836.

To the Stockholders of the Tuscumbia, Courtland and Decatur Railroad Company.

GENTLEMEN:—The anxiously looked for Report of the Engineer has been received, and together with that of the Treasurer, is herewith transmitted.

The Engineer has made out a full and specific account of the cost of the Road, in his several items; the cost of the various property of the Company appertaining to the Road, and of our receipts and expenditures from the time that operations were first commenced, up to the present. It appears, that notwithstanding the numerous disappointments and misfortunes that have from time to time befallen the Company, the total amount of expenditures, by a sum a little upwards of twenty thousand dollars, or nearly five per cent upon our interest, for the entire period since the Road first began to be used. This, though a small profit, should, nevertheless, afford us much encouragement, when we take into consideration the adverse circumstances under which it has accrued. In the first instance, we were either disappointed in the receipt of Engines contracted for, or else when received, they were found to be unfit for the purpose for which they were intended. By this means we were, in the first place, hindered in the execution of our business, in the second, lost the confidence of the public, who, in consequence refused to give us employment, and, thirdly, were put to much actual expense in making our Engines suitable instruments for the purposes of the Company. In addition to those considerations, the Engineer assures us, upon the most satisfactory data, that could Locomotive power have been exclusively employed from the first, the expenditures of the Road up to the date of his Report, would have been diminished at last ten thousand dollars. Such diminution of expenditure would have raised the sum of profits to thirty thousand dollars, or near seven per cent upon the investment, up to this date. From all the information derived from the Reports of the different departments, we may safely predict the future prosperity of the company. We may rest assured that our expenditures will be continually decreasing while our receipts will be continually increasing. We are now fully prepared to fabricate for ourselves every species of machinery relating to the Road; having for our chief workman an English bred mechanic of the first reputation. The embankment of the Road, which is now the principal object of repairs, when consolidated by time, will have been rendered almost independent of repairs. The labor we employ must necessarily grow cheaper as laborers multiply and population becomes more dense. While the increase of population, productive labor, commerce, manufactures, agriculture, wealth and travel, must greatly advance the business and emoluments of the Road. Thus while time will operate progressively, to reduce expenditure, on the one hand, it will progressively enlarge our receipts upon the other. And there cannot exist a doubt, that the ratios of these two progressions will be sufficient, speedily, to ensure an income that ought to satisfy the desires of the Company.

It is a fortunate circumstance for the Company, that their improvement has been in advance of all schemes for similar improvement in this region of the U. States. It will, on this account, tend to give direction to subsequent improvement in the same region. There was much talk in South Carolina of connecting their great Western Railroad with this, and although the plan was eventually abandoned, yet it is worthy of remark and full of encouragement for us, that our comparatively small establishment, should have been a matter of grave deliberation, in determining the route of that stupendous High Way. A connexion however, will ultimately take place. A south-western branch must strike off from some point on the Charleston and Cincinnati Road, and will certainly have its origin on this side of the Mountains, as it is

not to be supposed that a company would incur the expense of cutting a second pass through the mountains, when one already existed. This branch will have its direction through the Tennessee Valley, and must either be connected with our Road, or take a parallel route, and come in competition with it. But as competition would operate injuriously on both contending interests, nothing is more evident, than that co-operation and coincidence would, on both sides, be preferred; indeed a different supposition would be preposterous in the extreme.

The Georgia Improvement which may be regarded as a matter already determined upon, will next claim our attention, as it will become directly tributary to ours. The road from Augusta to Athens is now under contract, and in the course of construction. From Athens it will *double* (to use a nautical term) the Southern extremity of the Aleghany Mountains, and terminate at a point on the Tennessee River a little below the Suck. The intermediate link of connexion between our road and this will assuredly be supplied, as soon as found to be called for. Indeed we already have a certainty of a road from Decatur to Huntsville, or some eligible point in the county of Madison.

The contemplated road which is to connect the City of Mobile with the navigable waters of the Tennessee River, becomes a third guarantee of our future prosperity; and I am happy in being able to assure the company upon the most satisfactory information, that it will be entirely in our power to supply the conditions, upon which this road would be made to intersect ours at a point a little to the east of Courtland.

These three stupendous improvements are to pour their trade and travel along the channel of our road, into the great valley of the Mississippi.

Let us suppose the Charleston and Cincinnati Railroad to be carried into execution; and also the projected roads in Virginia, running towards the North and towards the South, through the towns of Lynchburg and Abington, to the junction of the French Broad and Nolichucky rivers; and it is evident that the vast majority of the travel from the States of South and North Carolina, from Virginia, Maryland, Delaware and New-Jersey, and a great portion of that from Pennsylvania, New-York and the New-England States, with their great commercial and manufacturing cities, in short from the old States generally to the new, will direct its current along our own highway, and down the Tennessee river, and Nashville and New-Orleans Railroad into the great emporium of the West and Southwest.

The passage through the Aleghany and Cumberland mountains, will be in the nature of a great seaport—where the commercial and social intercourse of two connecting regions will be concentrated—and it appears to be our good fortune to occupy, as it were the focus inpoint of position.

The Georgia Road, too, will render heavy contributions, and that from Mobile will deliver its burdens at a central point, to pass along our Eastern or Western division, according to particular destination.

Let us then, continue to cherish those sanguine anticipations which we have all along indulged, and instead of becoming discouraged, let it be our chief concern to perfect and mature our work, and be prepared in the resources that may be put in requisition, for the construction of a *second track*, to meet the demands that may in future be made upon us.

Respectfully submitted,
BENJ. SHERROD, *President, of the Tuscumbia, Courtland and Decatur Railroad Company.*

Agriculture, &c.

From the Farmers' Register.

THE "WATERLOO CÆSAREAN EVERGREEN CABBAGE"—ALIAS COW CABBAGE OF JERSEY.

The Farmer and Gardener of September 13, introduces an account of this cabbage (taken from the last No. of the Horticultural Register of Boston,) in the following manner:

"We have a few hundred of these plants growing at our little establishment; but as the season has been inauspicious, and they have not had a fair chance for luxuriant growth, we cannot say what may be the result of our experiment. We obtained the seed of Robert Sinclair, jr. at $5 a pound; those in England are, or were, held at $5 for 20 seed. The next season we shall take time by the forelock, and give the article a more fair and perfect trial. If it should prove by proper test to realize a moiety of what has been said of it, it will certainly produce a new era in agricultural pursuits; but as the venders of the seed of new things are not always the most scrupulous in pronouncing their eulogies on their virtues, time and actual cultivation are necessary in order that their capacities may be properly demonstrated.

In the more southern portions of our country, if this cabbage should prove as valuable as some of its encomiasts have stated it to be, it will, indeed, be a blessing. But of its properties after we have had time to form a correct practical opinion, we shall speak more fully."

Though the exaggerations of the English account given in the Horticultural Register, are partly neutralized by the remarks of its conductor, still there is some danger that there may spring up and spread over our land a *cow cabbage mania*, such as at different times has been excited by millet, Cobbet's Russian turnips, and Gama Grass. For this reason, as well as for the amusement of our readers, we republish (from the August No. of Loudon's Gardener's Magazine,) this most imupudent puff, and shameless yet very successful deception. The nostrums recommended by agricultural quacks and patent venders, like those of the medical quacks, are generally the more successful in proportion to the enormity of the pretension and falsehood.

"An individual in England having shown a specimen of this variety of what is properly a borecole, to Mr. Coke of Holkham, that gentleman expressed surprise at its size, &c. Advantage was taken of this to puff off, as the phrase is, this vegetable under a new name; viz. the Waterloo Cæsarean evergreen cow cabbage, and sell the seeds at the rate of a sovereign for a packet containing twenty seeds. The following is an extract from the advertisement:

'Patronised by His Majesty. Wonderful production of nature! Waterloo Cæsarean evergreen cow cabbage, of recent discovery, unequalled in affording the most interesting and desirable results to the farmer, grazier, and manufacturer. This singular and extraordinary species of cabbage, almost unknown in England till introduced by the persevering efforts of Mr. Fullard, three years since, grows from nine to twelve feet high, and from fifteen to twenty feet in circumference. Five of these stupendous cabbages, now raised to the greatest perfection in quality as well as size, have been repeatedly found, by proper management, an ample allowance of food for one hundred sheep, or ten cows per day; and the nutrition thence supplied by this delicious vegetable will (as experience has already abundantly demonstrated) speedily produce the most surprising improvement in the *growth* and *utility* of every description of cattle. As an evidence of the beneficial tendency of this cabbage, Mr. F. has the great pleasure and satisfaction of saying, that sheep fed upon it have been found to produce wool of the finest silken texture, twenty-five inches long; a circumstance which cannot fail immediately to claim the utmost attention and admiration: as such, the cultivator of these cabbages will not only realize pecuniary profit beyond any previous experience, but the manufacturer will also obtain a material superior to any heretofore produced by the most profitable speculation, the general and extensive demand for which must exceed all present calculation. The commerce of the country, as well as the interest and pleasure of the community at large, will likewise be greatly, if not incalculably, enhanced by the cultivation and use of this improved vegetable production. This Waterloo Cæsarean cow cabbage has been pronounced by the father of the agriculturists, whom, from his well known experience, we are all bound to believe, to be the greatest wonder that ever appeared in the vegetable kingdom. It was shown to that very highly esteemed and truly respectable gentleman, T. W. Coke, Esq., Holkham Hall, Norfolk, in October last, when he immediately said—'*Mr. Fullard, you told me, three years ago, agriculturists were only half way advanced in improvement: this cabbage makes me say I am bound to believe you. I do say it is the greatest wonder the earth ever produced.*' Mr. Coke subsequently introduced several *dukes* and other *noblemen*, to the number of nine, to view this great production, all of whom expressed their astonishment, and engaged a part of the seed for use this year (1836.) These cabbages, if designed for use in the winter season, can, for convenience, as well as advantage to the grower, be then removed from the fields, and will serve to make handsome serpentine walks in gardens; or they will form a most excellent avenue for winter across a field; or, by setting them singly, will make a ground, that has not a tree in it, a park for winter, and may be given to the stock in spring. To obviate skepticism, and to afford the highest satisfaction and confidence as to the perfect rectitude of the statements here given, agriculturists, graziers, and all who feel an interest in the species of produce, are respectfully requested to apply to Mr. ——, wholesale perfumer, No. ——, ——, London, who will, with pleasure, exhibit specimens of the cabbage, and also wool of sheep fed with this vegetable production. Mr. —— is the sole agent in London for the Waterloo Cæsarean cow cabbage seed. All purchasers of it are particularly desired to sow it at the proper season (which is in July,) as stated in the directions which accompany the parcels, price 20s. each. The plants of this seed, unlike other vegetable produce for cattle, *never fail*, either numerically or in quality. A part of this seed has been engaged by His Majesty, and forwarded to Norfolk Farm, near Windsor, to be sown this season; and the production is already likewise patronized by most of the royal family. The Duke of Wellington, and the following gentlemen, are a few only who have selected the seed

for cultivation this year:—the Right Hon. —— Dymock, Champion of England; Robert Leeds, Esq., Surrey; Thomas Back, Esq., Wellsbro'; Joseph Cowen, Esq., Bladenburn; Sir William Folk, Norfolk; R. Preston, Esq., Barrister, Lincoln's Inn; —— Allington, Esq., Little Barford, near St. Neots; Edward Lindsell, Esq., Broon, near Biggleswade; Henry Walker, Esq., Corn Exchange; R. Sutton, Esq., Royal Exchange; —— Jesse, Esq., Hampton Court; Henry Hills, Esq., Allebury; Henry Handley, Esq., M. P., Lincolnshire; —— Perkins, Esq., proprietor of Islington Market; William Shield, Esq., Lincolnshire; Thomas Hudson, Esq., York; —— Hern, Esq., Bury St. Edmonds; —— Watkin, Esq., Windsor. It is desirable to remember, that these sweet vegetables, when boiled, are remarkably tender, and in flavor resemble asparagus. For the table, or culinary purposes, they will ever be highly appreciated. They grow in the form of a cone, and from the thickness of their foliage, and being evergreen, they will be found ornamental to a garden. The plants, after two months' growth, (say in September,) require to be set out at the distance of two yards and a half from each other. They will grow on soil of moderate richness; but their greatest perfection will require soil of good quality. At any subsequent period to their being thus transplanted, they may be removed to any other place where convenience or taste may suggest. All letters from the country, requiring a packet of seed to be forwarded, must (to be attended to) contain a sovereign, or an order for the payment in London; and it is requested the name and address, where it is to be sent, be legibly written. Caution:—Any packet sold at a less price than a sovereign, either in town or country, cannot be genuine. Observe, also, upon each packet the circular seal, with this inscription: '——, No. ——.' It is important to observe, that none of the genuine cow cabbage seed will be sold after the month of July, for sowing this year. (1836.')

'*Further Particulars.*—In reference to the length of wool produced by sheep fed upon the new colossal vegetable, as described in this prospectus, the proprietor, Mr. Fullard, to prove the fact, has now a lamb-hog, one year old, to be *seen* at Mr. ——, No. ——, ——, where T. W. Coke, Esq., of Holkham Hall, paid a visit on Tuesday, the 14th instant; and, upon due examination of the said lamb-hog, he declared, in the presence of many witnesses, that he never before saw such a specimen of wool for *length* and *fine* quality. Mr. F. has already been awarded *nine* premiums, by the Agricultural Societies for the *superiority* of his sheep and other cattle.

'(Signed) ——, No. ——.'

"The noise made by Cobbett's Locust was nothing to this. We are informed, on what we consider undoubted authority, that from 30 to 40 sovereigns a day were taken at the perfumer's shop referred to, for several months. The London seedsmen are regularly supplied with similar cow cabbage seed from Jersey; which is sold by retail. by Mr. Carlwood, at 1s. per ounce; an ounce, as we are informed by Mr. Cormick containing about 5000 seeds, which would. of course, produce the wholesale perfumer £250 in ready money. As several gentlemen have called upon, and written to us respecting this cabbage, as they did about the time the *Gardener's Magazine* commenced, respecting Cobbett's Locust (see *Arb. Brit.*, p. 616,) we have thought it worth while to state the above; adding, that, as we know that our advice was not taken in regard to the locust, we doubt if it has deterred those who applied to us from purchasing the Cæsarean cabbage. The truth seems to be, that there is a portion of mankind who have a love for the marvellous to such an extent, as to become a disease which will have its course. . . . . . A correct estimate of the real merits of this cabbage, by Mr. Saunders, of Jersey, who supplies the London trade with their seeds, was published in the *Gardener's Magazine* in 1829, (vol. v., p. 440;) and it has also appeared in the *Encyclopædia of Agriculture*, 2d edit., p. 867."

ON THE HABITS OF THE HESSIAN FLY.

From the Farmers' Register.

CAMBRIDGE, EASTERN SHORE, MD., August 8th, 1836.

By the late disastrous ravages of the "Hessian Fly" throughout the whole wheat growing district of the United States, and the false notions entertained and circulated of the habits of this insect, giving astonishing currency to the most futile, yet strongly vouched remedies, for many years published, and yet publishing to the credulous community, lately in the "Baltimore American," formerly in the "American Farmer," and also in the "Farmer's Register," vol. 1., p. 351, (in which latter I am happy to see in a note appended, you dissent from the hypothesis to which I particularly allude,) I am led to offer a few remarks in opposition to the "prevalent and deleterious doctrine"—"the erroneous principles on which it is founded," and the consequently "erroneous prescription of the much-extolled specific."

An apology cannot be required for discussing one of the most interesting questions that is, or ever has been, before the agricultural community—"a preventive for the ravages of the Hessian Fly."

It is not that I am enabled to settle this mooted point of vital importance that I make this communication, but it is in the hope of *approximating* the *truth* by the detection of error; and it is thus, "*instar omnibus*," that man, with his finite capacity, must approach and investigate the mysterious modes and results of infinite wisdom. And for the small contribution I now offer to this point, if it meet your approbation, I ask the favor of a space of your "Farmers' Register," where zeal is sanctioned by example, and confidence promoted by liberality.

The author of the communication, lately in the "Baltimore American," signed "Maryland Agriculturist"—"others also to the same effect," remarks, "it" (the Hessian Fly) "is either generated in the grain of wheat, similar to the bug which infests the pea; or, the insect, when in its winged state, deposites an egg on the surface of the grain, when in the ear; and thus, when the wheat is sown and begins to vegitate, the egg vivifies, and the destructive worm is formed."

He adopts the latter opinion, and makes it the basis of his *remedy*.

His reasons for the opinion are, 1st. "That the insect releases itself by bursting the blade that covers it, when the head is forming, and assumes its winged state, and deposites its egg on the wheat when filling and coming to perfection."

2nd. "That with the aid of a microscope, the egg is discernible in the form of a glutinous matter."

Hence he deduces the remedy which he earnestly recommends to the notice of the farmer, viz: "to pass the seed, through brine or pickle, washing it well, and then roll it in lime."

By what means he does not inform us, he has arrived at the conclusion of this alternative, for the parental selection of a nidus; nor why he rejects the possibility of some other part of the plant being the chosen spot.

Indeed, the hypothesis adopted by this gentleman, and for many years, by others, so ardently, and no doubt so honestly pressed upon the agricultural community, rests upon a concatenated string of errors in fact, "false principles" and "false conclusions," and will lead, if practiced, to infallible disappointment.

It is not a fact, "that this insect releases itself 'by bursting the blade that covers it, when the *head* is *forming*, and then assumes the winged state' from which the writer infers the deposite of its eggs, when the *grain* is *filling*."

It is a fact, well known, I had supposed, to every wheat grower in the United States, who has noticed the habits of the Hessian Fly, that they have at least *two broods* in the year, the fall and the spring brood, and probably more; the *two* are well known, because of their effects upon a valuable crop: others are not generally known.

The first of the two is *deposited* (or, I will say, "*appears*,") as every one knows, on the young autumnal wheat, where it rests at the base of the blade, till the vegetable juices have nourished it, and the solar beams have matured it, which, in general, does not occur, at least in the climate of Maryland, until between the first and tenth of the following "*May*," when they are seen on, on the wing, over the wheat fields, though in a momentary period, perpetrating their appalling deeds of mischief, by that almost incredible multiplication and celerity of performance, which all the smaller and ephemeral insects are capable of. Their progression then, from the egg to the "*larva*," the "*chrysalid*," and the parent, or winged state, is more or less rapid, as the weather is favorable.

I would ask those numerous and respectable *entomologists*, and *farmers*, who contend thta the *grain* is the medium through which the parent transmits the *new progeny* into life, "what becomes of those whose destinies have fixed their first stage upon a period when the *grain* is *not formed?* sct. the "spring," or the "*May*" brood. Will they say that one brood adopts the *grain*, and another the *blade* for a nidus? This contrariety of habit in the same insect is seen no where. It would be repugnant to the "known laws of nature," to "analogy," and to the "character of *instinct*," which is notoriously *immutable*. Will they unite with us in the apostrophe—"*Natura! quam te colimus inviti quoque.*"

From the difficulty of accommodating

this "*May brood*," then, it would seem to be deducible, as a matter of necessity, "as they must be accommodated, and *a priori*" in a similar manner as the *fall brood*; and there is then no *grain* accommodation for them, there being no *grain formed at that time*; and yet they continue their procreation, "that the numerous and respectable entomologist, and farmers, who advocate the deposite *on* or *in* the *grain*, are "*quoad hoc*" in error; and their remedy *consequently* and *absolutely* erroneous, and wholly inefficacious.

It is certain that the deposite must be made upon a part of the plant already *substantial*, *visible*, and *tangible* at the time, but the "*May*" deposite finds no grain in this condition; and the dogma, "that it *must* be *on* or *in* the grain, *must* be abandoned as wholly untenable; and some other part of the plant must be sought as the selected spot of the deposite. I will presently show that this part is the blade.

2nd. The writer says, "if I had any doubts on this subject, they would be removed by the fact, that with the aid of a microscope the egg is discernible in the form of a glutinous matter."

What egg? I would ask. He has not attempted to show or to make it probable that the egg of the Hessian Fly has ever been seen on the grain of wheat, or on any other grain. If it can be shown that the grain was *ever* its resort, then it will be conceded, that it *always was* and *always will* be its resort; if the blade, the same: *reason* may be variable, but *instinct* never changes—the "*curculio*" will take his *fruit*, the "*aphis*" his *leaf*—they will perish rather than violate the laws of their nature, their physical and innate character. The eggs seen may have been the eggs of other insects. I have for some years observed a small, gaunt blue fly, very similar to the house fly, but much smaller, operating upon the head of wheat when neerly ripe, and apparently depositing eggs. I have found upon these heads, afterwards examined, and within the capsule, small larvæ which had consumed a portion of the grain. These are, possibly, from the fly the northern States are complaining of; and the eggs the gentleman has seen on the grain, may have proceeded from the same source.—They have never appeared here in sufficient numbers to excite alarm, and they certainly are not the product of the Hessian Fly. Having already shown that the head, or grain of the wheat cannot possibly be the place of deposite for the Hessian Fly, I will proceed to verify my promise in a manner which I hope will be satisfactory to make it conclusively certain, that the blade of the plant is the place of deposite for the egg. I shall annex the authority, because thereby a responsibility is offered; and consequently an additional sanction given to the verity of the facts. This is the more necessary, because of the importance of all facts, regarding this important subject matter; and especially such as may preserve the farmer from a fallacious confidence in a proposed remedy, which must inevitably disappoint his hopes, lull him into false security, and possibly suspend his further inquiries into a subject, whose vital importance requires incessant and united prosecution.

On the seventh day of "*May*" last, (a warm day, so noted on my agricultural diary,) I observed in an outer corner of one of my wheat fields, a cloud of insects, on the wing, swarming like bees, over a space of a few acres of the young wheat. Attracted by their dense and glittering appearance, increased, no doubt, by the bright solar rays reflected from them, I rode up to the swarm, whose elevation reached from the ground to about fifteen feet. I caught several, and found them to be the Hessian Fly. On that day week, (also a warm and bright day, the intervening days had been generally, cool,) I took a microscope to the field, and pulling up several bunches of the wheat within the sphere of their flight, I discovered on many of the blades of *every* bunch, ane on their upper surface, and a few inches from their insertion into the stem, agglutinated eggs, and larvæ invisible to the naked eye until the point was indicated by the instrument, when they might be seen in different stages of forwardness or progression to maturity: some *white*, in which no insect would be discerned upon breaking them, some *yellow*, in which insects were found, and others, from which they were recently released, and lying at the mouth of the shell, yet motionless, apparently, and with their heads turned downwards, as if to make their way as soon as they could move to the base of the blade, at which, finally, the too visible fattened, and grown larvæ, and chrysalid, give woful evidences of the source of their life and nutrition, and of the decline and death of the great object of our care and attention.

Having made these observations, I extended my researches through the apparent sphere of their operations, and found it infested: these few acres became entirely naked; and it is remarkable that no other part of the field afforded any vestige, *then* or *afterwards*, of the fly. Upon the remainder, I grew a heavy crop of straw—the grain was destroyed by the general, and subsequently disastrous scab. Many of the chrysalids I have brought to maturity, leaving no doubt of the identity of parent and offspring.

From the whole premises—"from facts"—"from reason"—from "analogy" it is clear, that the leaf of the plant, and not the head or grain is the *fit* and *actual* nidus of the Hessian Fly—it is *there* that it is deposited, hatched and matured; and probably in several successive generations from the first suitable stage of the autumnal wheat, until, by its growth it is rendered too coarse for the functions of the tender offspring, when, no doubt, they renew their deposites, perhaps sparsely, on other tender plants, their next preferences, till their favorite growth of the coming autumn, shall complete the cycle.

The general character of the instinctive faculty, in other, insects better known, for the preservation of their broods, under the influence of which, they seek a nidus, in or near which, their progeny, when hatched, may be nourished—the fact, never I believe denied, that the larvæ of this fly has always been found at or near the base of the *leaf*, and never *on* or *in* the *grain*, or the *head*—the fact, that the grain or head does not exist at the time of the "*May*" deposite—the fact, that the larvæ of this fly does not consume any part of the grain or head, nor leave any trace of even a transcient existence in that portion of the plant—the fact, that if the egg were deposited there, the grain, when thrashed, undergoing its necessary heat, would, "as with the moth" or wheat weevil, vivify its *incumbent*, occupying so delicate a shell, which is alleged by these theorists to be afterwards brought to life by a *less degree* of *heat*, in the earth, after the cool season of seed time—the fact, that if deposited and hatched *on* or *in* the grain, it must in its tender larvæ stage feed *there* or perish, and the fact, that it does not feed *there* and does not perish; all these facts undeniable, together with those stated, as coming under my late observation, can leave no reasonable doubt, that the place of deposite for the egg of the Hessian Fly, is the *leaf*—and *not* the *grain* or *head*, and demonstrate the absolute futility of the brining and liming remedy, so confidently and earnestly relied on, and recommended for many years; and to the present moment reiterated with ejaculations of surprise, "that so simple and infallible a remedy, (see Farmers' Register, vel. I.,) should not be generally circulated and adopted for the good of mankind."

Finally, I may remark, that I used this process of brining and liming for three years, not for the "fly," but for the smut, (*le charbon*,) a stinking, contagious pest, very different from the black head, (*la nielle*,) which latter is, with us, generally and improperly called smut: of the former, we have had but little: yet, for a few years, by some unknown cause, it was introduced among my wheat. I found this remedy unavailing also for this disease; and my crops were not relieved until I purchased a new stock of seed wheat and scoured my granaries. In one of these years, it happened, that my crops, thus treated, suffered as much, perhaps more, than any previous season: and from these experiments, (which were fully and faithfully executed, and on a large scale, because I entertained sanguine hopes of success,) I am under the fullest conviction, that the germinative principles is enfeebled by the process, and the plant rendered thereby an easier prey to the fly, or any other invading insect.*

I have, my dear sir, far exceeded the

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* From our experience of brining and liming seed wheat, to prevent the smut, we have arrived at a different opinion from Dr. Muse—as we have never known that disease to occur after the preventive process had been "fully and faithfully executed.' Still we admit that such negative proofs, are not conclusive, as possibly some unknown causes may have checked or prevented the disease. In another opinion expressed above, we are much disposed to concur—that is, that the process of brining and liming, (at least as usually, and perhaps carelessly, executed,) serves to weaken the germinating power of the seed, and thereby enfeebles, the plants. Ed. Far. Reg.

limits of my design in this communication; but really, the question of a remedy for the Hessian Fly is so interesting—the detection of a prevalent error in respect to it so essential to its true solution—the chief remedy offered is so confidently pressed upon the public, and so palpably worse than nothing, inasmuch as it holds out false views, and obscures the path of research, coming too under the sanction of many and highly respectable sources, from New-York to Virginia, inclusive—these considerations make my apology for the zeal which I have evinced, and the freedom which has been taken, by

Yours respectfully,
JOSEPH E. MUSE.

From the Portland Advertiser.

COTTON MANUFACTURES.

If the manufacture of cotton is a profitable business, and that it is so, we think those who have attended to facts and have read our former numbers cannot doubt; we believe it to be equally clear, that it can in no part of the United State be conducted with a prospect of more favorable results than in Maine. That locality has something to do with the result must be obvious to the most casual observer, and we have briefly adverted to some of the grounds of it on a former occasion. We have recently fallen in with some calculations on this subject which set the matter in a still clearer light. In a recent number of Blackwood's Magazine a writer has made a comparison between the expenses of spinning in England and France, by which it appears that the cost of spinning half a kilogramme of cotton which is 17½ ounces, into yarn No. 30 to 40 in Manchester, exclusive of the raw material, is 13 cents, while at Mulhausen a considerable manufacturing town in France, it is 20 cents. This expense is made up of wages, fuel, interest of capital, wear and tear, charges of freight, &c., steam being the moving power. In Zurich the principal manufacturing town in Switzerland where the moving power is *water*, the expense is less than it is in England, although in the latter country the interest and general charges are much lower than in France or Switzerland. In 1834, M. Kaechlin a large manufacturer and member of the French Chamber of Deputies, estimated the cost of spinning No. 30 to 35 yarn at 14 cents a kilogramme at Mulhausen, of which fuel, comprising lighting, constituted rather more than one seventh; while at Zurich where the machinery is moved by water, that important is item wholly saved, as admitted by the same distinguished operator. It is evident however, that in his calculation he was looking only to the moving power, for in every establishment, fuel for heating is a necessary charge.

In this country although wages and interest upon the capital are higher than in England or France, yet the cheapness of our water power and the much lower price of subsistence, taxes, and of the raw material, nearly equalizes the general expense, and enables us, especially in coarser goods, to undersell the foreign manufacturer. A writer in the American Encyclopedia, after enumerating the advantages possessed by this country says, "it would seem not improbable that this country will be the future source of supply, in coarse cottons for foreign markets."

But still notwithstanding the great advantages of manufacturing in our own country, and notwithstanding the encouragement held out by a protective tariff, the manufacture of cotton is carried on to a vastly greater extent both in France and England than with us.

In England in 1834, the number of spindles were 9,333,000, in France 3½ millions, while in the United States there were but 1¾ millions. And in the same year there were *imported into this country* cotton goods from England to the value of $8,200,000, from France $1,100,000 and from Germany $300,000, making a total of $9,600,000. This large sum expended among ourselves instead of being sent out of the country, might have given employment to a vast number of persons and been the source of wealth to many more. The fact also proves that there is abundant room for the profitable employment of a greater amount of capital in this important branch of business; for with our high protective duty, if the foreign manufacturer can afford to send his fabrics to this market, we, saving the duty both upon the raw material and upon the cloths, can certainly safely increase the quantity of our manufactures and afford to undersell him in our own markets. Besides these advantages our *exports* of cotton fabrics have been gradually increasing from 1826 when they amounted to but little over one million of dollars, until the present time.

In 1833 the exports amounted to $2,321,000, of which $1,900,000 were to South America and Mexico, $120,000 to India and Africa, $215,000 to China, and $86,000 to the West Indies. Now with all the advantages of our country for manufacturing, with the opening of these and other markets for our goods, with the increasing use and demand in our own country and abroad, and the increasing popularity of American manufactures, can any doubt remain about the st bility and the profit of cotton manufactures in the United States, and especially in New-England. Let it be remembered that we haveconfined ourselves principally to the manufacture of *coarse goods*, but as the business advances, the higher and more valuable qualities of fabrics will become the subject of attention, by which new employment will be given to skill and ingenuity, and new markets opened to the manufactures of our enterprising and indefatigable countrymen. The same causes which have built up the cities of Liverpool and Manchester in England, of Glasgow and Paisley in Scotland, and give employment to a million and more of persons in thosecountries, are now in operation among us, and under the fostering protection of our free institutions, the security of property, an energetic spirit, and increasing skill and improvements, are destined to diffuse wealth and prosperity widely over our land. The following progress of a pound of cotton, extracted from the English Monthly Magazine, will not be uninteresting. "There was sent to London lately from Paisley, a small piece of *Muslin*, about *one pound weight*, the history of which is as follows. The wool came from the East Ii es to London; from London it went to Lancashire, where it was manufactured into yarn; from Manchester it was sent to Paisley, where it was woven; it was sent to Ayrshire next, where it was tamboured; it was then conveyed to Dumbarton, where it was hand-sewed and again retured to Paisley, whence it was sent to Glasgow and finished, and then sent per coach to London. It may be reckoned about three years that it took to bring this article to market, from the time when it was packed in India, till it arrived complete in the merchant's warehouse in London: whither it must have been conveyed 5000 miles by sea, nearly 1000 by land, and have contributed to reward the labor of nearly 150 persons, whose services were necessary to the carriage and manufacture of this small quantity of cotton, and by which the value has been advanced more than 2000 per cent."

FACTS AND OBSERVATIONS.

The following is from an old number of the Memoirs of the Massachusetts Agricultural Society:

The attention necessary to be paid to raising and feeding silk worms, would form an agreeable and lucrative employment to those who are placed above manual services. There is no part of *America* wherein the silk worm cannot be supplied with proper feed: as mulberry trees will thrive with very little care, even in the coldest. We are informed that in 1789, no less than 5400 pounds of silk were raised in the cold and sandy territory of *Prussia*. Perhaps no country possesses greater advantages for this purpose than *America*; and should this manufacture ever be actively pursued, it will not be extravagant to expect silken stuffs as cheap as any cloth made in America.

To show with what ease and convenience the worm may be fed, the following directions are extracted from some sensible letters, written by Mr. Joseph Clarke, of Northampton, and communicated by the Hon. James Winthrop, Esq., of Cambridge. To these gentlemen, the Society return their thanks, and will be obliged by any further communications to improve the agriculture and manufactures of our country.

Extracts from Mr. Clarke's Letters.

About ten years ago, I set over an acre of land with small mulberry trees, ten feet apart; they flourished extremely well, and in three or four years they formed a perfect forest. From these I used to gather my leaves; but I soon found the trouble and expense was too great; for I was obliged in the latter part of feeding, to employ a great many people, or the worm must starve; having observed those trees which were accidentally broken down sprouted anew and luxuriantly the following year, determined me on another method. I had a small enclosure of very rich ground, about six rods square, which in the spring of the year 1793 I ploughed and manured well. Here I sowed my mulberry seeds in rows, like carrots or parsnips in a garden, at suitable distances from each other for weeding and hoeing between them. The seed came up well, and the plants were kept quite free from weeds that summer; in doing which, you must be very careful as the plants are exceeding tender; in this first weeding the fingers must be principally used. The next spring before they began to sprout, with a scythe, I cut down all the bushes within two inches of the ground, and carefully weed them. This method answered my most sanguine expectations; for by the middle of July, when the worms devour the most leaves, they had grown up three feet in height, and being cut with a sickle, furnished me with abundance of leaves, in a cheap, easy and expeditious manner. The same method has been pursued with these trees or bushes ever since; so that you see there is no necessity for sowing the seed annually. A field once sown, will, for aught I can see, last a thousand years, if it be well ta-

ken care of. My mulberry trees are more flourishing this year, and yielded more food for the worms than they ever did before. This I attribute chiefly to the manure I put on them the last spring; notwithstanding they were cut down last July, they are now (October) about three feet high. My worms were hatched out the 24th of June, and continued eating just four weeks. They have consumed upwards of three thousand pounds of leaves, and the trouble of gathering them has been but little, compared with the whole business. A man can reap 3 or 400 weight within an hour; the expense and trouble are therefore trifling. I perform about three quarters of the business myself. The quantity of silk produced is about ten pounds; as to the quality; I can in no way so well inform you as by sending a skein of sewing silk,' which I pray you to accept.

The idea that water is injurious to silk worms, is totally unfounded. My worms this year have been chiefly fed on wet leaves, gathered early in the morning, and as they grow dry in the course of the day, were sprinkled with water.† I have used in one day three pails full, in sprinkling the leaves, for I think it invigorates the worm in sultry weather. Hot water for the purpose of killing the chrysalis that is within the cocoon, to prevent his making his way through, and spoiling the silk, is never used. Hot water is only used when the cocoons are wound off into skeins. To kill the chrysalis, the cocoons are put into an oven, about as warm as when a woman takes out her bread; or they are exposed one or two days to the fierce rays of the sun. The last method is best, as there is no danger of injuring the silk, as may be the case in the former way. Should the oven be a little too warm, spread your cocoons on a table in the sun for two days successively; if you suspect they are not effectually killed, let them be out another day. They must be carried in at night; they must not be wet; if you wish to know whether the chrysalis be dead, take one of the thickest of the cocoons and cut it open; if you cannot perceive any life, you may conclude they are sunned sufficiently; should you perceive any signs of life, sun them another day.

From the Key West Enquirer.

FLORIDA ARROW ROOT.

The day we trust is not far distant when prejudices in favor of the productions of foreign countries will case to operate to the detriment of the agriculturists and manufacturers of our own. We are sufficiently friendly to the policy and principle of free trade, to allow every man to exercise the most perfect freedom in the purchase of whatever he may require, whether the necessaries or luxuries of life, at whatever price he may think proper, yet we cannot but lament the blindness or perverseness that lead any one to overlook an article of home manufacture supplied at comparatively a low price, for one of foreign production in no way superior and truly considered "a dear artirle." The arrow root which is the growth of South Florida, may be considered one of the home productions which are sacrificed to the undue preference for those imported. Equally white, equally pure with that of Jamaica, heretofore deemed the best, and by many thought to be the most nutritious of the two, there can be no reason for its not superseding the necessity of supplying market with any of the articles from abroad.

We have no price current at hand giving the value of the imported article in first hands, but we are well assured that it cannot be imported at less than from two or three times the price of that manufactured in this vicinity, which is from 6 to 8 cts. per lb. With an increase of demand, the aid of machinery would be required, and diminution in price might be anticipated; at present a similar mode of manufacture to that followed abroad is pursued in Florida, though it is probable that Florida manufacturers possess not all the facilities of their competitors.

We are not sufficiently versed in botany to pronounce upon the similarity of the Florida root to that of Jamaica or Bermuda, but there can be no doubt of their belonging to the same family of plants. The quantity manufactured is sufficient for the present demand, and doubtless will increase, as the root is indigenous, and but two or three planters being at present engaged in the manufacture, and that too, in connection with their other agricultural pursuits.

The low price at which the Florida arrow root is sold, allows of its being applied to other purposes than those to which, from its dearness, foreign arrow root was usually restricted. For instance, it is used here almost universally, in the place of starch, and no one can visit Key West without being positively satisfied of the fitness of the substitute. It is so extremely valuable in the composition of many niceties of the table (a fact which we have made known for the particular edification of our fair readers,) and particularly in an imitation *Best Mung.* It is used by the planters in some places as a bread stuff, and was so used by the aborigines, but do not ask it for so general a use as to have it supersede the use of either wheat or rye.

We shall rest satisfied if our notice secures for the manufacturers as great a demand as the goodness of their arrow root deserves.

RAILROAD ACCIDENT.

We learn that the train of cars which left this city yesterday morning for Frederick, on the Baltimore and Ohio Railroad, were upset about two miles this side the Monocacy, and about two hundred yards beyond the watering place. The accident occurred about noon, and is understood to have been the consequence of an unperceived defect in the road,—one of the rails being loose and out of place, the end of it struck the tender and turned the whole train of cars off the track, thus causing the overturn. Several passengers, as we regret to learn, were more or less injured by the accident, though it is believed none dangerously so. The lady of JAS. L. HAWKINS, Esq. of this city, and the conductor of the train of cars, were the two most severely injured. Mrs. H. we learn, received a wound in the head. The person in charge of the train cars was taken out from under one of them, and was supposed to be considerably injured, though not so as to affect life. The accident, it will be seen, was one of those against which no degree of care and foresight is at all times a sufficient safeguard. [Balt. Pat.

CONSUMPTION OF OPIUM IN CHINA.—"It is a curious circumstance," says the *Quarterly Review*, "that we grow the poppy in our Indian territories to poison the people of China, in return for a wholesome beverage which they prepare, almost exclusively for us." From the following statement made by Mr. Davis, late Chief Superintendent at Canton, it appears that the money laid out by the Chinese on their favorite drug far exceeds what they receive for their tea:—

Imports in 1833

	Dollars.
Opium, ...	11,618,167
Other Imports, . .	11,858,077
	23,476,244

Exports in 1833.

	Dollars.
Tea, ...	9,133,749
Other Exports, . .	11,309,521
	20,443,270

The Chinese smuggle all this opium, and pay the difference between the price of it and that of the tea they export in silver.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings o every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

WESTERN RAILROAD.

PROPOSALS will be received at the Office of the Western Railroad Corporation, in Worcester, until the 20th November, for the grading and masonry of the first division of the Road, extending from Worcester to East Brookfield, a distance of 19¾ miles.

Plans, profiles, etc., will be ready for examination after the 10th November. W. H. SWIFT,
Resident Engineer.

Worcerter, Mass. Oct. 19, 1836. 43—tnov20

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron 4—ytf

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Bray's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Dechertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at No 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is $500,000 with liberty to increase to $800,000, divided into shares of $100 each.

The sum of $5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I. BLAIR,
JOSEPH E. EDSALL,
COMMISSIONERS

Dated Oct. 3rd, 1836 41—9t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf.

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½ by	½,	15 ft in length,	weighing			$4\frac{68}{100}$	per ft.
280 "	2 "	½,	"	"		"	$3\frac{50}{100}$	"
70 "	1½ "	½,	"	"		"	2½	"
80 "	1½ "	¼,	"	"		"	$1\frac{25}{100}$	"
90 "	1 "	¼,	"	"		"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2⅝ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.
28—tf Philadelphia, No. 4, South Front st.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR

TO RAILROAD CONTRACTORS.

PROPOSALS will be received until the 8th day of December next, for the graduation and masonry of the first ten miles of the Gainsville and Narkeeta Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Gainsville for ten days previous to the time of letting and all other information given, on application to the subscriber or to the Assistant Engineer. Recommendations will be expected in all cases, of persons not known to the officers of the company or to the Engineer.

For the information of persons at a distance, it may be remarked, that this road commences at the town of Gainsville, on the Tombeckby river, and extends twenty-two miles south-west to Narkeeta in the State of Mississippi. The Tombeckby is navigable for Steamboats the greater portion of the year and having a direct communication with Mobile and New-Orleans, will afford facilities for procuring the supplies necessary for the hands employed on the work, or for their ready conveyance hither, if procured from a distance. The country through which the road is located, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season renders the contract peculiarly desirable to those wanting winter employment. To an enterprizing and energetic contractor the construction of this road offers the prospect of a profitable job.

D. H. BINGHAM, C. E.

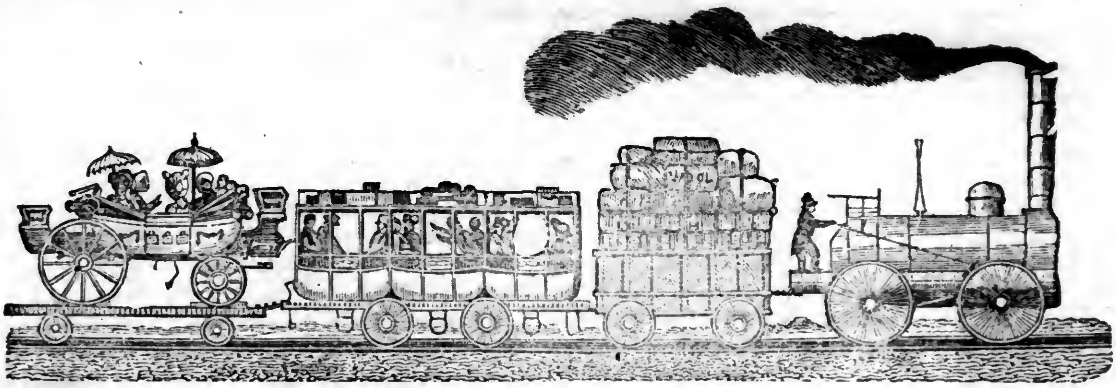
Gainsville, Ala. Sept. 21, 1836. 42—tDec1

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, NOVEMBER 19, 1836. [VOLUME V.—No 46.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, NOVEMBER 19, 1836.

LOCOMOTIAE ENGINES.

The demand for Locomotive Engines has been such that it was with great difficulty that companies could be supplied either in this country or in England—and we are gratified to be able to say that the NEWCASTLE MANUFACTURING COMPANY have so increased the number of their workmen as to be able to furnish several first rate Engines immediately to companies now in want of them.

Orders for the following described Engines will be received by us, at the Office of the *Railroad Journal*; and immediate attention given to them.

FOR SALE.—Three *Locomotive Engines*; built by the New-Castle manufacturing company; and now ready for delivery.—They are suited for a track of 4 feet 8½ inches wide. The boilers are 7 feet long, 36 inches diameter and contain each 109, copper tubes 1¾ inches diameter, with 11 inch cylinders and 16 inches stroke; standing on six wheels, two of which, viz. the *driving* wheels, are 5 feet diameter. Engine weighs about 7½ tons. All the materials are of the first quality, and the workmanship we believe will bear comparison with any other, either American or European. The price of each, with tender, water cocks, feed hose &c., complete, is $7500, delivered at the wharf in this place.

Engines of this Company's manufacture are in use on the Boston and Providence Railroad, and the following copy of William Raymond Lee's letter, will show the opinion entertained of them by those who are every way competent to judge. Office, B. & P. R. R. Co.

BOSTON, May 12, 1836.

Mr. E. A. G. YOUNG of Newcastle, Del.

Dear Sir, I take pleasure in communicating to you, the minutes of a trial made with the Locomotive, recently received from your shop, they need no comment, and are perfectly satisfactory, in relation to the power of the machine.

Left Boston 4 minutes past 12, with twelve cars, loaded with 87,670 lbs., of iron, gross weight, behind the Engine (exclusive of tender) 60.5 tons,—made the 8 mile post 28 minutes past 12 o'clock, (rate twenty miles per hour)—made 17¾ miles out (1 hour and three minutes) 1 o'clock and seven minutes P. M.—having run over the last 5.95 miles in twenty-five minutes, passing up ascents of 37½ and 45 feet per mile for the distance of 4.8 miles—with regard.

Your obedient servant, signed

W. RAYMOND LEE.

METEORS OF NOV. 12TH AND 13th.

Much discussion has arisen in the scientific world upon the question of the yearly appearance of this phenomenon.

At present we believe that but few attempt to deny the fact. It is in our power to prove the fact from personal observation.

While off the port of Pernambuco in the year 1832, the writer of this article witnessed a similar display to that of the night and morning of Saturday and Sunday last. The fact was registered in his journal, but the date was not remembered until two years after, when the subject excited considerable attention—on a reference to the diary the date was found to be Nov, 12th and 13th. This being a year before the famous "shower of stars," another link is added to the chain of evidence.

During the night of Saturday and morning of Sunday last, we kept a careful lookout, and at last were well rewarded for the trouble.

It may not be out of the place to state here, that from 8 o'clock in the evening til day break, constant flashes of lightning, it is supposed, were seen in the east; precisely like what is called heat lightning in summer.

At 9 o'clock, a very beautiful column of Auroral light shot up in the N. W., of a pinkish hue, and continued for 6 minutes. During the whole night there was a strong but ill defined light in the north.

The temperature of the air was moderate, the wind right from the west, and the deposit of dew very great.

The air was of unusual transparency, and the stars shone with increased beauty. Thus a fine opportunity was afforded for observation, and at a season when such nights are not frequently seen.

A few meteors were noticed through the evening, but at 2 o'clock on looking out, several were seen to cross the Great Bear in rapid succession, several leaving behind them a trail.

From this time till daylight constant observations were made.

From 2 o'clock till 3 o'clock, 98 meteors were counted.

From 3 o'clock till 4 o'clock, 150 were seen.

The enumeration was continued until over 300 were seen, and then no farther account was taken. About 400 in all were seen.

Of these the greater number were large and exceedingly brilliant, leaving a trail

of some length and going off with a sort of explosive appearance. The resemblance to a rocket was perfect.

The trail remained in some instances for two minutes. ! !

It was very soon seen that all these meteors had a course divergent from some common point, this point was ascertained and its place confirmed by observations during the whole night. At times the remaining trails of 3 or 4 meteors would clearly indicate its place. The position of this point was in Leo, Dec. 21° 30′ N., R A 150.°

Not more than two or three very smal meteors (such as are seen during any night) were observed to deviate from this course, excepting one or two of greater size which appeared to describe in a short space, a semicircle.

Those meteors that originated near to this point of radiation, appeared to pass over less space and to move more slowly—in fact the impression was irresistible, that the meteors all had the same direction toward the spectator and being seen in prospective appeared to radiate from the point.

Jupiter and Mars in the early part of the night and afterwards Venus afforded opportunities for comparison as to brilliancy of light. These planets are in favorable positions, and Venus in particular is very brilliant—but they were all eclipsed by the light of several of the meteors—one in particular for outshining Venus—to a casual observer it would have seemed a brilliant rocket set off at a short distance.

From the position of the observers, facing the N. E. is it probable that not more than half of the meteors were seen—from which it may be estimated that over 1000 appeared in the course of the night.

The dawn was one of surprising beauty, the pearly day light melting it to a deep rich blue in the zenith and being lost in a clear orange brown in the horizon. Jupiter and Mars in close vicinity over head, Venus in the clear light, and Sirrus with the stars of Orion in the deep blue. Even the brilliant meteors shot through the day light close by Venus, still exceeding her in splendor.

The appearance of the phenomenon was in all respects similar to that witnessed by the writer two years ago, the number of meteors that appeared then was perhaps greater.

This curious phenomenon is one of great interest to us, it being first observed and its annual re-appearance first conjectured, if we are not mistaken, in our country.

It is desirable that all the information on the subject should be collected, from this body of evidence, new light may be thrown opon the subject.

Durability and Preservation of Timber.—This is one of the most important subjects to which the attention of Engineers and mechanics can be directed. Until recently the causes of decay in timber had been unknown and uninvestigated, *dry rot* being as great a bugbear to the artisan and engineer as hydrophobia to the *leech* in our bustling inquisitive days, the true course and treatment of both of these diseases have been earnestly and carefully investigated, with more success however in the case of the vegetable than in that of the animal.

Our readers must be well informed of the methods proposed from time to time—some more and others less successful. Lime stands foremost on the list—as a corrective to fermentation and acidity, it is undoubtedly useful. We saw recently a remarkable instance of its preservative powers recorded in one of our exchanges.

A platform had been used for mixing mortar and had been continued in the same place (on the surface of the ground in an exposed situation,) and in the same use for nearly sixty years. At the end of that time the ground being wanted for other purposes the platform was directed to be removed, and as it was grown over with weeds and covered with a film of soil it was supposed that it would crumble to pieces. To the surprise of those removing it, they found it to be perfectly sound as much so as if it had been recently made from sound timber.

In this case however the preservative effect is rather to be ascribed to the mortar acting as an indurated covering, than to the lime penetrating the fibre of the wood. Both causes however may have operated in conjunction to produce an effect that neither would have accomplished unaided by the other.

But the most efficient preventive to decay is *corrosive sublimate* used in solution. This is now well known in Europe as Kyan's process. It has been introduced with constant success into the different Naval establishments in Great Britain, and large tanks are erected for the purpose of soaking the timber of any size.

The cost of this preparation is not great and when the importance of the object in view is considered, much money will be saved by it.

It was found upon trial that sail cloth exposed to damp and close air, after having been prepared resisted the mildew while unprepared cloths placed in the same situation fell to pieces.

It was objected to the introduction of this process that the corrosive sublimate being a violent poison, would endanger the lives of those living in the vicinity of article so prepared. It was found however by one of the best chemists of the day, that after soaking in water until no more sublimate could be obtained, even from stuffs of the finest texture, that the preservative effects were still the same.

In fact he found that the corrosive sublimate had entered into a sort of chemical combination with the vegetable fibre, by which it was in a manner neutralized.

To us it is a matter of astonishment that so little attention is paid to the preservation of timber in our country. It is true we have a vast region of forest yet untouched by the axe—but these cannot last forever, and moreover no pains are taken to renew them when removed.

The immense quantities of timber used in our public works should direct attention to the durability of the material employed—as a failure in certain parts may cause the destruction of the whole. An instance of this in one of the Southern Railroads is well know. The rails were supported upon piles without any embankment—when after a short time it was found that the timber was disposed to a peculiar rot, rendering the road liable to accidents of the most serious consequence.

Though Wood enters largely into the structure of most of our railroads—we do not think that sufficient provision has been made for its durability, and we most earnestly desire to see the subject thoroughly sifted, and experiments made with a view to some specific preservative process.

The application of *corrosive sublimate* is certainly worthy of trial—the effects of coal-tar and other proposed preservative should also be examined.

The question as to the propriety of wooden pavements for our strees, and also for the roadway of suspension bridges is now seriously discussed. The only objection of force is the liability to decay in most kinds of wood when exposed in a vertical position, the moisture entering in the direction ot the fibre, and finding its way easily to the very heart.

We have no doubt of the efficacy of Kyan's process in this case, and recommend the trial as of the greatest importance.

A very interesting and exceedingly useful subject of inquiry is the comparative value of our different kinds of timber in different situation, some remaining sound while constantly under water or earth, while but few stand alternate exposure, some remain sound longest in one soil while others are to be preferred in a soil of different nature.

This is a wide field and will richly repay those who labor in it, while the benefit to result from such investigation is a sufficient stimulus.

RAILROAD TO ERIE.

Agreeably to public notice a large and respectable meeting of citizens friendly to the construction of a Railroad to Erie, by the route of the West Branch of the Susquehanna, was held at the Exchange on Wednesday evening, Nov. 2, at half past 7 o'clock.

On motion of G. Ralston, Esq. John White was called to the Chair, and William Buehler appointed Secretary.

A circular from citizens of Erie, calling a Convention to meet at Williamsport on the 16th inst. being read, it was on motion, ordered that a committee be appointed to report to this meeting what action ought to be taken on the subject.

The Chair appointed William B. Reed, Simon Gratz and Gerard Ralston as the committee, who, after retiring for a short time, submitted the accompanying Report and resolutions, which were considered and unanimously agreed to.

Resolved, That the Citizens of Philadelphia fully participate in the solicitude expressed by their fellow citizens of North Western Pennsylvania, for the construction of a continuous line of communication, by Railroad or Canal, between the seaboard and Lake Erie, along the West Branch of the Susquehanna, believing such connexion to be practicable, and in all respects desirable for the promotion of the interests of this city and the Commonwealth at large.

Resolved, That the project of an Internal Improvement Convention, as suggested by the citizens of Erie, to be held at Williamsport, in Lycoming County, on the 16th November, to concert measures for the attainment of the object proposed, meets with our full concurrence and approbation.

Resolved, That this meeting will proceed to elect Delegates to represent Philadelphia in the said Convention, and that such delegates be authorised to fill any vacances which may occur among them.

The meeting then proceeded to the selection of Delegates to represent the City and County of Philadelphia in the Williamsport Convention, when the following gentlemen were duly elected.

CITY.

Nicholas Biddle,	Manuel Eyre,
Simon Gratz,	John White,
William B. Reed.	George Handy,
William J. Leiper,	William H. Keating,
Joseph H. Newbold,	James N. Barker,
Joseph R. Chandler,	Jacob Ridgway,
Gerard Ralston,	Robert Toland,
Walter R. Johnson,	William Buehler,
Charles B. Trego,	Jacob Lex,
Evans Rogers,	B. W. Richards,
Joseph M. Ilvaine,	Gen. R. Patterson,
Joseph T. Mather,	Cheney Hickman,
Thomas Reeves, jr.	J. B. Sutherland,
Henry C. Carey,	Timothy M. Bryan,

COUNTY.

William Wagner,	Franklin Comby,
George W. Ritner,	Samuel Stevenson,
John Naglee,	Francis J. Harper,
A. S. Roberts,	Robert Carr,
George N. Baker,	Thomas Rotch,
Robert A. Parish,	Henry Leech,
Samuel Harvey,	Richard Peltz,
James Gowen,	James Goodman,
James M. Cormick,	Thomas D. Grover,
Samuel Breck,	Augustus Stevenson,
Samuel Swift,	Charles Penrose,
J. R. Burden,	

On motion ordered that the report and proceedings be published in all the daily papers.

Adjourned to meet at the call of the Delegates,

JOHN WHITE, Chairman.

WILLIAM BUEHLER, Secretary.

MR. REED, from the committee appointed made the following

REPORT.

This meeting has been called by a number of individuals interested in the public improvements of the State, and desirous especially, to promote the object indicated in the circular from the citizens of Erie, which has just been read. It is scarcely necessary to add any thing in the form either of facts or persuasion to what is stated in that letter; but in order to place before the meeting, as strongly as possible, the inducements to action on the part of our fellow citizens, it may be desirable to submit a few words of further explanation.

In the first place, it will be distinctly understood, that this movement does not contemplate at this juncture, an investment of money, in the form of contribution or subscription of stock. In the present distressed and embarrassed state of the money market an invitation to capitalists to enter into new engagements and incur new responsibilities, would be utterly illusory. No such proposition or suggestion is made; a merely preliminary movement is contemplated, to devise the best mode of *hereafter* completing an important public work, and to determine whether that shall be by State action, or by private contribution at some future and less unpropitious time. That such a period will come, sooner or later, we have no reason to doubt—when it will come, it is not at all important for the purposes of the present meeting to inquire.

Were there no other inducement to accede to the suggestion of the Erie circular, than such as arises from the fact of an invitation having been sent to us, it would in itself be quite sufficient. None but those who have mingled freely either in the course of commercial intercourse, or in the public councils with our fellow citizens of the interior of the State, can realize the importance which is attached to the expression of active sympathy on the part of the commercial men and capitalists of Philadelphia, with their wishes and interests in any favorite public enterprise. Nor is this solicitude on their part at all unreasonable. They think and think justly that every project of public improvement that benefits them, benefits Philadelphia far more; and while they appeal to us to aid them in their views, as citizens jointly interested in the prosperity of the commonwealth, an appeal we have no wish or right to resist, they incidentally address what should be a lively sense of our own interest as inseparably connected with theirs. As an illustration of the feeling on this subject, it may be mentioned, that at the railroad convention held at Bedford, in July last, to devise measures to complete the railway from Philadelphia to Pittsburg, through the southern counties of the State, at which all the middle and western counties were fully represented, the absence of any representation from this city, and the utter indifference which it implied, became the subject of much severe and resentful remark. In that instance, however, the resentment felt and expressed, happened to be misdirected; no notice of an intention to convoke such a convention having been communicated to us. It is merely referred to now, in a case not parallel so far as the invitation affects it, to enforce the propriety and necessity of promptly responding, when our country friends ask us to join them in the discussion and consideration of our common interests. The senseless jealousy between the city and county, which once was so active, to the embarrassment of both parties, and was so sensibly felt in our legislative councils, is nearly extinct—a result attributable altogether to the communion of feeling and interest, which the improvement system has forced upon us, and the happy influence which the accumulated capital of this community, has been made to exercise in its appropriation to remote public works.

There are however, connected with the project now in view, considerations of immediate and substantial interest, which deserve to be strongly presented to the view of our fellow citizens. They can now merely be hinted at—the occasion not permitting more than a very cursory view of them.

It is known to this meeting, that the original draught of the improvement system of Pennsylvania, as contemplated by the legislature and the convention of 1825, had in view a connexion between Philadelphia and Pittsburg, and a connexion between the Atlantic and the Lakes at the harbor of Erie. Whether the latter was to be from the Ohio, or without touching Pittsburg, by the head waters of the Alleghany and west branch of the Susquehanna, was not determined; but by one route or the other the connexion with lake Erie was expressly stipulated. To this effect the faith of the State was solemnly and expressly pledged. Relying on this, the northwestern counties of Pennsylvania, espoused the cause of internal improvement with a zeal, and have adhered to it with a perseverance for which they have not had sufficient credit. Until recently, their reward has been bitter and continued disappointment—year after year—session after session passed by, to bring them only renewed mortification. With the exception of two small pledges of future action in the canal from the mouth of Bever, to New-Castle, in Beaver county, and the French creek feeder, literally, nothing was done. Nor for a long time did there seem to be the prospect of a change. Circumstances to be sure, for which the public authorities were not at all responsible, operated adversely to them. After the unfavorable report of the engineers, as to the supply of water on the West Branch summit, a report in whose accuracy, confidence has been somewhat lessened, and the final adoption of the Juniata route to Pittsburgh, the attention of the public was necessarily directed to a connexion between the Ohio and the Lake, making Pittsburgh a point. This being the case, a conflict of interests immediately arose as to the superior eligibility of the two routes, the one known as the Chenango route through Beaver and Mercer counties—the other by the way of the Alleghany river, through Armstrong and Venango counties to the Lake. In

this conflict, the people at the extremity of the route, in Erie and Crawford counties, had no other interest than to have it adjusted. It continued however, without intermission, for a series of years; nor was it adjusted till last year, when the peculiar form which the Improvement Bill assumed, as well as the increasing conviction of the superiority of the Chenango route, determined the question in its favor.

In all this conflict and throughout all this disappointment, the Representatives of Philadelphia, with a few exceptions, adhered steadily to what they considered the promise of the State, as made in the original plan of improvement, and voted generally, but fruitlessly, for the Erie extension by one route or the other. The session of 1834-5, however brought immediately to the view of the Legislature, improvements which were in all respects, in direct rivalship with the extension to Erie, and which became necessarily the source of renewed disappointment The cross-cut canals to Ohio, one of the immediate effects of which was to give a preference, as a Lake port, to Cleveland over Erie, were brought forward anew, and in such a form as to give assurance of their ultimate success. Their encouragement gave a keener edge to the disappointment of North Western Pennsylvania, and seemed to justify the apprehension that their Eastern friends, having secured an outlet to the Lake through Ohio, would be carless and indifferent to their favorite work to Erie.

Fortunately, however, owing to circumstances and opportunities to which it is not necessary particularly to refer now, at the session of 1835-6—after ten years deferred hope and anxious exertion—the Legislature were enabled to redeem their pledge, and by a liberal appropriation actually to re-commence the work on the route from the Ohio to the Lake. It has been said that the peculiar form in which the Improvement Bill of last year was framed, led to an adjustment of the ancient difficulty between the rival routes. The decision between them being left to the representatives generally of that section of the State—and those friendly to the Allegheny route being unable conscientiously to support the bill as it was necessarily presented, the western route was without further opposition adopted, and is now under contract.

So far then as the plighted faith of the State was involved, it has been at last redeemed. But so far as the expectations of this city from a participation in the Lake trade are concerned, little has yet been done. The strong inducements which directed all our attention to the speedy completion of the main line to Pittsburgh have been the means of throwing into the shade the only effectual line of communication with the Lakes, viz: by means of the West Branch of the Susquehanna. Attention is now turned to it anew. So zealous and so persevering have been the assertions of the citizens of the upper counties, of the perfect practicability and ease of a railroad, if not a canal communication with the Lakes by this route, that confidence in former adverse representations has been greatly impaired—so much so as to induce the Legislature at its last session, to make a liberal appropriation for new surveys on that line. Should they result favorably as it is believed they will, the only question will be whether the great trade of the Wetsern Lakes is of so little value as to justify Pennsylvania and Philadelphia in relinquishing it to their more enterprising neighbors.

It is to the restless enterprize of those neighbors that we are perhaps indebted for the strongest impulse for action now. Reference to a few significant facts will illustrate what is meant. The city of New-York has with Lake Erie a complete and perfect water communication, by means of the Erie canal. Philadelphia has none.—Nor will she, even when the Erie extension and the cross-cut canals are completed, have such an avenue to the Lakes as will enable us in the seasons of open navigation, to compete with New-York in this respect. Observation of the existing state of things, as well as moderate foresight, has, however, satisfied the public spirited citizens of our sister State, that the trade of the North Western Lakes must seek other outlets than its single canal; and while Philadelphia, with far greater natural advantages, neglects the great opportunity of a direct diagonal line of communication with the Lake which her position might give her—the last year has given birth to two great enterprizes in New-York, directed solely to securing the Lake trade, either of which is deserving of all admiration, in the enlargement of the Erie canal and the construction of the great New-York and Erie Railroad. If then, New-York considers herself justified in executing new and gigantic enterprizes to secure the great trade of the Lakes to her capital, and if we have it in our power to construct a cheaper, a shorter and better route than she can possibly devise, are we justified in being longer indifferent?

We say a cheaper, shorter and better route. From the Hudson to the harbor of Dunkirk, is a distance of, say, 483 miles. Over this whole distance, a railroad is to be completed at a cost, according to the estimates, of not less than nine millions. Supposing the connexion through Pennsylvania to be by canal, it must be borne in mind that it is already completed as far as the mouth of Tangascootack, on the West Branch. If by railroad, all that need be constructed for the present, will be from the head of the State works just referred to, to the lake and when hereafter, as doubtless it soon will be, a continuous railroad will be required, the only link to be supplied, will be between this north western section of the road, and the progressing works at Sunbury and Catawissa, from either of which points the railroad communication to Philadelphia will be soon completed. The superiority in other respects of the Pennsylvania work is equally decided—both in relation to the point of termination on the lake, and the resources of the country through which it will pass. For while the New-York railroad passes through a country of doubtful fertility and limited mineral product, the Pennsylvania improvement traverses regions of unsurpassed mineral resources, and thence must become the avenue by which not only the lake business will travel to the eastern market, but by which the whole coast of the lakes may be supplied with our iron and coal. As to its termination it is well known that the harbor of Erie is the only safe harbor on the coast from Buffalo to Sandusky. It can be approached with any wind, and is capacious enough to contain all the shipping, which for a long time to come will float upon the upper lakes. In this respect alone, the superiority of the Pennsylvania over the New-York improvment can scarcely be appreciated. The port of Dunkirk, where the New-York and Erie road is to terminate, is believed to be little better than an open Roadstead wholly unprotected, and which will require a very large expenditure, before it can be rendered even ordinarily secure.

In point of freedom from ice in the spring and fall, Dunkirk, distant but 45 miles, can boast of little superiority over Buffalo, which is known to be closed on an average always five weeks earlier and later than Erie. So slight in this respect is the difference between Dunkirk and Buffalo, that it is confidently believed that the interests of the New-York company will induce them when they obtain the consent of Pennsylvania, which can scarcely be refused, to extend their work as far westward as Erie, and there to fix its termination. In fact, a company has been already incorporated by New-York to make a Railroad, crossing the New-York and Erie Railroad at Dunkirk, from Buffalo to the State line. The stock has been fully subscribed, and measures will before long be taken to continue the Road from the line to Erie. Should this be done, and no communication effected through Pennsylvania, Erie having become the great depot of the produce of the Lakes, will look altogether to New-York as its metropolis. As Pennsylvanians and Philadelphians, we ought to endeavor to avert this result.

It is not designed in this place to enlarge upon the increasing trade of the Lakes, for the transit of which the New-York works are constructing. It is enough for us to know, that having one line of communication, *they* deem it utterly inadequate, and are actively engaged in designing new ones, while we, without any outlet, have been thus long the indifferent observers of their movements. Let any one cast his eye on the map, and observe the immense tracts of country in the progress of settlement to the North West, possessing a fertile soil, and rapidly filling up with an active and enterprising population, and he will realize how utterly inadequate are all the existing or projected outlets for the business which the exigencies of this vast territory must create and how vast a market for goods from the Eastern cities has, within a few years, sprung up in the wilderness. In 1825 there was but a single steamboat navigating Lake Erie, and that an incommodious vessel, whose engine was not able to propel it at a more rapid rate than four

miles an hour. This season there are at least forty fully equipped steamers on the Lake, and square rigged vessels to the number of nearly 200. And as an illustration of the immense amount of business now done on the lake, mainly in the transportation of emigrants and supplies for their subsistence it is a well ascertained fact, that two citizens of the town of Erie, owners of four of the largest steam vessels on the lake, received during the last year at least $30,000 clear profits from their investments. All this tide of emigration now passes partly along the Canada shore and the St. Lawrence but principally through the Erie Canal. What advantages our New-York neighbors promise themselves from the continuance and increase, may be inferred from the following passage, taken at random from the report of the Directors of the New-York and Erie Railroad Company for 1835.

"If the experience afforded by the Erie Canal be taken as a guide, it may be safely stated that the accomplishment of the proposed work will add not less than one third to the present population and trade of the city of New-York, and augment in an equal degree its landed wealth; and that it will double, if not quadruple the present value of the extensive district, embracing six millions of acres in the southern and middle counties of the State. When it is considered also, that by means of the great avenue of intercourse, and its tributaries now springing up and spreading through all the great vallies of the west, bringing lake Erie into close connexion with the Mississippi and Missouri, and extending southwardly even to the Gulf of Mexico, the immense inland communities upon the western waters for the purpose of trade, will be rendered commercially tributary to the State and metropolis, it becomes difficult to fix within moderate bounds the value of the proposed road; or the amount of travel and transportation which it is destined to create and accommodate."

Such testimony, from such a source, is as significant an admonition to us to arouse to active exertion, as any that could be given. Having secured the command of the trade from the valley of the Mississippi by means of the cross-cut canals, and our main line, we have only to devote our energies and enterprise to active competition for the lake trade, to secure the greater share of it. With a continuous line of Railroad to Erie, by the west branch of the Susquehanna, an intersection of the New-York works by the Williamsport and Elmira Railroad and North Branch Canal, and a railway to the Ohio through the southern counties, our Pennsylvania Improvement System will be complete, to render this Commonwealth the richest and most prosperous of the States, and to make this city, what her position so well enables her to be, the great distributing city of the Union.

These cursory remarks have been made in the earnest hope of calling public attention anew to the proposed public work on the west branch route, as one of the most important, as it actually has been the longest neglected of our enterprizes. The first, and only measure we have now to adopt, is to send an efficient delegation to represent this city in the Williamsport Convention, to co-operate freely and cordially with our fellow citizens in the consummation of this great design.

WILLIAM B. REED,
SIMON GRATZ,
GERARD RALSTON, } Committe.

INTERNAL IMPROVEMENT.

At a meeting of the friends of Internal Improvement, holden at the Court House, in Montpelier, Oct. 27, 1836, His Honor, David M. Camp, was called to the chair as President, and the Hon. Lyman Fitch and Capt. J. Sherman, were appointed Vice Presidents, and Charles Paine Secretary.

The following preamble and resolution were then introduced by the Hon. William Slade, of Middlebury.

Whereas, the internal improvement of a country by roads and canals, is among the most important means for the development of its resources, and its advancement in wealth, population and general prosperity,—And whereas the mild climate and productive soil of the western States, aided by their extensive internal improvements, are holding out inducements which are rapidly drawing off the population and wealth of Vermont to new and more promising fields of enterprise. Therefore

Resolved, That it is expedient to form a *State Internal Improvement Society*, for the purpose of concentrating effort—exciting a spirit of inquiry, and embodying such facts in regard to the agricultural, commercial, manufactures, water power, and mineral resources of this State, as shall enable its people to determine upon the expediency of entering on such a system of Internal Improvement as may tend to advance the value of its staple productions—retain its population—give fresh impulse to its enterprise, and disclose new objects for the employment of the capital, ingenuity and industry of its citizens.

The meeting was then addressed by Messrs. Slade of Middlebury, Story of Coventry, Pierce of Woodstock, Fairbanks of St. Johnsbury, Cahoon of Lyndon, and Stevens of Barnet, in favor of the resolution, when it was unanimously adopted.

Mr. Fairbanks of St. Johnsbury, then moved that a Committee of one from each county be appointed, to nominate officers for the Society, which motion was adopted, and the following named gentlemen appointed said committee:—

Orleans County,	Gov. Crafts,
Franklin "	John Smith,
Chittenden "	John Van Sicklin, Jr.,
Grand Isle "	Melvin Barnes,
Addison "	Harvey Bell,
Rutland "	C. W. Conant,
Bennington "	Leonard Sargent,
Windham "	William Henry,
Windsor "	F. E. Phelps,
Orange "	A. B. W. Tenney,
Caledonia "	Mr. Fairbanks,
Essex "	Doct. Dewey,
Washingt'n "	Milton Brown,
Lamoile "	Levi B. Vilas.

Mr. Slade moved the appointment of a Committee to report a Constitution for the government of the *State Internal Improvement Society*, and Messrs. Slade, Coolidge and Richmond were appointed.

Mr. Waterman of Montpelier, then introduced the following resolution.

Resolved, That a committee of three be appointed by the President, to petition the General Assembly, now in session, to appropriate such sums as may be necessary to defray the expense of surveys of the eastern, western, and central railroad routes, now under contemplation in this State.

The resolution was adopted, and Messrs. C. Paine, of Northfield, Henry, of Rockingham, and Foote, of Rutland, appointed said committee, whereupon the meeting adjourned till Friday evening, Oct. 28th.

FRIDAY EVENING, Oct. 28, 1836.

The convention met, pursuant to adjournment. The committee appointed for that purpose, reported the following:—

CONSTITUTION OF THE VERMONT INTERNAL IMPROVEMENT SOCIETY.

ART. 1. This Society shall be denominated *The Vermont Internal Improvement Society*.

ART. 2. The officers of this Society shall be a President, fourteen Vice Presidents, a Secretary, a Board of Managers, and Committees in each County, as hereinafter provided.

ART. 3. It shall be the duty of the President, and, in case of his absence, the Vice Presidents in the order of their appointment, to preside in all meetings of the Society; and the Secretary shall keep a record of its proceedings.

ART. 4. The Vice Presidents shall be selected from each county in the State, and shall have power, at any time to call county meetings, for purposes connected with the objects of this Society, and shall preside in such meetings.

ART. 5. The Board of Managers, which shall consist of three members of the Society, shall correspond from time to time, with the county committees, and with such other persons as they may deem proper, for the purpose of eliciting such information in regard to the Agriculture, Commerce, Manufactures, Water power, and Mineral, and other resources of Vermont and also in regard to the effect upon these interests, in other States, of improvements by railroads and canals, as shall be deemed useful in determining whether it will be for the interest of the people of this State to undertake such improvements.

ART. 6. There shall be appointed a committee of three persons in each county in this State, whose duty it shall be to institute inquiries in their respective counties, relative to the various subjects specified in the foregoing article, and to report the result of their enquiries to the Board of Managers, on or before the first day of September annually. And the Board of Managers shall, at each annual meeting of the Society, make a report, embodying such information as they may have obtained from the said county committees, or from other sources, touching the objects of this association.

ART. 7. There shall be an annual meeting of the Society at Montpelier, on the day next succeeding the meeting of the legislature, at seven o'clock, P. M., at which time, the President, Vice Presidents, Secretary, Board of Managers, and county committees shall be chosen.

ART. 8. Every freeman of this State is to be considered as having a right of membership in this Society, and entitled to vote in its meetings, and participate in its deliberations.

ART. 9. This constitution may be altered or amended, by a vote of the Society, at any annual meeting.

The report was taken up and acted upon, section by section, and after an animated discussion upon the general subject of Internal Improvement, was unanimously con-

curred in, and the Constitution adopted without amendment.

President, Hon. SILAS H. JENNISON.
For Vice Presidents.

Wm. C. Bradley,	Timothy Hubbard,
David M. Camp,	William Jarvis,
Benjamin Swift,	Nath'l P. Sawyer,
Wm. A. Palmer,	Richardson Graves,
Lyman Fitch,	Samuel Swift,
M. Chittenden,	George T. Hodges,
Hiland Hall,	Melvin Barnes,
For Secretary	E. P. Walton,
Ass't "	Lucius B. Peck.

For State Central Committee.—J. P. Miller, Dan Carpenter, Araunah Waterman.

For County Committees.

Bennington, Stephen Hinsdale, Isaac Doolittle, Nathan H. Bottom.

Windham, J. C. Holbrook, Phineas White, Henry F. Green.

Rutland, Hannibal Hodges, A. G. Dana, John A. Conant.

Windsor, Francis E. Phelps, Samuel W. Porter, Thomas Emerson.

Orange, Asa Lowe, Hiram Tracy, Thos. Kendrick.

Addison, Samuel Swift, Russell Ballet, Elnathan B. Goddard.

Chittenden, Heman Allen, Henry Bradley, John N. Pomroy:

Washington, Henry F. Janes, Thomas Reed, Jr., Paul Dillingham, Jr.

Caledonia, Erastus Fairbanks, Harry Stevens, Abel Edgell.

Franklin, Homer E. Hubbell, Horace Eaton, Asa O. Aldis.

Essex, John Dewey, Hezekiah M. Wead, Wm. Haywood, Jr.

Orleans, Samuel C. Crafts, Lemuel Richmond, James A. Paddock.

Lamoile, Thomas Waterman, James Tinker, Eliab Herrick.

Grand Isle, Samuel Adams, Hector Adams, John M. Sowles.

This report was accepted, and the nominations of the committee confirmed.

On motion of Hon. Milton Brown Resolved, that all editors of papers in Vermont, friendly to the cause of internal improvement, be requested to publish the foregoing proceedings.

DAVID M. CAMP, *Chairman*.
CHARLES PAINE, *Secretary*.

WABASH AND ERIE CANAL.—EASTERN TERMINATION.—We have been politely furnished with a copy of the order of the Board of Public Works, fixing the location of this canal along the Eastern valley of the Maumee. It has been a question of great interest to the Western speculators, and the precise terms of the arrangement are given.

Ordered, That the Eastern termination of the Wabash and Erie Canal be at such point in the town of Manhatten, or on the public land near the town of Manhatten, on the Maumee river, as the advising Commissioner of that district, the acting Commissioner, and the principal Engineer, having charge of the work, may designate and that said Canal, from the head of the Rapids of the Maumee river to the Eastern termination of said Canal, be located and constructed on what is called the high level. looking into and connecting with the Maumee river at Maumee city, at Toledo a Manhatten, and at such other points as may hereafter be determined on.

I enclose you an extract of a letter from the agent of the New-Orleans and Nashville Railroad Company at Nashville. The faith there evinced in the success of the road, contrasts with the want of it in our Legislature not much to our credit. But things are changing, and all things will come right.

You, with other editors of our city, have complained loudly and very justly of the failures of the northern mail; which might lead us to suppose that the western mail is otherwise. I give you some data to judge by: a letter from the company to the agent at Nashville, was mailed the 9th September and received 28th, and his answer of 29th was received 13th, &c. &c. The one from which the extract is taken had better fortune, and came to hand in 12 days.—Now the distance is the same as between Baltimore and Cincinnati, where the mail passes regularly in 4½ days. With such an intercourse in summer, what will it be in winter? And while this evil exists, how vain is it to invite the merchants of those States to seek us at their mart for dry goods, &c. Your line of Liverpool packets will be one link in the chain; but a railroad to Venable the merchant, to come and go without loss of time and convoy his orders, is just as necessary as two links are to make a chain. But our Legislature thought otherwise when they refused $5000 for the surveys of a road. They thought it bettter to pray to Hercules—forgetting that it would require a life time for our mails to convey their prayers. If we wish to escape the fate of the wagoner, we must do it as our Atlantic brethren have done. The city of Baltimore has invested, as a corporation, in the Baltimore and Ohio railroad, 3,500,000. Compare the commerce of the two cities. H.

"I have now to inform you that I have laid before our General Assembly, now in special session, a memorial on behalf of the New-Orleans and Nashville Railroad company, asking a subscription on the part of the State of the stock reserved for her. A bill containing instructions to the Governor to that effect has been introduced by a member, and the whole referred to the internal improvement committee. The success of the application will depend mainly upon the view which the members may ultimately take of the propriety of making appropriations at this (called) session.—[Standard.]

WATERTOWN AND ROME RAILROAD.—WILLIAM DEWEY, Esq., the skilful and efficient engineer, has completed his survey of the route, the estimates of the cost of construction, and has submitted the whole to the commissioners named in the act of incorporation. The Report which is very full and accurate, presents clearly the obstacles to be overcome, the facilities of the route, and the comparative cheapness with which the road may be constructed. We deem the report alike creditable to the Engineer and the commissioners who employed him, as it proves conclusively his capability and their discrimination. The result of his labors and observations cannot but be beneficial to this section of the State, for the great natural advantages with which this country abounds, need only be known to be rightly appreciated. And whether the road is, or is not constructed, this point, to a certain degree, has been secured; the remarks and opinions of men of science and discrimination, will always command the respectful attention of the public. But of the construction of the road, and that shortly, we have no doubt; it is manifestly of such public importance, that its commencement cannot be long delayed.

Mr. Dewey is now engaged in the survey of the Watertown and Cape Vincent, railroad, and will probably be able to make his report this fall. In the mean time his report of the survey of the Watertown and Rome railroad, will immediately be published.—[Eagle and Standard.]

From the London Mechanics' Magazine.

LONDON AND BIRMINGHAM RAILWAY.

REPORT OF THE DIRECTORS TO THE SIXTH HALF-YEARLY GENERAL MEETING OF THE PROPRIETORS, HELD AUGUST 5, 1836.

The Directors have the satisfaction to announce to the Proprietors, that the progress of the works generally, in the last six months, has been such as to warrant the expectation which was held out at the last meeting, that the whole line will be completed by the summer 1838, and the first twenty-one miles from London in the spring of 1837.

Of the Primrose Hill Tunnel, which is 1105 yards long, only 114 yards remain to be made; the Kensal Green Tunnel is finished, and traversed by the Company's locomotive engines; 1423 yards are completed of the Watford Tunnel, the total length of which is 1793 yards; and the difficulties which were presented by the quicksand in the Kilby's Tunnel have already been so far surmounted, as to leave no doubt in the mind of the Company's engineer, that they will not delay the opening of the railway beyond the time mentioned. With reference to the other portions of the work, the Directors are making every exertion to forward them, so as to give the Proprietors the benefit of a revenue at the earliest possible period; satisfied that although for the attainment of this object an additional charge will be incurred by the Company, the advantage to be derived from it will be more than commensurate to the expense.

The Directors have entered into a contract, under the guarantee of two responsible sureties, with Mr. Edward Bury, of Liverpool, an able and experienced builder of locomotive engines, for the conveyance of passengers and goods, on the railway, by locomotive power, to whatever extent may be required, at a fixed rate of remuneration; the Company providing engines of Mr. Bury's specification, and Mr. Bury, on his part, maintaining and keeping them in repair; the contract to be in force for three years from the opening of the railway.—The Company have thus assured to themselves the advantage of locomotive power at a uniform and moderate rate, and under a system of management which it is the interest of the contractor to render mutually beneficial to the Company and himself.—

The Directors have also contracted for such locomotive engines as will be first wanted, and for a portion of the carriages.

The Directors in referring to the Bills for railways, connected with the London and Birmingham, which have received the Royal Assent in the present Session, feel themselves called upon to congratulate the Proprietors on the great accession of traffic which they may anticipate from the direct communication opened with the northern and eastern parts of the kingdom, by means of the Midland Counties, North Midland, and Birmingham and Derby Railways, not to mention the connection between Birmingham and Gloucester, by the Birmingham and Gloucester Railway, nor minor lines, which will all contribute to swell the revenue of the Company. Acting upon the suggestion of the Proprietors at the last General Meeting, and considering it desirable that a connexion should be secured with Leamington and Warwick, the Directors have instructed the Company's engineer to ascertain the levels for a branch line to those places, to join the London and Birmingham Railway near Coventry; and they have also set on foot the usual investigation into the traffic, so as to be prepared to follow up the object with such measures as may, in the opinion of the Proprietors, be deemed expedient.

By the statement of accounts now to be laid before the Proprietors, it will appear that

	£	s.	d
The receipts to the 30th June were	1,955,608	0	5
The disbursements . . .	1,492,100	16	8
That the balance in favor of the Company was, at that date . . .	463,507	3	9

And that the amount received on loan, pursuant to the powers given by the last General Meeting, was 443,800*l*.

It is estimated that the liabilities of the Company, for the next six months, will be sufficiently met by the cash at their disposal, and by loans which have been tendered and agreed for, with the addition of calls. Great as the present scale of expenditure will appear, the Directors are satisfied that so long as the works proceed with energy proportioned at that expense, the Proprietors will hail the increase as an additional evidence of the approach of their great undertaking to completion.

RAILROAD TRANSIT AND INLAND NAVIGATION.

(*From the Times' Report of First Days's Proceedings of the Bristol Meeting of the British Association, Aug.* 22, 1836.)

The subjects arranged for discussion were two—on certain points connected with the theory of locomotive carriages, and on the application of our knowledge of the phenomena of waves to the improvement of the navigation of shallow rivers and canals.

Professor Mosley opened the first poin by stating that there were many gentlemen present acquainted with the practical working of steam engines, but the relations between the theory and practice were not perfectly understood. The piston of a locomotive engine was pressed on either side, one resulting from the friction on the road, and the other from the passive friction of the engine itself. If it was lifted from the ground, a person endeavoring to move the wheels would find a resistance equal to 150 lbs. The cause of the resistance was this—that the traction upon the engine induced additional friction of the machinery, and that probably was one fifth of the whole amount of friction. If the engine moved without a train, there would be a passive resistance; if a train was attached to it, there would be induced a considerable friction of the machinery. There were, in fact, three causes of resistance—the friction of the carriage, the passive resistance, the additional friction by the train—the first and last varying according to the weight of the train. On the other side there was the expansive force of the steam. The quantity of work done was greater as the velocity was less. Inclined planes on railroads he considered to be injurious.

Dr. Lardner said he had given a good deal of evidence before Parliament upon this subject. In all inclined planes more steep than the angle of repose there was an unfavorable loss of power. The portion of mechanical force expended in ascending the plane was not repaid in the descent.—Theoretically they might take advantage of the accumulative matter as a deposit of momentum, and make a perfect mechanical compensation, but that was not the case in practice, because they were obliged to check the velocity in the descent. He had never said, as had been represented, that inclined planes were not of importance, because the friction in the ascent was given back in the descent. When the engine was descending, great part of its steam was going off in the safety-valve, therefore inclined planes were injurious. All the experiments led to the conclusion, that every effort should be made to attain as perfect a level as possible. Every departure from a level, though it saved a quantity of capital in the construction of a road, entailed an everlasting expense. The result of some experiments he had made was this—that in the ordinary state of the roads, the force necessary on a level was 7 lbs., per ton. but he found an extraordinary difference depending on the state of the rails, a difference amounting in some instances to such an extent that the friction was reduced to 4 lbs. When it rained and the rails were wet, he found the friction reduced to 4 lbs., but as soon as the rails became again dry, the friction was again 7 lbs.; he should therefore suggest, that two watering-pots should be placed before the wheels, so as to give the engine an additional power of nearly 50 per cent. There was another point with regard to dust: he had let himself down a very steep inclined plane, and when he attained a speed of 60 miles an hour, he had a quantity of sand put on the rails, and the consequence was, that the steam engine came to a stop.

As to the second subject for discussion—namely, "On the application of our knowledge of the phanonema of waves with a view to the improvement of the navigation of shallow rivers and canals."

Mr. Russell made some very lengthy, but very interesting observations, the substance of which was this,—where canals did exist, there was no man but wished they should be conducted in the most profitable manner. Newton's law had been confirmed, that the resistance was in proportion to the square of the velocity. The difference in the amount of resistance between a veesel drawn on a canal by a horse, trotting or cantering, was from 108 to 136. He would read from a paper the results of various experiments he had made, in which they would perceive a very curious fact as regarded the pace of eight miles an hour.—The table was thus:—

				lbs.
4 miles an hour	gave a resistance of			33
6 ditto	..	ditto	..	91
7½ ditto	..	ditto	..	265
8½ ditto	..	ditto	..	215
9 ditto	..	ditto	..	235
11 ditto	..	ditto	..	246
12 ditto	..	ditto	..	352
15 ditto	..	ditto	..	444

But at the rate of 20 miles an hour the vessel skated along the surface of the water, and there was scarcely any resistance at all. When a vessel was propelled at a great velocity and then stopped, it produced a wave varying in its form, according to the mass of the water, and he had followed such a wave a mile and a half; the velocity of the wave was uniform, and independent of the velocity of the vessel. If the vessel was going four miles an hour, this wave would go at the rate of eight miles an hour, and he had seen a large wave overtake a small wave and pass it. The waves never exceeded in height the depth of the quiescent water. Vessels at a slow velocity did not divide the water as was generally supposed, but pushed it forward in the shape of a wave; but where the velocity was greater than eight or nine miles an hour, the vessel did divide the water. It was possible to bring the vessel completely upon the wave, and then you had scarcely any resistance. A velocity of between four and six miles an hour on canals was unprofitable; beyond 11 miles an hour you had a high velocity, and comparatively little resistance. He recommended a rectangular canal where it was intended the velocity should be great, as by widening a canal with sloping banks you increased the resisting power.

The Rev. Mr. Whewell agreed with Mr. Russell in nearly all his remarks, which he considered most valuable and important to be considered. It was clearly ascertained that the greater the velocity the less the resistance.

Mr. Russell felt convinced that by adopting a considerable velocity, the Atlantic might easily be crossed with steam-vessels.

The Chairman (the Marquis of Northampton) said, that the observations of Mr. Russell were most important, and that the gratitude of the country was due to him for his experiments.

ARSENIC.—M. Schweiger Seidel has invented a very simple method of ascertaining the presence of arsenic in food, &c.

however small the quantity may be. He puts a portion of the matter to be tried, and double its weight of soda, into a little glass tube; he closes the open extremety of the tube with blotting paper; and heats the other end with a taper: the arsenic is sublimated in a few moments, and adheres to the sides of the tube in the part which is not heated.—[Atheneum.]

CURTIS'S CHIMNEY-HOOD AND ASH-PAN FOR LOCOMOTIVE-ENGINES.

SIR,—I send you a drawing and description of my chimney-hood and ash-pan for locomotive-engines, as used on the London and Greenwich Railway, and shall feel obliged by your insertion of the same in your valuable pages.

The Hood.—The chimney of the engine is covered with a dome, which projects the steam and heated air escaping into the atmosphere upon a surface of water contained in the receiver or outer vessel, so that any sparks or other matter ejected from the chimney must necessarily be received in the water, and consequently extinguished. The condensation of the steam, together with the priming of the boiler, supply sufficient water to keep the bottom of the receiver always covered; and for the purpose of carrying off any excess of water, a small tube is fixed to the bottom of the receiver, and this pipe stands up about 1¾ of an inch, so that a plate of water of 1¼ inch deep is always ensured. The pipe enters the chimney and forms an elbow, which elbow also is always full of water, so that no fire can possibly pass through it. It is my intention eventually to form the dome double, and to pump up the cold water, which will be thus heated (by the waste steam, and then to pump this heated water into the boiler, thus converting the apparatus into a feed head. I find a space all round of about four inches sufficient for the passage of the steam, &c. I have put this invention to the most severe tests I could devise, but could never force a spark from the chimney. The engine runs freer and faster than with the gauge, the draught is unimpaired, the apparatus is cheap and simple, and absolutely safe.

Fig. 1.

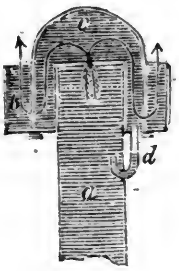
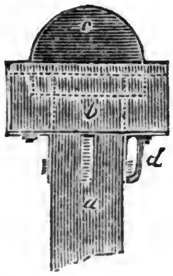


Fig. 2.



Description of Engravings.

Fig. 1 is a section, and fig. 2 an elevation of the hood: *a*, chimney; *b*, receiver, containing water; c, dome or hood; *d*, bent tube; the curved arrows show the path of the steam, air. &c.

The *ash-pan* is a box of sheet-iron suspended under the fire, and water-tight, so that the water filtering through the fire-box *a* is received into it The pan is about eight inches deep, and the sides rise above the fire-box about three inches all round, so that the dust in the act of falling is not blown away during the progress of the engine, or by the wind, and being received into water is, of course, immediately extinguished, while the water is evaporised; and the vapor not only prevents the coke from clinkering on the bars, but materially assists the combustion. The box is open all around and behind about eight inches, thus providing abundant area for the passage of the air to the fire. It is suspended behind by a joint to the framing, and before by a chain which coils round the axle of the hand-wheel *f*, so that when the engineer wishes to discharge the ashes, or rake the fire-bars he merely lets go the wheel, when the pan falls down, describing the curve shown by the dotted line.

Fig. 3.

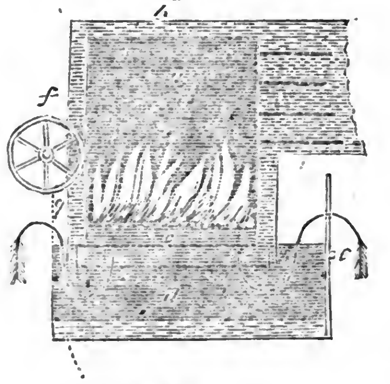
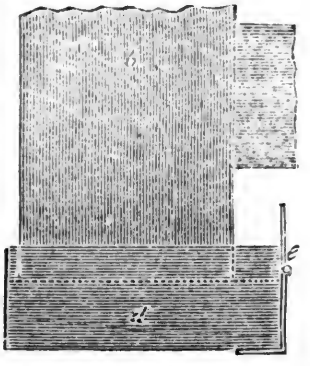


Fig. 4.



Description of Engravings.

Fig. 3 is a section, and fig. 4 an elevation of ash-pan and part of the boiler: *a* fire-box; *b*, boiler; *c*, fire-bars; *d*, ash pan. containing water; *e*, hinge of ditto; *f*, hand-wheel; *g*, chain by which the pan is suspended. The curved arrows indicate the path of the air.

Your most obedient servant,
W. S. CURTIS.

DEPTFORD, August 6, 1836.

APPLICATIONS OF CHEMISTRY TO THE USEFUL ARTS, BEING THE SUBSTANCE OF A COURSE OF LECTURES DELIVERED IN COLUMBIA COLLEGE, NEW-YORK, BY JAMES RENWICK, PROFESSOR OF NATURAL EXPERIMENTAL PHILOSOPHY, AND CHEMISTRY.

VI.

USEFUL APPLICATIONS OF THE EARTHS.

1. LIME.

PREPARATION OF QUICK LIME.

AUTHORITIES.—DUMAS. Chimie applique aux Arts.
BISTON Manuel du Chanfournier

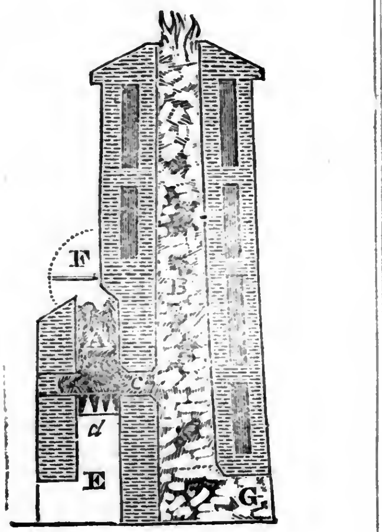
Under the general name of limestones are comprehended all mineral substances which contain not less than half their weight of carbonate of lime. Quick lime is prepared from most of these limestones, by calcination, and is characterized by the property of absorbing water with phenomena of heat, an action which, if it also cause the lime to fall to powder, is called slaking. Lime prepared from different varieties of limestone has different properties in this respect. In some cases the action is rapid and violent, the heat produced, great; in others the operation is more slow. and the heat less intense. There are also, limestones which after calcination will not slake. The limestones which are richest in carbonate of lime belong to the first variety; those which contain carbonate of magnesia in a proportion greater than 10 per cent. to the second; while the resistance to the action of slaking in the third is due to the presence of argillaceous matter. The two first varieties are alone suited to the preparation of mortar. The last variety will not make mortar in the usual manner, but is nevertheless of great value as an ingredient in cements which will resist the action of water. In the act of slaking, quick lime, which retains after calcination the shape and structure of the limestone whence it is prepared, falls, as has been stated, to fine powder. It also falls to powder after exposure to the air, when it is said to be air slacked. In the first case the lime combines with water forming a solid hydrate; in the latter it absorbs carbonic acid from the atmosphere, and returns to the same chemical state which the limestone possessed before calcination.

The calcination, or, as it is usually styled *burning* of lime, is performed in chambers built of stone, which go by the name of kilns. Of these there are two descriptions, ordinary and perpetual. The ordinary lime kiln is of the shape of a truncated cone, or of a portion of an ellipsoid. The limestone is prepared for calcination by breaking it into pieces none of which have a greater dimension than 3 or 4 in. cube. The larger fragments of limestone are employed in building a rude vault, over a cavity left in the lower part of the kiln. To this cavity an entrance or door is left in the wall of the kiln. The rest of the kiln is filled up with smaller pieces. When wood is used as fuel, it is introduced by the door into the space beneath the vault and is burnt on the floor of the kiln. When coal or turf are employed, an iron grate is provided, on which the fuel is placed, leaving an ash-pit beneath. In building the vault, the spaces between the stones are left of as great an area as possible, and in filling the kiln the largest of the remaining pieces are laid next to the vault, while the smallest fragments are used for covering the rest, and closing the top of the kiln.

The fire is at first moderate, in order that the limestone may be gradually heated. After 10 or 12 hours the quantity of fuel is gradually increased, until the mass of limestone is brought nearly to a white heat. After it has been kept for some hours at this temperature, the bulk of the mass of limestone decreases about one sixth, and flame issues almost free from smoke, from the top of the kiln. The intensity of the heat is then gradually diminished until the fire is permitted to extingush itself, for

want of fuel. In order to complete the calcination of a given bulk of limestone in an ordinary kiln, nearly three times its volume of wood, or twice its volume of turf or coal is required. Much of this quantity of fuel is consumed in the gradual heating of the limestone and in preventing it from cooling too rapidly after the calcination is complete. It is therefore obvious that in a kiln in which the operation might be kept up without ceasing, a considerable saving of fuel might be ensured. Such a kiln is said to be perpetual. The first attempt at the construction of a perpetual kiln was made by Count Rumford. Its construction and use will be understood from the annexed plate. Pl. 1.

Plate 1.



A. Furnace
B. Body of the kiln.
C. Flue by which the flame and heated air passes from the furnace to the kiln.
d. Grate.
E. Ash-pit.
F. Iron Door.
G. Opening by which the lime is removed.

The furnace being charged with fuel and lighted, the door F, and the mouth of the ash-pit are left open until the fuel is ignited. The mouth of the ash-pit is then closed, and a draught will be directed downwards through the fuel into the body of the kiln, and carry the smoke, flame, and heated air through the limestone which it contains. That which is completely calcined is removed at the opening G, and its place supplied by limestone thrown in at the top of the kiln. In consequence of the air being drawn downwards through the burning fuel, the smoke is almost wholly consumed.

An improvement in the kiln of Rumford was made by Monteith of Closeburn in Scotland, but although more effectual and convenient, the cost of its construction would forbid its being brought into common use.

The consumption of the smoke, which is the distinctive character of these two kilns, is of little value in this case. Hence, various kilns have been contrived in which the draught of the fire places is not inverted, and these are placed in the circumference of a circle round the body of the kiln. It is unnecessary to describe the kilns of this character, for a far simpler form has been found sufficient, wherever coal or turf can be employed as a fuel. The kiln to which we refer has the form of an inverted truncated cone whose height is twice as great as the diameter of its greater base. A few faggots or billets of wood are placed in the bottom of such a kiln, and set on fire. These are covered with coal, and when the latter is fully ignited, the kiln is charged with alternate layers of limestone and coal, until it is filled to the top. The combustion gradually extends itself through the several beds of coal. When the calcination is completed, two thirds of the charge are withdrawn from the lower part of the kiln, which is then filled up with fresh layers of limestone and coal. In this way the consumption of coal does not exceed one fourth of the bulk of the limestone calcined. Fuel also of a very inferior description will answer the purpose of lime burning in the last mentioned kiln, as, for instance, the refuse cinders of bituminous coal, and the screenings of anthracite. A kiln of this construction is represented pl. 2.

Plate 2.

Fig. 1.

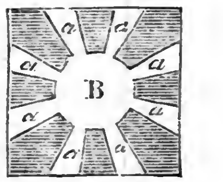


Fig. 2.

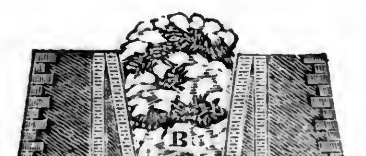


Fig. 1 is a ground plan, fig. 2 a section
B. Body of the kiln.
a, a, a opening through which the lime is received.

PREPARATION AND USES OF MORTAR.

Rationale.—When the hydrate obtained by slacking quicklime is mixed with water to the consistence of paste, a small portion of the lime is dissolved; the dissolved lime attracts carbonic acid from the atmosphere and is precipitated upon that which remains undissolved, the water is thus left free to dissolve a new porton of the lime which is in its turn precipitated, and this successive action will be continued so long as moisture is present, or any portion of quicklime remains. The cessation of the action arises more usually from the loss of moisture by evaporation, than from the complete solution of the quicklime. A portion of the latter therefore remains, which is gradually converted into carbonate, and thus the semiliquid paste is gradually converted into a white solid possessing but little adhesion. If silica be mixed with the lime and water, the precipitation of the carbonate takes place upon it in preference, and the adhesion between them is stronger than in the former instance. Indeed, it appears as if the chemical affinity which exists between lime and silica influences the adhesion, and that the conversion of the carbonate into silicate of lime begins, and continues to go on for ages. It is only in this way that we can account for the long series of years which elapses before mortar attains its limit of hardness, and a force of aggregation often superior to that of the limestone whence it is made. The theory of the formation of a silicate of lime is also corroborated by the act, that even in the most ancient and hardest mortars, the quantity of carbonic acid which is present is always less than would be required to convert the lime into carbonate. For the same reason that the adhesion of the precipitated carbonate of lime to silica is greater than to other portions of lime or carbonate, the adhesion of mortar to brick or siliceous stones is greater than to limestone. It is however necessary in all cases that the stone or other material which is to be laid in the mortar be moist, or at least do not absorb moisture. If the material absorb water from the mortar, the solution and precipitation no longer take place, and no adhesion will ensue between the mortar and the stone. In laying brick, therefore, it is necessary that it be wet before the mortar is applied, otherwise no bond will take place.

Preparation.—The lime intended for the manufacture of mortar should be either recently burnt, or should have been carefully preserved from the action of air.

Lime which has been long slaked will make as good mortar as recent quicklime, provided the latter condition have been attended to, but as it is more difficult to judge of the freedom from carbonic acid in slaked than in quicklime, it is considered preferable to use the latter rather than the former.

When the lime is prepared from a stone which is free from impurities, it slakes readily, and may be converted into mortar as the art of slaking is going forward. For this purpose, a sort of basin is formed on the ground, by means of the sand intended to enter into the composition of the mortar. The lime is thrown into the middle of this basin, and water gradually poured over it. The quantity of water must be sufficient not merely to form the solid hydrate, but to convert it into the mechanical mixture known as the milk of lime. As the quicklime falls to powder, it is gradually incorporated with the sand and water by means of a hoe, which is also of use in breaking down those parts of the lime which longest resist the action of the water.

If the lime be combined with magnesia, it slakes too slowly to permit this method to be employed. Such lime should be placed in a conical pit, water thrown upon it, and

then covered up with the sand intended to be mixed with it. Days, or even weeks may elapse, before the whole mass shall have fallen to powder, but after the disintegration is complete, such lime will make as good a mortar as that prepared from a pure carbonate. It is more usual to slake such lime in the neighborhood of the kiln, and to separate the parts which have not fallen to powder by means of a screen, but this method is objectionable, as the finer and richer portions are liable to be charged with carbonic acid before they can be transported to the place where the mortar is to be prepared. A method which is preferable to either consists in plunging the magnesian lime into a vessel of water, where it is permitted to remain until completely pulverised. The excess of water is then drawn off, and the lime with the residue of water incorporated with sand. The sand which is to be used in making mortar, ought to be made up of angular fragments of quartz. Such sand is found in the bed of running streams, or in diluvial and alluvial deposites from running water. It is designated by masons by the epithet sharp. A mixture of argillaceous matter deprives it of this quality, but as this may be separated by agitation with water, the necessary sharpness may often be acquired by washing the sand.

For laying brick or well jointed stone, fine sand is to be preferred; for common hewn stone, sand of coarser grain; and for rubble work, the mortar made with coarse sand should be mixed with small pebbles, or rather with angular fragments of a siliceous stone.

The best proportion of the materials of mortars, is one part of a pure quick lime to three of fine or four of coarse sand. If the lime be of less purity, the quantity of sand must be lessened in such manner as to bear the same proportion to the pure earth contained in the limestone.

The rapidity with which mortar sets may be much increased by the use of quicklime, ground to powder, instead of being reduced to that form by slaking. This method is the invention of Loriot, a French engineer, who supposed he had discovered the secret of the hardness of the ancient mortars. He directs that three parts of slacked lime be mixed with four of water, and that sixteen parts of pulverised brick or sand be added. After these materials are thoroughly mixed one part of quicklime ground to fine powder is to be added. This mortar has not all the valuable properties which were anticipated by its inventor. It might however, be used to advantage in building in frosty weather.

Limestones which contain silicoous or argillaceous matter are fit for the preparation of mortar, so long as the lime prepared from them retains the property of slaking, but the proportion of sand with which they can be mixed must be still further lessened by the bulk of the other earths contained in the limestone.

HYDRAULIC CEMENT.

History.—The ancients were acquainted with a substance which, when mixed with a pure quicklime and water, formed a mixture that possessed the property of hardening under water. This is a volcanic product having the form of powder, originally found at Puteoli in the neighborhood of Vesuvius, and called from the locality *Terra Puteolana.* The material is still used on the shores of the Mediterranean and is called Puzzolana.

The wants of the people of the Low countries led them to seek in their own vicinity for a substitute for Puzzolana. This was found in a rock furnished by extinct volcanoes, whose traces are to be seen on the banks of the Rhine. This differs from Puzzolana in requiring a calcination to prepare it for use, and when calcined it absorbs moisture so readily that it must be carefully preserved from contact with the air, unless it be used within a short time of its manufacture. During the sixty years war, the people of Holland were cut off from a supply of this important article. In order to replace it, earth was drawn up from bottoms of their canals, formed into brick, burnt, and pulverized. This article was found to be nearly as efficacious as the native product, and both go by the common name of Terras or Trass.

Not only is there a substance which when mixed with pure lime makes an hydraulic cement, but these are varieties of limestone, which are characterized by refusing to slake when water is poured upon them, that when mixed with sand have the same valuable property. The discovery of this property seems to have been accidental and its date unknown. Such limestones were first worked at Aberthaw in England, and Salenches in France. When the construction of the New-York Canals was commenced, such limestones were found in its vicinity, and since that period quarries of the same description have been opened in various parts of the United States. It may indeed be inferred that there is hardly any calcareous formation some of the layers of which do not possess this property.

Even where native puzzolana, Terras, or an hydraulic lime are all wanting, the example of Holland shows that artificial substitutes may be found wherever clay can be obtained.

Of all the materials for the preparation of an hydraulic cement, those which contain within themselves all the necessary substances, and thus require no foreign matter to be mixed with them, seem to be best. Such are the septariæ found in the London Clay and used in the preparation of "Roman cement."

Rationale. If the scale of a smiths forge, or the black oxide of iron in any other form, is mixed with common mortar, it acquires the property of setting more rapidly, and speedily becomes so hard as to resist the action of watar. Clays rich in ferruginous matter, if burnt and reduced to powder, have the same effect upon lime. It was also found that the native Terras contained from 10 to 15 per cent. of oxide of iron. It was inferred from these facts, that the property possessed by a cement of setting in water, was due to the presence of oxide of iron. Some of the most valuable hydraulic limes however, contain little or no iron, and Puzzolana is also poor in that substance. An isolated observation subsequently led to the ascription of the hydraulic property to the presence of oxide of manganese. Another view of the subject led to the hypothesis that hydraulic cement was obtained from a sub-carbonate of lime, the limestones from which it was prepared being in such a state of combination that heat could not expel more than half their carbonic acid. The theory which is now received is that of Vicat, who infers that hydraulic cement is obtained, whenever a silicate of lime is either formed in the calcination of the limestone, or generated rapidly by the action of the substances with which a pure lime is mixed. This silicate has the property of combining readily with water, and then the aqueous part of the cement speedily becomes solid. To this we may add that the ternary compounds of silica are formed with more readiness than the binary, and thus metallic oxides, alumina, and probably other earths concur in hastening the formation of the solid hydrated silicates.

PUZZOLANA.

AUTHORITY.—BELIDOR. Architecture Hydraulique.

Hydraulic cement may be made of puzzolana, by mixing nine measures of a pure quicklime, or an equivalent quantity of that which is less pure, with water, and twelve measures of puzzolana, and six measures of good sharp sand. If the place where it is to be employed in the erection of masonry is so situated that the stones may be laid above the level of water, no other preparation is necessary than in the use of common mortar. If it is to be used below the usual level of a mass of water, a coffer dam may be constructed. This is a case formed of piles and pile-plank driven into the bed of the mass of water, in such manner as to resist its passage. After the coffer dam is finished, the water inclosed within it is raised by a pump, or other appropriate hydraulic engine, and the work is performed, after the water is thus discharged, precisely as if it were common masonry. When the bed is level, or can be rendered so, a caisson may be employed. This is a water-tight vessel whose bottom is flat, and whose sides are vertical. It is made large enough to contain the proposed structure and at the same time have room for the workmen and necessary scaffolding. The caisson is buoyant, and floats at the surface of the water. The building materials are introduced into it, and covered up in regular courses from its bottom. As the work advances the caisson sinks, until it rests upon the bed. After the structure has been raised above the level of the surface of the water, the sides of the caisson may be removed, but the timber bottom remains as a foundation for the masonry. Stone may also be laid in hydraulic cement beneath the surface of a mass of water by means of the diving bell.

A more rapid mode of construction was employed by the ancients, and is still used in the ports of the Mediterranean. Instead of a tight coffer dam, a mere inclosure of wood-work is formed in the water, inclosing a space of the figure of the contemplated structure. To 27 measures of hydraulic

cement, made as has just been described, 16 measures of pebbles or chip stone are added, and the whole incorporated by stirring it for an hour, either with a hoe in the hands of a workman, or by the aid of machinery. The mixture is then formed into a conoidal heap, and allowed to remain at rest until a hard crust is formed on its surface. This will happen in warm dry weather in five or six hours, but in moist weather, some days may elapse before the cement acquires a proper degree of consistence. The mass is then broken up by the pickaxe, and intimately mixed for the second time by agitation. No water need be added to the mass, but it will regain its fluidity by stirring. When the water in which the structure is to be built is deep, the mixture is plunged into it by means of a wooden case of cubical shape. This is managed by means of a windlass moveable upon a railroad, and has a sliding bottom, or a shutter fastened by hinges. When this has been lowered until no more space is left than just suffices for the opening of the shutter, the latter is permitted to open, and the cement falls to the bottom. A second case full is lowered and deposited beside this, and the surface of the two masses leveled by rakes and other appropriate instruments. When a uniform bed, of about a foot in thickness over the bottom of the whole space inclosed by the wooden partition has been thus deposited and spread, blocks of stone of not more than eight inches cube are thrown upon the cement, until an entire layer of such stones has been spread over the cement, in which they are capable of partially embedding themselves by their own weight. Upon these a second layer of cement is spread by means of the case, which is followed by a second layer of stones, and thus the level of the surface of the water is reached. The case however becomes uesless when the depth of water is less than twice the vertical dimension of the case. After the structure has been raised thus high, the cement is thrown in by baskets and hods, and the last courses may even be laid by the trowel.

In Europe, the wood which encloses this structure is usually removed, and may be employed again for the same purpose, but when wood is abundant, it would probably be better to leave it as a protection to the structure, until it decays, when the masonry will probably be perfectly consolidated.

Terras both native and artificial may be used in the same way. So also may the powder of burnt clay or brick, of calcined ochre, and roasted clay slate.

Terras is prepared from a columnar greenstone or trap rock found near Andernach on the banks of the Rhine. This is roasted and reduced to powder. A similar stone is found on the bank of the Hudson near Fort Lee, and might no doubt be used for the same purpose. Other varieties of trap rock or basalt may be prepared for a similar use, by heating them until they begin to fuse, and grinding them to powder.

Hydraulic Lime.—Hydraulic lime is calcined in the same manner as common limestone. It is prepared by grinding it in a mill to a fine powder, and ought to be kept for use in tight casks. Any limestone which contains from 9 to 10 per cent. of argillaceous matter is slightly hydraulic, and it possesses this property in perfection when the proportion of that compound amounts to 20 or 30 per cent.

An artificial cement may be prepared by mixing 3 parts of chalk with one of clay, tempering the mixture with water, forming it into bricks, calcining, and grinding to powder. Care must be taken, that, while the heat must be sufficiently intense not only to drive off the carbonic acid from the chalk, but also the last portion of water from the clay, the mixture does not begin to fuse, for, after this stage is reached, the hydrate can no longer be formed.

It was long supposed that the hydraulic limes and artificial cement could not be used in building in a mass of water, by throwing in loose stones upon a bed of cement mixed with chip stone, as described under the head of puzzolana. But recent experiments in France have shown that this idea is unfounded, and that the hydraulic limes mixed with common sand, have all the properties of the cements of which puzzolana or terras form a portion. It is necessary however, to examine experimentally the length of time which they take to set beneath the surface of the water, for this will differ with the different varieties of the natural mineral; and where the rate of setting is not such as to render the mixture hard within a few hours, the mixed cement and chip stone must be allowed to lie in heaps until it becomes hard at the surface, before it is plunged into the water.

Roman Cement.—This celebrated article is prepared in England from a stone found in nodules in the geological formation called the London clay. It is a compact substance of a brown color, susceptible of high polish It is usually divided into irregular masses by veins of crystalized carbonate of lime. The quantity of silica and alumina contained in the brown portion is sufficient to form the cement without any further addition, when it is to be used beneath the surface of water. When thus unmixed it will set, either in the open air or in contact with water, in not more than fifteen minutes. Its properties in the two cases are however different, for it does not, if used unmixed, increase in hardness after it has once set, when merely exposed to the air; but if immersed in water, or in a damp position, it gradually acquires the firmness of the strongest native limestone. It should therefore never be employed pure, except when it is to be exposed to the action of water. Where it is used merely in a moist place, two parts of good sharp sand should be mixed with three of cement; if in a position exposed to frost, three parts of sand to two of cement; while in a dry and warm climate or in covering walls exposed to the sun, at least five parts of sand should be mixed with two of cement. It is probably owing to the Roman cement, when applied as a stucco, having been used pure, and laid upon dry brick, that its use has been attended with little success in this country, or when properly prepared and applied, it has borne equally well the extreme climate of Canada, and the torrid air of the West Indies. Its use also requires an experienced workman. When it is to be mixed with sand, the two materials must be thoroughly incorporated before water is added.

A stone, identical to that which the Roman cement is prepared, has been found at Boulogne, in France, and one similar in texture, and in being veined with carbonate of lime, at Cumberland in Maryland. The poor calcareous ores of iron, found in coal formations, have also been used in preparing a cement, which has all the properties of the Roman, and goes by the same name. The material whence Roman cement is prepared has also been used in England in the preparation of artificial stone. For this purpose the cement while still liquid is poured into moulds having the figure of architectural ornaments. A similar use has recently been made of the American hydraulic cements, under the sanction of a patent.

USE OF LIME IN AGRICULTURE.

(*a*) There are certain soils which contain inert animal or vegetable matter, which being insoluble is unfit for the food of plants. Quicklime has the property of hastening the putrefactive process, and will thus, by disposing the inert matter to enter into fermentation, render it capable of supporting the growth of plants.

(*b*) Some soils are charged with a small quantity of acid matter, which interferes with vegetation, except that of a few useless plants. This acid may be neutralized by lime, which may either be applied in the state of quicklime or of carbonate.

(*c*) Sandy soils may be barren in consequence of the rapidity with which moisture escapes from them; and clay soil in consequence of its forming tough clods in dry weather, and being too retentive of moisture. Both of these opposite defects may be remedied by lime, for this earth renders the toughest clay friable, and causes sand to be more retentive of moisture. Quicklime will act most powerfully in both these cases, but the carbonate is not inefficient.

(*f*) The seeds of the cereal granima all contain lime in combination with acids. Their stalks also contain it, but in less proportion. Wheat is the grain which contains most of this earth. Hence none of these valuable vegetables will flourish except in soils which contain lime, and some soils which are fertile in grass, may be incapable of bearing grain; or those which yield a tolerable product of the less valuable grains, may refuse to bear wheat. As the lime enters into the constitution of the plants, the calcareous matter of the soil will be gradually exhausted, and hence it has been found that even under careful management, wheat has gradually ceased to be a profitable crop in the older parts of the United States. Animal manures contain the phosphate of lime, and thus convey to the soil some of this earth, but not in quantities sufficient to maintain a soil in condition for wheat. Carbonate of lime ought therefore to be applied from time to time, or slacked lime spread upon the ground, and ploughed in, after it has attracted carbonic acid from the air.

(*g*) Lime and its carbonate have also the property of condensing the gases which arise from putrefying vegetable and animal substances, and of combining with other products of their decomposition. Hence the native fertility of calcareous soils will continue much longer than that of other descriptions, and the effects of vegetable and animal manures will be more permanent if applied to a soil containing lime, or in combination with that earth or its carbonate.

In England and Scotland, as much as 400 bushels of slacked lime have been advantageously applied to clay soils, and 200 bushels to sands. In this country the use of lime has been chiefly confined to the farmers of German origin, in Pennsylvania, and their descendants in other States. The proportion has rarely exceeded 40 bushels per acre; but while in England the effect of the larger quantity lasts for more than the life of man, the less quantity in America is renewed as a preparation for every wheat crop.

The best mode of applying lime is that practised in La Sarthe, (France.) Here, slacked lime, in the proportion of no more than 12 bushels per acre, is made into a compost with sods.

Pulverized limestone may be used for most of the purposes for which slacked lime is applied, for, except when it is wished to promote the decomposition of inert organic matter, or to render a clay soil speedily friable, the caustic earth is unnecessary, and occasionally injurious; but it is generally cheaper to reduce limestone to powder by calcination and slacking than by mechanical means. In Europe, however, chalk is used as a manure.

The true marl, or mixture of carbonate of lime and clay, is also a valuable manure, as are the shells found in the green sands of the seaboard of the United States, which are improperly termed marls.

The magnesian limestones ought, if calcined, to be applied with great caution, as magnesia when deprived of carbonic acid is destructive of vegetation, and as it attracts that acid from the atmosphere much less rapidly than lime does. In small quantities, however, or if exposed until the whole of the magnesia has been carbonated, the magnesian limestones yield a valuable manure.

Lime, even if pure, must be applied with caution to soils which have never before been subjected to its action. The dose may be increased at each successive application, and it is more efficacious, and may be applied in greater quantities, when animal or vegetable manure is used at the same time. But it must not be mixed previously with stable or barn-yard manure, as much of the value of that substance will be destroyed by the rapid decomposition induced by lime. This rule does not apply to carbonate of lime, and therefore marl, in particular, may be mixed to great advantage with dung-hills, and used to form a bed in barn-yards, for the purpose of absorbing liquid manure, and the gases generated in the putrefaction of the litter.

Agriculture, &c.

From the Baltimore American.

Culture of Tea.

We find in the last number of the Western Review the fullest and most interesting account we have ever met with, of the nature and culture of tea, a commodity which forms the chief bond of connexion between the empire of China, with its population of 350 millions and the rest of the world.

The tea plant is a bushy evergreen shrub, which, if permitted to attain its natural size will grow to the height of 12 feet. In botany it constitutes by itself a distinct genus, of it there is but a single species, the plants yielding the different kinds of black and green teas, being in reality no more than permanent varieties, the result of long culture. The plant has been cultivated in China from time immemorial. The latitudes in which it thrives best are from 23 to 30 north. Like the vine it is cultivated on the sides of hills in preference to plains. It is raised from the seed, and yields its crop in from two to three years.

When the best teas are raised, the plant is carefully pruned and prevented from attaining a height exceeding two or three feet. The production of good tea depends upon soil, locality and season, full as much as that of good wine; like it, too, the produce varies according to the care with which the crop is collected and prepared for use. From the same plant, are commonly taken in each season four crops; which is another cause of variety in tea as it appears in market. The younger are the leaves the higher is the flavor. The earliest crop is taken in the beginning of spring, and the last in August.

The growth of teas of sufficiently high flavor to keep for considerable time, and fit in consequence for exportation, was for a long time confined to two provinces—Fokein, that yielded black tea, and Kiangnan, which yielded green tea. Of late years owing to the great demand for teas in Europe and America, the culture has been extended to three additional provinces. The two original provinces, however produce the best; the worst comes from Woping in Canton.

In China, contrary to the usage of the other great despotism of Asia, the soil is private property, and is very minutely subdivided. The leaves of the tea plant are picked by the cultivator's family, and conveyed at once in a fresh state to the market, where they are purchased by a particular class of dealers, who dry them under a shed, and in this imperfect state of preparation dispose of them to a second and higher class of traders, who sort the teas according to their qualities, and after completing the process of manufacture, pack them in chests. The tea arrives in Canton about the middle of October, and the business period of the trade exists from that time to the end of December. The traders in green tea amount in number to about four hundred; the dealers in black are less numerous but more wealthy. They accompany their chests, carried mostly by porters from distances of several hundred miles to Canton. In Canton the sorts quoted for export do not exceed fifteen in number, about eight of which are black and six green, the prices varying from twelve to sixty cents a pound.

In regard to consumption of tea in different countries, the writer remarks that all the nations of Asia, east of Siam and Camboja, are what may be termed habitual and immemorial consumers of tea. With the Chinese themselves, the teapot is in constant requisition from morning until night with persons of both sexes, of all ages, and all conditions. They use it always without milk, frequently without sugar. Supposing—what is a very reasonable supposition—that each inhabitant on an average, drinks twice as much as each inhabitant of Great Britain, the annual consumption in China would be half a million of tons.

The use of tea in Europe commenced about one hundred and eighty years ago, and in this time the consumption has raised from a nameless fraction to nearly thirty thousand tons. A greater quantity is consumed in Great Britain than in all the rest of Europe and America.

Recipe to Cure Pork Hams.

By E. Foote.

7 pounds salt,
3 ozs. salt peter,
6 red peppers,
4 gallons water.

Make a pickle according to these proportions, sufficient to cover your hams well, by putting the salt, saltpeter and peppers, into the water, till the salt is nearly dissolved. Pack your hams in a barrel or other vessel, and pour your pickle on them, stirring it well at the time that the undissolved salt may be all poured to your hams. Be careful that they be all covered with the pickle, and kept so for six weeks; then take them out and wash or rinze them off in clear *clean cold* water, hang them up and let them drain for a day or two, then smoke them with sugar maple or hickory chips or wood green from the tree, which makes the purest and sweetest smoke of any kind of wood I am acquainted with, and makes it entirely unnecessary to put sugar and molasses in the pickle, as I used to do.

My method of smoking is, if in moderate fall or winter weather, to make one smoke in twenty-four hours—if in severe winter weather, two. The object to be aimed at in regulating the smoke is, first, to make as little fire as you can, and make a good strong smoke—second, to let your hams get thoroughly cooled through after each smoke before another is made. Every farmer who uses an axe, knows how rapidly a cold frosty axe collects pyroligeneous acid, or escence of smoke. While hams are cold they collect it as rapidly, and as they become warm it dries into them. If you increase the heat so as to make them drip the fat, you lessen the weight of your hams and injure their flavor. With regard to the credit of my hams in market I will only say, that gentlemen in Cleveland, who have used hams of my curing, pronounce them equal to any they have ever seen, and they command the highest price in market.—[Ind. Far.]

Brooklyn, Ohio, Sept. 1836.

The following flash of humor is from the proceedings of the Worcester County Agricultural Society.

The committee were called upon to discharge a duty, which was much to their taste, in testing some Wine—not old madeira made of whiskey, nor Old Port dyed with logwood, nor sparkling champaigne fresh from the cider cask, but genuine, unadulterated, home-made Wine, made

without the admixture of alchohol, from the currents of the garden of Newell Nelson, Esq. of Milford.

The committee did not find time to discuss the question of temperance in its bearing upon this article, but did from time to time find opportunity to discuss this Wine quite freely and after repeated tests and tastes, they are unanimously of opinion, that current wine of Mr. Nelson was truly a "current" article, and if old Milford wine be not as fashionable, it is as palatable as old Madeira. They therefore recommend that a gratuity of $3 be given to Mr. Nelson for his Milford Wine.

All which is respectfully submitted,

C. C. P. HASTINGS, *Chairman.*

SWINE.

[There is Attic Salt enough in the following to pickle all the pork in the County of Worcester.]

The committee on Swine, under the peculiar circumstances of the occasion, beg leave to report chronologically.

At a very respectable meeting of their body, duly notified to be held this morning, at nine o'clock, in the area between the pens, it was found that the Committee was not to be found. One person and one pig only answered to their names on the call of the house. It seemed that there would be nothing to do, and nobody to do it. The solitary grandeur of the situation became oppressive of its sublimity. The chairman conceived that he was in a delicate condition of perplexity. The responsible duties of his elevated official station pressed heavily on the one hand, while on the other, the laws of the society prohibited him from having any opinions of his own, or voting, except in case of division. Of the constitutionality of such enactment doubts might have been entertained: but the scruples which arose, were more entertaining than useful, as nullification was out of the question. The wind from down East blew as coldly as if it had been made from the ghosts of the pine logs described in the specifications of proprietors of Maine townships, or had passed over the consciences of traders in timber lands: and with it came water enough to wash anything but a solid conscience clean. After serious consideration, the chairman solemnly declared to his sole coadjutor, in the language sanctioned by high authority, "our sufferings is intolerable," and made application to the Trustees for relief. By their order, *volunteers* were *impressed*, and five good men and true, selected with reference to excellence of taste and looks, were *compelled* to come in *freely*, to assist in the arduous labors of the day. A most judicious committee having been thus constituted, the multitude of swine rapidly increased, and business advanced prosperously to its consumation.

One boar only graced the anniversary by his presence. The certificate of his owner testified that he possessed every excellence, except good moral character, of which nothing was said. Although much diversity of opinion could not be expected to arise in the plentiful lack of competition, yet the committee considered it dignified to proceed with great deliberation. The only fault they could detect, on careful inspection of this candidate for the honors of the society, was, that like the dog described by Washington Irving, his tail appeared to be curled so tight as to lift his hind feet from the ground. As no reasonable doubt could be entertained, that, on the suggestion of the difficulty, some ingenious inventor would obtain a patent for a machine to straighten such crooks, the committee unanimously awarded *Five Dollars* to the Hon. John W. Lincoln, for this the greatest and best boar they saw.

A fine company of sixteen noble swine had arrived from jail, and were placed in one pen by Mr. John F. Clark. One of them appeared to have been converted by the scarcity of corn to the doctrines of Dr. Graham, the gentleman who, by the practice of his own principles of health, might expect, as the survivors of mortality, at a venerable old age, to be able to write the life of Death. Standing by the fence, and inviting his companions to gnaw their dinner from the society's new chesnut rails, this creature, like the sincere disciple of an illustrious master, contented himself with earnest exhortations to others to reform their luxurious diet without himself partaking of the frugal fare. A breeding sow, attended by one generation of three children, and another of nine, was exhibited by Mr. Clark. This fair image of female loveliness afforded evidence that the phenomena of the science of animal magnetism are not confined to the beauties of Boston. On being struck with the top of an umbrella she fell into a state of somnambulism, like that of a lady whose case has been reported in the newspapers. Lying with closed eyes, consciousness of the approach of the stick was manifested, and strong dissent expressed at renewed applications of the magnetic power. While in this abstracted condition, several questions were proposed, but strange as it may seem, no answers were returned. The committee were of the opinion that the first premium of *five dollars* for the best breeding sow should be given to Mr. Clark. They regretted to see in animals subject to the good discipline of that gentleman, some indications of a contentious disposition and want of sedate behaviour, and recommend that they be sent to the House of Correction, for such term as the improvement of their manners may seem to the keeper, their owner to require.

A breeding sow, with a round dozen of very round and neat little pigs, was exhibited by Mr. Thomas T. Farnsworth. The accomplishments of the mother of this small and interesting family deserved, in the opinion of the committee, the premium of *three dollars.*

"The best weaned pigs not less than four in number" were not offered by any person.

In concluding the detail of their doings. the committee feel it to be their duty to remark that a solemn crisis in the affairs of swine is impending. When corn has been frozen and potatoes parched, when the deposites of the granaries have been removed, and the desolated fields yield no surplus, the inquiry rises with startling force what can the pigs do? It comes home to the pot and plate of every lover of his country. Our lands, our liberties, our wives, our children are dear, and pork is dear also, and grows dearer day by day. The subject is one of vast relations. Where would be patriotism without pork? where virtue, where valor, where ancient faith, where modern degeneracy, without swine? The soul of honor cannot be sustained without the body of bacon. The lamp of love would burn dim without spareribs. The very face of fashion would grow rough without bristles to beautify its smoothness.

But although the prospects of the race have been gloomy as the clouded heavens, that constancy and unconquerable resolution, alluded to by the President, have been found still in the pens. The spirit of the Pilgrims' pigs still animated their successors. Beneath the stormy clouds the committee have heard no swine swear, they have seen none elevating their spirits by depressing other spirits, none stooping to smoke long nines or chew pig tail. There has been no unswinish repining at the allotments of Providence. The only boar of the festival was noticed to wipe his eyes with his fore foot instead of a pocket handkerchief, as if in tears; but it was ascertained that he was only brushing away the rain drops. Such firmness in wet and affliction deserves the wish that it may be rewarded by sleeping many a long summer day in all the luxury of mud, with the soft green earth beneath, and bright blue sky above.

All which is, as much more might be, most respectfully submitted.

WILLIAM LINCOLN, *Chairman.*

From the Gennesee Farmer.

VALUABLE PROPERTY OF THE LOCUST

It has long been known that for ordinary purposes, and in the most exposed situations, the wood of the locust tree was more durable, and of course valuable, than any other, where strength and durability were the main requisites. Experience has shown that it possesses another invaluable quality, that of resisting the "dry rot," or fungus, which is so destructive to some other kinds of wood, particularly the oak. The place where it has been thoroughly tested is in the mines of France, where substitution of it for oak commenced in 1830. Before this oak had been generally used, and sticks of from 8 to 10 inches in diameter seldom lasted longer than a year or a year and a half. According to M. Francois, director of the mines, under the influence of the subterranean heat and moisture which proves so fatal to the oak, a yellowish viscious substance is formed on the locust, which protects the alburnum or sap wood from the influence of the surrounding air. This covering affords a protection to the wood for several months, by which time the alburnam is gradually converted into a porous ligneous substance to which the ulterior preservation of the wood is probably owing, the interior or heart-wood retaining, to an indefinite period, the healthy soundness and firm texture it first possessed. The saving in expense

's found very great, and the feeling of security much increased, since the decay of the timbers that supported the roof exposed the miners to continual dangers from its falling. The loss to the English navy from dry rot alone amounts to millions annually. Ships of the line have been built and launched, and have rotted at the docks without ever going to sea. Owing to the substitution of live oak for common oak in a great measure, our navy has hitherto suffered much less than European ones,—but we have not been exempt, and the known superiority of the locust should ensure its adoption wherever it can be procured in the national and commercial marine, both on the sea board and on the lakes.

G.

From the Southern Agriculturist.

AGRICULTURAL ESTABLISHMENT AT MOEGELIN, IN PRUSSIA.

[FROM JACOB'S TRAVELS IN GERMANY.]

About twelve or thirteen years ago, the King of Prussia, who, like his uncle, was always anxious to extend and improve the agriculture of his dominions, invited Von Thaer, who resided near Lunenburg, and whose celebrity was even then great, to settle in his kingdom, to assist in diffusing agricultural knowledge, and, by his management, set an example to the other great landed proprietors, which might stimulate them to adopt similar improvements. His majesty also wished him to conduct a seminary in which the knowledge of the sciences might be applied to husbandry, for the instruction of the young men of the first families.

The estate of Moegelin was given to him to improve and manage, as a pattern farm. It consists of eighteen hundred Berlin morgens, or about twelve hundred English acres. At that time the annual value was estimated at two thousand rix dollars,* but is now supposed to be worth twelve thousand; but some part of that increased value must arise from the buildings that have been since erected. The principal improvement, that of the soil, has arisen from the large flows of sheep, which in summer are folded on the land, and in winter make abundant manure, in houses constructed for their lodgings.

The Royal Institution, of which Von Thaer is the director, and which occupies a considerable portion of his extensive buildings, has three Professors besides himself. One for Mathematics, Chemistry, and Geology, one for Veterinary knowledge; and a third for Botany, and the use of the different vegetable productions in the Materia Medica, as well as for Entomology. Besides these, an experienced agriculturist is engaged, whose office it is to point out to the pupils the mode of applying the sciences to the practical business of husbandry.—The course commences in September.—During the winter mouths, the time is occupied in mathematics, and the first six books of Euclid are studied; and in the summer, the geometrical knowledge is practically applied to the measurement of land, timber, buildings, and other objects. The first principles of chemistry are unfolded. By a good but economical apparatus, various experiments are made, both on a large and small scale. For the larger experiments, the brew-house and still-house, with their respective fixtures, are found highly useful.

Much attention is paid to the analyzation of various soils; and the different kinds with the relative quantity of their component parts, are arranged with great order and regularity. The classification is made with neatness, by having the specimens of soil arranged in order, and distinguished by different colors. Thus, for instance, if the basis of the soil be sandy, the glass has a cover of yellow paper; if the next predominating earth be calcareous, the glass has a white ticket on its side; if it be red clay, it has a red ticket; if blue clay, a brown one. Over these tickets, others of a smaller sise indicate, by their color, the third greatest quantity of the particular substance contained in the soil. This matter may appear to many more ingenious than useful, and savoring too much of the German habit of generalizing. The classification of Von Thaer is, however, as much adopted, and as commonly used on the large estates of this country, where exact statistical accounts are kept, as the classification of Linnæus in natural history is throughout the civilized world.

There is a large botanical garden, arranged on the system of the Swedish naturalist, kept in excellent order, with all the plants labelled, and the Latin as well as the German names. An herbarium, with a good collection of dried plants, which is constantly increasing, is open to the examination of the pupils, as well as skeletons of the different animals, and casts of their several parts; which must be of great use in the veterinary pursuits. Models of agricultural implements, especially of ploughs, are preserved in a museum, which is stored as well with such as are familiar in Germany, as with those used in England or other countries. I remarked the absence but of two things used in this country, viz: the mole plough, and a new machine invented for sowing small seeds. The first of these would certainly be of little use in most parts of Germany; and the other is so new, that, excellent as it is, its adoption is by no means general, even in England.

The various implements used on the farm are all made by smiths, wheelers, and carpenters, residing round the institution; the workshops are open to the pupils; and they are encouraged, by attentive inspection, to become masters of the more minute branches of the economy of an estate.

It appeared to me, that there was an attempt to crowd too much instruction into too short a compass; for many of the pupils spend but one year in the institution; and thus only the foundation, and that a very slight one, can be laid in so short a space of time. It is, however, to be presumed, that the young men come here prepared with considerable previous knowledge, as they are mostly between the ages of 20 and 24, some few appeared to be still older.

The sum paid for each pupil is four hundred rix dollars annually; besides which, they provide their own beds and breakfasts. In this country, such an expense precludes the admission of all but youths of goood fortune. Each has a separate apartment. They are very well behaved young men; and their conduct to each other, and to the professors, was polite even to punctilio.

As I have not had an opportunity of visiting Hofwyl, and have met with no account of that Institution, written by any person who is well acquainted with many details on the subject of its agriculture, I cannot make a comparison between that widely-blazoned establishment, and the unostentatious Institution of Meogelin. I was indeed told that the plan and effects were far inferior; but, as my informants were Prussians, I make some allowance for the national vanity, which felt itself piqued that the establishment in Switzerland should be praised most highly, and their Royal Foundation be unknown beyond the boundaries of the kingdom to which it belongs.

* A rix dollar is seventy-five cents.

From the Farmers' Register.

REPORT OF THOMAS BLANCHVRD, ESQ. ON THE UPPER ROANOKE NAVIGATION, IN REGARD TO THE USE OF STTAMBOATS.

To A. Joner, Esq.

Agreeably to your instruction, I have examined the Roanoke River from Rock Landing, at the entrance of the canal, to Clarksville, in Virginia, for the purpose of ascertaining the practicability of navigating the said river between those points, by steamboats, and beg leave to submit the following remarks.

The present sluices, or most of them, are altogether inadequate for steamboat navigation; and in some places the fall of water is too great, to be overcome without locking. I have therefore made such remarks as I thought necessary, on the falls and shoals as I passed along, taking the names of the different places as given me by the boatman: but the distances between the obstructions, I could not accurately get, and have omitted them altogether.

The first rapid shoal that came under my notice, is called the Old House Ledge. It is a rapid of aqout 30 rods long—the fall of water in the distance about two feet, and the water in the sluice, about two feet and a half deep. This shoal can be made navigable for steamboats, by deepening the sluice at the head, and giving it a more gradual fall or inclined plane.

2nd. Eaton's Falls. The fall at this place is about ten feet, and is overcome by a short canal and lock. The latter will admit the passage of boats of only seventy feet long. The entranse to the lock requires straightening, and to be made deeper: the canal will require to be made straight, and some wider.

3d. Allen's Falls. The first rapid was about two feet fall in a short distance—was found to have two and a half feet water in the sluice, and must be improved. The second rapid, in the same falls, is much the same as the first, and can be sufficiently improved by sluicing.

4th. Hamlin's Shoals. The first bar is along side of an island—the rapid is short, and water very strong. The second bar is a ledge of rocks, extending the whole width of the river—the water in the sluice two feet deep, the fall two and a half, in fifteen or twenty rods. The third rapid is in all respects much like the second; the head of which, is the foot of the fourth sluice, which has a stone wall, and is shoal and rapid. The fifth sluice terminates these rapids. They are about two miles long, and form a continued succession of shoals the whole distance—the bed of the river being wide, the bottom composed of solid rock, and the fall more than sixteen feet. To make theese shoals navigable for steamboats, locks are necessary. To improve them by sluicing, would require one regular inclined plane over the whole of them, making a fall of water of about ten feet to the mile, which is as great a fall as can be overcome to advantage.

5th. Ballard's shoals. These shoals are three-fourths of a mile long, and about four feet fall in two short rapids—the sluices of which are crooked and shoal. They can

be improved by extending the sluices with side walls, and using dams and making them deeper.

6th, Pugh's Falls are about three-quarters of a mile long, having a fall of six feet. Here are the ruins of an old lock, which it will be necessary to re-construct, or build a new one. A short distance above this place, on the south side of Cotton Island, is a short rapid of about two feet fall, breaking over a ledge of rock, extending from the island to the opposite shore. The water is deep both above and below, and nothing more is wanting but to cut a sluice through the ledge.

7th. Lizard Creek. There are two rapids at this place, about one-fourth of a mile long. The first has a fall of about three feet in twenty rods—the second is not so strong, but both will require improving by locks or long sluices.

8th. Collar Bone Falls. At this point the water falls about two feet in thirty rods, and can be sufficiently improved by deepening the channel at the head of the sluice, and making a wall up the side of the north shore, thus forming a long sluice.

9th. Black Shoals. The fall here is about eighteen inches, in two short rapids, and can be easily improved by cutting sluices.

10th. Horseford Falls. The whole extent of these falls, is nearly two miles, but the greater part of the fall is in a distance of three-quarters of a mile, having a fall of about six feet, the whole fall being eight feet. The main fall is over a stratum of rocks the whole width of the river. One lock of about six feet lift would be sufficient for these falls.

11th. Short's Falls are one mile long, and can be improved by sluicing.

12th. Bug's Island Shoals, require to be made deeper and straight.

13th. Butcher's Creek Shoals. These falls are too rapid to be overcome without lockage—the most difficult place is around Eagle Point, where a wall has been constructed. The sluice is crooked. A dam of five feet lift would raise the water sufficiently for the two first rapids; the others can be improved by removing rocks, and making the sluices straight.

14th. Johnson's Sluice Shoals, are more than a mile long; the sluices are too narrow and crooked; the turn too short around the island. The sluices must be made wider and longer.

15th. Clarksville Falls. At this point there is a fall of about three feet. The sluice through the milldam is too short and rapid for steamboats. As here is a good mill seat, a dam and lock would be necessary for steamboats, and supplying water for a mill.

The examination I have been able to make of Roanoke River between the points already indicated, (Rock Landing & Clarksville,) induces me to believe that five locks at least are necessary, and there are not less than twenty-five shoal places where the water falls from one to three feet in short rapids requiring improvement. Sluices have been formed through these falls or rapids for batteau navigation, but they are generally too crooked and narrow for steam boat navigation. In addition to this, between the ponds formed by the several falls, there are many secret or hidden rocks near the surface in low water, which would be destructive to steam boats, and must be removed. The sluices at places where this mode of improvement is adopted, must be so extended as to give the water a gradual fall of not more than at the rate of ten feet to the mile. This rate of inclination may be considered the maximum fall that a steamboat will overcome, taking other boats in tow. The sluices should be three feet deep, and not less than thirty feet wide to navigate them with safety. The kind of boat I would recommend for the river is 85 feet long, and 13½ feet wide, with the wheel in the stern: such a boat, if built with my patent arches, would not draw more than 18 inches water.

As to the cost of making the necessary improvements on Roanoke River, for steam navigation, it would be impossible for me to form any correct estimate, having no adequate data upon which to found such estimate for work in this part of the country.

THOS. BLANCHARD.

THE GREAT WESTERN ROAD.—It will be recollected by our readers, that at the last session of Congress, the sum of $100,000 was appropriated for opening a military road from St. Peter's, near the falls of St. Anthony, on the upper Mississippi, along the Western frontiers of Missouri and Arkansas. to Red River. In conformity with this act, a Board of Officers has been appointed by the Secretary of War, consisting of Col. Taylor, and Major Smith, of the United States Army, and Major McNeil, of the Topographical Engineers, who were ordered to rendezvous at St. Louis, (where we perceive by the last papers, some of them had arrived,) to mature their plans for surveying the whole route for the road. It is contemplated (we understand by a gentleman of the army who has seen the instructions of the Board) to establish a cordon of military posts along this road, for the more permanent and effectual protection of the western frontier.

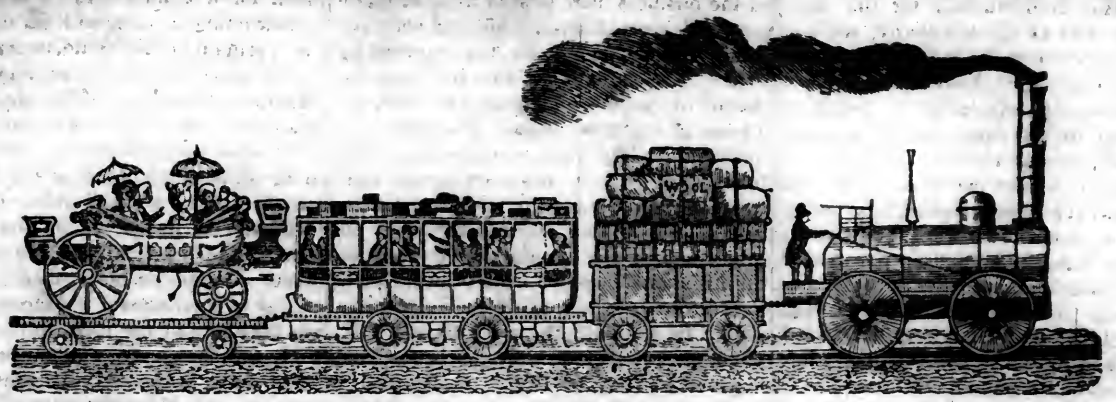
CABBAGES.—If cabbages are set on old ground, they are very liable to be eaten by the cut worm, or if they escape this destroyer, they are frequently injured by lice; and they will not grow so well as on new ground A piece of rich mellow greensward, (pasture ground is preferable,) rather moist is very suitable for cabbages, and will generally yield large crops. Put a few quarts of manure and a pint of ashes into each hill, mix them together, adding a little earth, then cover the hill and set the plants in the evening, if the weather be fair, and water them if the ground be dry.—[Yankee Farmer.]

ATMOSPHERE.—The air on the tops of high mountains is so rare as to diminish the intensity of sound, to affect respiration, and to occasion a loss of muscular strength. The blood burst from the lips and ears of M. D. Humbolt as he ascended the Andes; and he experienced the same difficulty in kindling and maintaining a fire at great heights, that Marco Polo the Venetian, did on the mountains of Central Asia.

LIME, now so extensively and profitably used in agriculture, exists in its purest state in good marble. The refuse of marble, which is in great abundance at our valuable quarries in Montgomery and Chester counties, has recently been burnt into lime of the best quality, and promises to be a valuable acquisition to our farmers, and a profitable appropriation of a refuse article to the owners of marble quarries —[Philadelphia Herald.]

CLOVER WITH OATS.—Many farmers are getting into the habit of sowing clover with their oats, under the belief that it takes better than with wheat or rye. The ordinary rotation in most parts of the union is corn, oats, rye or wheat with clover. In order to secure the enriching properties of clover, even in this rotation, it is said to be profitable to sow the clover, with a view of turning it under for rye, or wheat in the fall. The expense of seed is but trifling when compared with the benefits resulting from the pasture thus afforded from the time the oats are cut to that of plowing for winter grain—this alone is worth more than all the expense of seed, independently of the enriching qualities of the clover plowed in.

FOSSIL BEAR.—The fossil head of a bear was recently presented by M. Larrey to the French Academy of Sciences. It was of the species called the great cavern bear by Cuvier. It was found in the grottos of Mialet, department of Gard. It does not appear that there at present exists any species at all resembling it; and the excellent state of preservation in which it was discovered, induced M. Larrey to purchase it. M. St. Hilaire was charged with its examination, for the purpose of drawing up a report upon it.



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, { EDITORS AND PRORIETORS.}   SATURDAY, NOVEMBER 26, 1836.   [VOLUME V.—No 47.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, NOVEMBER 25, 1336.

RAILROAD TREASURER'S OFFICE. }
TUSCUMBIA, Aug. 1, 1836. }

TO THE PRESIDENT AND DIRECTORS OF THE TUSCUMBIA, COURTLAND AND DECATUR RAILROAD COMPANY.

GENTLEMEN:—The following Report will exhibit the situation of this department and the transactions that have transpired from the time of my appointment [11th of April, 1836] to this day.

In pursuance of resolutions of your Board, exertions have been continually making to get the old balances on stock liquidated; for this purpose, I obtained the services in part, of Mr. Walter Simpson, who proceeded upon that business, under written instructions, [a copy of which is appended to this report, marked No. 1.] He visited nearly every stockholder, who was accessible at the time; and succeeded in closing many of the accounts; but still a long list, amounting to a large sum of money, is standing open, which from one cause or other, could not, up to this date, be brought to a close. This business will continue to occupy my attention until all these accounts are closed. A list of stockholders is appended, marked No. 2, exhibiting the number of shares held by each individual, and the balance due from the same.

From this list, it also appears that the total original stock amounts to 3,063 shares, equal $306,300. Of which 258 shares have been transferred to the Company.

Of the 1,500 shares of the additional stock created in June last, 1,155 shares have been subscribed, and secured [excepting $7,500] in the way proposed by the resolution of your Board. 345 shares remain to be subscribed: when this shall have been done, the total capital stock in the Company will amount to 4,563 shares, equal $456,300.

An account current, showing the receipts and disbursements in this department is annexed, marked No. 3, by which it appears that the receipts from various sources have amounted to $207,396 76 cts. and the disbursements to date, amount to $164,216 23, leaving a balance of cash in the Treasury on this day, of $43,180 50.

A general list of balances is also annexed as drawn from the books of this department. All of which is very respectfully submitted.

DAVID DESHLER, *Treasurer of the Tuscumbia, Courtland and Decatur Railroad Company.*

ENGINEER AND GENERAL SUPERINTENDENTS OFFICE. }

TUSCUMBIA, Aug. 1, 1836.

TO THE PRESIDENT AND DIRECTORS OF THE TUSCUMBIA, COURTLAND AND DECATUR RAILROAD COMPANY.

GENTLEMEN:—In compliance with the regulations of the Company, I beg leave to submit the following brief Report, showing the operations in this department, from the period of the last annual Report from the Engineer department, 4th March 1834. At the date of that report, the Railroad had been completed to Town Creek, say 14¾ miles above Tuscumbia, and was in rapid progress of construction, for the remaining 8 miles to Courtland. The space between Courtland and Decatur had just been let to contract, and the contractors were beginning upon the work. By 4th July the road was completed, and opened as far as Courtland. And on the 15th December of the same year, [1834] the work was accomplished to the town of Decatur, and the locomotive with her train of cars, passed through the whole extent of the road for the first time. Thus it will be seen that 28½ miles of the road were accomplished in a little over nine months.

Before the road was quite completed business began to accumulate. In anticipation of that event large quantities of merchandize, destined for the upper Tennessee, had been sent to Courtland, to remain until a thorough transit should be

forded. But unfortunately for the community as well as the Company, we had been disappointed in the receipt of cars as well as locomotives. Two locomotive engines had been purchased at the north, to be delivered to us early in the season. One of which was received in February, 1835, without tender car or tank, both of which however were supplied, after some loss of time, at our own works; but when the engine came to be put on the road it was found not to answer the purpose, being deficient in almost every important respect. This engine had been purchased second handed from the Philadelphia, Germantown and Norristown Railroad Company—an article which they had tried to their own satisfaction, and were no doubt, pleased at the opportunity of disposing of it. The other engine did not arrive until about the 1st of January—this engine was made at the West Point Foundery, New-York, and had the appearance of a good article, and indeed performed well for a few weeks—but owing to a defect in the castings of the cylinders, as well as a bad arrangement in the slides that carry the crossheads, one of the cylinders gave way on the 15th day of June, immediately under the exhaust passage, bursting open nearly its whole length; the metal in that part being only about an eighth of an inch in thickness. The engine of course was perfectly useless until new cylinders could be procured. Not being prepared with tools at our own works to remedy the difficulty. I wrote to Mr. Kemble, the manager of the West Point Foundry, advising him of the deficiency of the engine, and requesting that he would, with all practicable despatch, make a new pair of cylinders, as well as slides, and forward them to us. Which he promised to do. We waited on his promise till quite late in the fall, say October or November, expecting daily to hear of the anxiously looked for articles; till at last despairing of any further news from the West Point Foundry, we set to work at our own shops and accomplished the job, so that said engine has been in service since some time in January last, and answers a good purpose. From the West Point Foundry we have not even to this day heard a word of excuse or apology for the treatment given us.

Our car establishment was also extremely limited at the period of opening the road, amounting to but about 15 lumber and 3 pleasure cars, instead of from 50 to 75, the number required.

Owing to these various disappointment in regard to motive power, we were compelled to resort to the only alternative left us, horses to do the business. And in the use of this kind of power, the want of car was much more sensibly felt than it would have been with engines, owing to the limited speed of horses; besides this the railroad having been just completed as the winter and bad weather set in, and the horse path not being gravelled, the path very soon became almost impassable for horses. In consequence, it was entirely beyond our means to perform the transportation that was offered to us during the winter of 1834 and '35, and a large portion of the business had to seek another channel. This was not all, it affected very materially our business for the succeeding year. The community who had been disposed to patronise us from the first, not aware of the true causes producing the inability of the Company to perform what had so confidently been expected from them, became soured in their feelings towards the Railroad, and determined not to encourage the Company any further, until it should be prove itself fully adequate to the transportation of all the freights that should be offered. By about the 1st July, 1835, the number of cars had been so far augmented, that we began to be able to keep up with the business; every exertion was continued to be made to increase the number of cars, and at the same time two new locomotive engines were ordered, one from M. W. Baldwin, of Philadelphia, and the other from Liverpool. The former was placed upon the road about the 1st of June last, but the latter has not yet arrived, owing as we understand, to the great number of orders on hand before ours. It is however, a gratifying fact to state, that since about the 1st July, 1835, we have had the capacity to accomplish the business that was offered, although at an immense expense, owing to the mixture of motive power used upon the road. From the period last above mentioned, up to this date, I presume about one third to one half of the business was done by horses, and the remainder by locomotives, viz: one small engine, the "Fulton," the "Comet," since January last, and the "Triumph," since about the 1st of June. Since the latter engine was placed on the road, no horse power has been used in transportation between Tuscumbia and Decatur. I say we were able to do the business that was offered and I confidently believe we had the capacity to double the amount that was presented since October or November last, and our car establishment having been continually augmenting, we feel perfectly assured, that although the business the ensuing year is expected to be fully double what it was the last 12 months, yet we shall be enabled without difficulty to give it despatch.

From the Vermont Daily Journal.

REPORT OF THE COMMITTEE ON ROADS AND CANALS,

To the Hon. Senate and House of Representatives.

Your committee on Roads and Canals to whom was referred so much of the message of the Executive as relates to internal improvements, and also sundry memorials praying for an appropriation for surveys of routes with reference to the construction of railroads in the eastern, western and central parts of the State, respectfully report: That they have had the subject under consideration in joint committee, and ask leave to submit the following facts and opinions.

First. In relation to the contemplated route for a railroad on the East side of the Mountain, it appeared that a charter was granted by the Legislature at its last session, for a company to be organized for constructing a railroad from the south to the north line of the State, under the style of the Connecticut and Passumpsic Rivers Railroad Company. The route contemplated is in the valley and near the banks of Connecticut River from the south line of the state to the mouth of the Passumpsic River, thence up the valley of the Passumpsic, to its source, in the vicinity of one of the principal streams falling into Lake Memphremagog, thence down the valley of said stream to Magog Lake, and on the shore of the Lake to the line.

It was shown your committee, that measures are in progress in the States of Connecticut and Massachusetts, for the construction of a railroad from Hartford Ct. to Brattleborough, meeting at the latter place, with the Connecticut and Passumpsic Rivers Railroad. That a sufficient amount of funds have been secured for defraying the expense of a survey, which survey is now in progress. From Hartford to New-Haven Connecticut, a railroad is already in progress of construction, and will probably be completed the ensuing season.

It was further shown before your committee that memorials are pending before the Provincial Parliament of Lower Canada, for Charters for railroads from the south line of the Province near Magog Lake, down the valley of the St. Francis to Port St. Francis, on the St. Lawrence river, and also from the south line of the Province aforesaid, to the outlet of the Lake, and thence to St. Johns, in the direction of Montreal—that the route in the valley of the St. Francis has already been surveyed from Port St. Francis, as far as Sherbrooke, and a favorable report made—and that it is expected this survey will be completed to the Province line the present season.

Your committee further learn that by the aid of report of surveys which have heretofore been made with reference to the construction of a canal up the Connecticut and Passumpsic rivers, data have been formed upon which estimates have been made as to the practicability and probable expense of constructing a railroad upon the above route, and that in the opinion of an eminent and experienced Engineer, Col. James Stevens of R. I. (as published in his report at a convention holden at Windsor,) the route is in a high degree feasible, and the facilities for constructing a railroad, with comparatively moderate expense, are greater than in almost any other section of the United States.

According to the estimates of the aforesaid gentleman, the expense of constructing a railroad on this route, upon the most permanent and approved plan, similar to the Boston and Providence railroad, exclusive of grading, will be $8,000 a mile for a single track, including the turn outs; and that the grading on an average will not exceed $3,000 a mile for a double track including masonry, bridges, engineering and all contingent expenses—and that the superstructure of a road with timber, without rubble stone, might cost $6,000 a mile

less than the estimates of one similar to the Boston and Providence railroad. This route is adapted to accommodate the whole of the eastern slope of the mountain, including the counties of Orleans and Essex; and the amount of available water power, distributed almost equally through its whole extent, is shown to exceed that of any other section of equal extent in the United States, and probably of any other country known. This route will intersect at Springfield, Mass. the "Western railroad," leading from Boston to Albany. It also intersects the contemplated route for a railroad from Lowell and Concord, N. H. to Burlington, Vermont, through the valleys of White and Onion Rivers.

In relation to the contemplated route on the west side of the mountain, your committee are informed that there is now a McAdamized road from Bennington to Troy N. Y. graded and nearly completed. That the charters for said road permit the occupancy of it for a railroad, and that the grading has been made with reference to this object, as respects inclinations, curving, &c.

From Bennington, the route extends through the counties of Bennington, Rutland, Addison, Chittenden and Franklin to Canada line, in the direction of St. Johns and Montreal. It is believed that no obstacle will be found which may not be surmounted, in constructing a railroad on the above route. The whole section through which it would pass, is rich in the production of Iron, Marble, and in many parts Copperas, Manganese, Ochre and various other productions of first importance in the arts and manufacturing operations of the country—while through its whole extent is found an abundant water power, rendering it a most desirable location for the manufacturer.

Your Committee cannot doubt that the construction of these contemplated railroads, or any considerable portion of them, if found practicable, would result greatly to the advantage of the various interests of the citizens of Vermont. It would facilitate commerce, opening any obstructed and expeditious intercourse with different Atlantic cities. It would encourage Manufactures, and bring into requisition a vast amount of water power now unoccupied. It would add to the wealth of the State, by inviting investments of capital from the wealthy towns and cities on the sea board. It would increase the value of real estate, not only in the vicinity of the routes, but throughout the whole extent of the State. It would increase the population of the State, which is already becoming sparse in many parts through the blighting influence of the spirit of emigration. But the greatest advantages to be derived from a work of this kind would be in favor of the *agricultural* interest. Indeed important as these improvements would prove to the various commercial, manufacturing and mechanical operations of the State in the opinion of your committee, these and all other interests combined would not derive so great an amount of benefits from them as the farming interest alone.

It is at once apparent, and a point conceded, that if Railroads were to be constructed on the line of the principal route contemplated, extensive and numerous manufacturing villages would immediately grow up in every good location within a reasonable distance of these roads. This opinion rests not merely upon theory, but upon the fact that such results have invariably followed the construction of Canals and Railroads in every other section of the interior of the country. The consequence in Vermont would be the creation of a market almost at the door of every farmer, not only for all the staple products of his farm, but for various articles, as vegetables, timber, stone, &c. &c. which now are accounted as comparatively of very little value.

The staple products of Vermont, as wool, butter, cheese, pork, &c. are principally transported in various methods to New-York, Boston and other maritime markets, at an expense averaging from fifteen to twenty dollars a ton. This item of freight is a dead loss to the producer, for the mere transporting of an article from one place to another adds nothing to its real value. A pound of butter sent from Vermont to Boston is a pound of butter still. A ton of pork sent from Vermont to Boston is no more than a ton of pork still, and will go no further with the consumer than if it had not been subjected to this process of transportation.

Now if by the construction of Railroads, the consumer is induced to locate in the immediate vicinity of the producer, it is obvious that the item of freight will be to a very considerable extent dispensed with.

Your committee have not had access to such statistical accounts as would be necessary to enable them accurately to estimate the various agricultural productions of Vermont, but assuming that the staple articles which are now subjected to the expense of transportation, amount in the aggregate to ten thousand tons,—an estimate which it is believed is below the facts,—it will be seen that at twenty dollars a ton there is now a dead loss to the producer of these articles, upon the above assumption, of two hundred thousand dollars in the simple item of transportation. In other words, if the proposed improvements were to be completed there would result therefrom a net saving to the farmers of Vermont, in the item of transportation alone, of two hundred thousand dollars annually. And if it be said that any deductions should be made from the above estimates, on the ground that a considerable portion of the agricultural products of the State would still find a market on the sea board, although at a diminished expense for freight, it is still believed that such deduction would be more than supplied from the market of such articles as will not now pay the cost of transportation, to say nothing of the great advantages to the producer resulting from the competition in prices which would arise from a multiplication of market towns.

Your committee have taken into consideration the apparent *necessity* of some action on the part of the citizens of Vermont in aid of internal improvement, in view of the fact that the encouragement afforded to these important works in other States has operated to give the various interest of those States a decided advantage over similar interests in Vermont—an advantage which they could not have obtained but for these works—an advantage which will continue to operate disastrously to the people of this State, unless similar works of internal improvement are prosecuted here. The unprecedented spirit of emigration which has during the last twelve months taken from Vermont thousands of her most industrious and valuable citizens, and which threatens a further drain upon her comparatively limited population, is not produced wholly by the fact that western lands are cheap and productive; but mainly from the fact that these are directly accessible by means of railroads and canals. The Legislatures of the Western States have been aware of the importance of these public works. Hence the fact that Ohio and Indiana, and Illinois, and Michigan, even, are engaged in the construction of Railroads and Canals, not merely from one important point to another, but frequently from the principal forwarding depots into the interior. The people know and enjoy the benefits of these works, and they enjoy them at an expense to the State of Vermont, of many of her most valuable sons, from whom she withholds that encouragement which is offered them by other States through these public works.

But it is believed little need be said to demonstrate to this legislature and to the citizens of this State generally, that the projected improvements are important and worthy of patronage, *if practicable*. It becomes therefore important to inquire, preliminary to any action, is the enterprise practicable? If these railroads are chartered, surveyed and the stock created, will such stock be taken up? Will the probable amount of business be such as to convince capitalists that such stock will prove a profitable investment?

Of the practicability of constructing railroads on these routes, your committee believe they have information, which will enable them to express an affirmative opinion, both in view of the physical obstructions on the routes, and the facilities for bringing the expense of these roads within such limits as shall ensure a fair profit upon the investment,

Your committee have called the attention of the House to the report of an experienced engineer, based upon certain surveys which were heretofore made from Hartford, Connecticut, to Canada line, with reference to the construction of a canal. Upon the practicability of constructing a railroad upon this route, this gentleman remarks that "so far as rise and fall are to be regarded, no unusual obstacle is presented; that for so great an extent the route is uncommonly level, and that there is no one point of obstruction in the whole extent that may not be readily overcome, and that without serious expense." The same is

probably true of the other routes to a considerable extent.

Similar surveys upon the central railroad route, show the rise from Lake Champlain to Montpelier, to be about 400 feet, and thence to the height of land in the valley leading to White River, about 350 feet more, making an elevation above Lake Champlain of about 750 feet.

Upon the route on the west side of the mountain, no surveys are known to have been made, but from information obtained from gentleman well acquainted with the geography of the country, your committee are induced to believe that a railroad may be constructed from Bennington through Manchester, Rutland and Middlebury to the north line of the state, following the valleys of the Battenkill and Otter Creek, and probably approaching the shores of the lake in Chittenden and Franklin counties, and that the facilities are equal to those of the route on the east side of the mountain.

While many of the most important railroads in the U. States have been constructed with reference to the greatest permanency, at an expense far beyond any means which can be commanded for similar works in Vermont, it is also ascertained that other railroads are now in operation on important routes, in the construction of which great economy has been observed, and which are found practically to answer all the purposes of those more substantially built. While the Schenectada and Utica Railroad was built at an expense of $21,000 a mile, the Saratoga railroad exclusive of the bridges over the *Sprouts* of the Mohawk, cost but $6,500 a mile. And in the estimate of Col. Stevens, above mentioned, while the cost of a railroad in the valley of the Connecticut will amount to $13,000 a mile upon the plan of the Boston and Providence railroad, a plan equally practicable might be adopted at a saving in expense of $6,000 a mile—making the entire cost of the superstructure of a road on this route only $7,000 a mile.

Corroborative of the correctness of this estimate may be mentioned the opinion of the Engineer, now engaged in making estimates upon the New-York and Erie railroad, formed the present season, while passing through the valley of the Connecticut river from the white Hills to Hartford, Connecticut.

Of the amount of business which these railroads if constructed would command, your committee would only remark, that no proper estimate can now be made in view of the present business operations of the State. The immense increase of business and of transit on those routes in other states now enjoying the benefits of railroads has uniformly exceded the fondest anticipations of the friends of those works while it has astonished those who had stood aloof from the enterprise. And this remark is true not only in its application to the principal thorough fares of the country, but to every considerable railroad in the interior of the United States.

Should the entire works now proposed be ever completed, connecting the cities of the St. Lawrence with those of the Atlantic, it is obvious to remark that the freight for passengers, travelling for business and pleasure from the *termini* of the routes alone would approximate to an amount equal to the interest of the investment.

With these views your committee venture the opinion that if measures are adopted for procuring competent surveys under the superintendence of Engineers known to the public, and if corporations should be organized for the construction of railroads upon the routes in question, the stock of such corporations to a very considerable extent will be taken, and the work commenced with a reasonable prospect of ultimate completion.

In expressing this opinion your committee do not rely mainly upon their own opinion or knowledge of facts, but have paid great deference to the opinions of gentlemen actively engaged in the prosecution of similar works in other states, whose observation and knowledge of facts enabled them to form conclusion from existing circumstances upon which great reliance may be placed. In reply to an inquiry addressed to James Brewster, Esq. President of the New-Haven and Hartford Railroad Company, that gentleman writes, "As to the question whether the stock will be taken, I think there cannot be a doubt, first because I think it will promise ample returns, and secondly it will secure a decided influence in its favor in the city of New-York. I feel a confidence that were a subscription for the stock opened in New-York and other places at a proper time with reference to the money market, it would be filled immediately."

But however correct may be the opinions of individuals on this subject, it is most obvious that capitalists from abroad can never be induced to furnish the means for preliminary surveys. Nor will it be possible to call their attention to the importance of this, or any other similar enterprize, until competent surveys shall have been made, with approximate estimates. Then and not till then, can they be induced to examine into the importance of the work with reference to the value of the stock.

In view of the foregoing premises, your committee recommend that an appropriation be made by this Legislature of dollars, out of any funds in the Treasury not otherwise appropriated, in aid of preliminary surveys of the principal and most important routes, with reference to the construction of railroads thereon, and that your committee be further instructed to report a bill accordingly.

E. Fairbanks, *Chairman of Committee from House.*

A. Young, *Chairman of Committee from Senate.*

Steam-Engines.—There are in Glasgow and its suburbs 310 steam-engines. viz. 176 employed in manufactories; 59 in collieries; 7 in stone-quarries; and 68 in steam-boats. Average power of engines, 20.46.100th; total horses' power, 6406.

We take great pleasure in publishing the following report, containing a very complimentary notice of Thomas Blanchard, one of the greatest mechanics of the day. In our notice of the Fair of the American Institute we shall mention some of the most useful inventions of Mr. B., which elicited universal admiration.

From the Journal of the American Institute.

REPORT ON THE NAVIGATION OF THE UPPER ROANOKE, BY MEANS OF STEAMBOATS OF SHALLOW DRAUGHT.

Lawrenceville, June 20th, 1836.

To Col. Andrew Joyner, Superintendant of the Roanoke Navigation Company.

Sir: Agreeably to the order of the board of directors, made at their meeting in April last, I set out, on the 12th day of last month, to perform the duties assigned me. The people of Clarkesville most promptly and liberally responded to this effort of ours, by appointing Tucker Carrington, Esq., to accompany me, from whom I received much assistance.

From the Hon. Walter Coles, and the Hon. B. . Leigh, we obtained every assistance they could give us in our investigations, by procuring and giving us letters to all persons in our route most capable of aiding us in obtaining the information we were seeking. These letters enabled us to make the acquaintance of many persons in the city of New-York, and the States of Connecticut and Massachusetts, best acquainted with the subject of steam navigation in shoal water. In T. B. Wakeman, Esq., of the American Institute of New-York, Alfred Smith, Esq., of Hartford, Conn., and Charles Stearns, Esq., of Springfield, Mass., I found gentlemen well acquainted with the subject, and who were not only willing, but did put themselves to much trouble and inconvenience to oblige and assist us in every thing we desired. And although we applied to no one who did not manifest the greatest willingness to assist us, yet I should be doing injustice to myself and to one of the most valuable and worthy men in New-England, did I not in a most especial manner acknowledge the great kindness and service rendered us by Alfred Smith, Esq. Mr. S., like all his countrymen, is engaged in business, to which he devotes himself with great assiduity; and his worth being duly appreciated by his fellow townsmen, much of the public business is thrown on his hands. Notwithstanding all this—and although at the time of our visit to Hartford, he was superintending the erection of a large public building—he gave us many hours of his time every day, during our sojourn in that city. He had been superintendant of all the improvements on the Connecticut river, and knew all the facts in relation to them. He gave me a duplicate of the profile of the canals and locks around the falls; and a survey of the river, made under his direction; which I will send you for the use of the Roanoke Company by the first opportunity.

Every person to whom we mentioned the object of our visit to the north and east, invariably directed us to Thomas Blanchard, as the man to be consulted and employed by us. Indeed the unanimity with which all recommended Mr. Blanchard was astonishing—but when we went to Hartford and Springfield, and saw the steamer Massachusetts ascending the Enfield falls, and what he had done in the

United States' Armory at Springfield, we too, had no doubt of Mr. B.'s ability to put steamboats on the Roanoke, if mortal man could.

This extraordinary man was a common artisan in the United States' Armory at Springfield, and I was told by Col. Robb, the superintendant, that he had added improvement to improvement in the machinery there, until it would seem to be as perfect as the art and wit of man could make it—the principal of which, however, is the machine for *turning* gun stocks, and any irregular figure. But the improvement for which, perhaps, his country will be most indebted to him, is his steamboat for shoal water—it might be more appropriate to call it an invention—for it is built on a new principle. This gentleman I lost no time in engaging for our service; provided you should sanction it. By promptly adding your request to mine, you will soon have an opportunity of learning from Mr. B. himself, what he has done, and what he can do on our river.

I shall now proceed to mention such facts as I have collected, and I shall also venture to give you some conclusions I have drawn from those facts. Being, however, entirely ignorant of engineering, (never having had my attention directed to such pursuits,) my conclusions must be received with great allowance.

The better to appreciate and apply the facts to be detailed, some account of the Roanoke, Dan and Staunton rivers, will be necessary. The facts here stated of those rivers, are extracted from the surveys, &c. of Messrs. Moore, reported after the death of the principal engineer, by Mr. Isaac Briggs, to the Board of Public Works. The distance from Rock Landing to Clarkesville, is 60 miles—from Clarkesville to the highest point of the survey up Dan, is 125 miles—and from Clarkesville to the highest point of the survey up Staunton, is 109 miles. The whole fall from Rock Landing to Clarkesville, is 156.60 feet—average fall, per mile, 2.61 feet. Whole fall from Clarkesville of the 125 miles surveyed of the Dan river, is 277.47 feet—average fall per mile, 2.221 feet—whole fall of Staunton, from, Clarkesville in the 169 miles surveyed, is 322 621 feet—average fall per mile, 2 96. It will, from this be seen, that the navigation of the Staunton is the most difficult—and that of the Dan the best of the three rivers.

In one material thing these surveys are very deficient; namely, the fall throughout each mile; for although a fall of ten feet to the mile, might be easily overcome if equally distributed the whole distance, yet, as is frequently the case, if the whole fall, or a large portion of it, occurs at one or two places in the mile, it might defy all the power of man or steam. In other instances too, the survey only gives the fall for two, three, four and five miles; and frequently from place to place, so that the distance cannot be accurately known. This occurs most frequently on the Dan and Staunton rivers; on the Roanoke, the fall in the mile is generally stated. The falls in the Roanoke, which require to be here noticed, are Eaton's, fall in the mile 11.1 feet—Hamlin's Shoals, fall in two miles 16 11 feet. The next mile above these two. (having no name to designate it,) fall, 5.95 feet. Pugh's falls, fall in the mile 5.62. Horse-ford fall in two miles 8.95 feet—and Butcher's Creek, being two miles long, fall in one mile 5.60, and in the other 5.50 On the Dan the only ones I shall notice, are those of Hyco—they being the only obstruction for some 50 or 60 miles above Clarkesville. These falls are about $1\frac{3}{4}$ miles long, fall 12.89 feet. On the Staunton, Falty's falls are the only obstacle to Brookneal—and it is useless to notice any other on that river. Here, the survey is too inaccurate to enable me to ascertain the distance to which is affixed the fall mentioned; but as well as I can understand it, the rapids must be about $1\frac{3}{4}$ miles—in which distance, the whole fall is 15.23.

I will now beg leave to conduct you to the Connecticut river, and lay before you some minute statistics. From Hartford (below which, the river is free from any obstruction) to the foot of Enfield falls is 12 miles—fall, not more than two or three inches to the mile, and the water smooth. Enfield falls are nearly 5 miles from head to foot; with 1 mile of slack water between the upper and lower falls. The lower falls extend nearly $2\frac{1}{2}$ miles, (half a mile of which is slack water,) and has 20 feet descent—principally, if not entirely, confined to two miles; within these two miles there are a succession of rapids—one or two of them greater than the others. After the termination of the lower falls, one mile of slack water intervenes; after which, we come to the upper falls, being 1 mile in length, and having a descent of 10 feet—the descent is unequally distributed, being most of it in three bars, namely—at Enfield bridge, Mad Tom bar, and Surf bar. From the head of the falls to Springfield, is 8 or 9 miles—and from thence to the foot of Hadley falls, is about 8 miles farther; making the distance of 16 or 17 miles from one fall to the other—in all which distance there is slack water, and fall of only a few inches to the mile. One mile below Hadley falls, however, you have Williamansett falls, being not quite such hard water as upper Enfield falls. Hadley falls have a descent of 50 feet in $2\frac{1}{2}$ miles, around which there are locks and a canal through which all boats and rafts are obliged to pass. From the head of Hadley falls to Miller's falls is 35 miles, with sand and gravel bars—having, by actual admeasurement, only between 8 and 9 feet fall in the whole distance. Above Miller's falls there is more rapid water, where steamboats have been tried without much success—owing, it would seem, more to the want of employment, than to their inability to navigate the river.

But to return to Enfield falls (where we have actual experiments and well attested facts for our guide)—several boats were put on the river and abandoned before they got one to succeed. There are now two passage boats, and I believe two tow boats. The passage boats, are the Vermont and Massachusetts—the former, intended to run in low water, is 75 feet long—including wheel, 13 feet wide—draws 19 inches. The Massachusetts is $97\frac{1}{2}$ feet long, including wheel, (which is in her stern,) $13\frac{1}{2}$ feet wide—draws 22 inches of water when laden, and has two engines $17\frac{1}{2}$ horse power each. Aboard of this boat I passed over Enfield falls three times. She can carry 75 passengers, has no accommodations for night or meals—but comfortable cabins for both ladies and gentlemen. In ascending the lower rapid $2\frac{1}{2}$ miles, she cleared them handsomely and with ease in 42 minutes; and she went up the upper falls (being exactly one mile) in 23 minutes by my watch. Descending, little or no steam is used—ascending, the boat is quite obedient to the helm; but when the current is extra strong, poles are used to keep her steady—descending she is also steered by a tow oar. She makes a daily trip from Hartford to Springfield, 26 miles, and back—going up in 5 hours, and returning in $2\frac{1}{2}$ hours—has run with regularity and entire success, for four years; and is considered as good property as any in New-England. She, as well as the Vermont, was built by Thomas Blanchard. Her crew consists of 5 hands, including captain and pilot—her expenses are about \$100 a month; and cost about \$5000; but owing to the advance in labor and materials, it is probable that such a boat would now cost more.

Around Enfield falls, as well as the other falls on the river, there are locks and a canal, through which the freight and tow boats pass. Though the tow boats have gone up Enfield falls, it is found to be best to go through the canal. These two boats can carry 150 tons, at the rate of $2\frac{1}{2}$ miles an hour, against the current of $1\frac{1}{2}$ miles an hour; but experience prove, that towing less than that, is much better. The William Hall, one of the tow boats, has ascended a rapid of 9 feet in the mile, towing up 20 tons—her engine is 20 horse power, and she cost between four and five thousand dollars. At Hadley falls, after the frieght boats get through the canal, they are taken in tow by another tow boat, at the head of the falls, and carried up to Miller's falls.

Before steamboats were used on this river, above the falls, the trade was carried on by means of freight boats of 25 tons, with a sail, to be used when the wind was fair. When these boats ascended Enfield falls, they took in additional hands, so as to have one hand to the ton, when they were propelled by poles; and I was told that it was as hard labor as men could endure: it frequently consumed the whole day to get one of them over the falls, $5\frac{1}{2}$ miles. Here, steam has succeeded, both as applied to passage and tow boats—and it would seem from this, that where a man can push a ton up a current, by means of a pole, steam can be employed with success, profit and regularity.

The Connecticut, upon an average, can only be used for navigation seven months in the year—it is ice bound for three months and a half, (last year much longer,) and the water is too low for one and a half months in the summer. I saw Mr. Goddard in Hartford, who is the proprietor of the steamboats on the Altamaha, Ocmulgee, and Ockonee rivers, who informed me that they were entirely successful. I was also informed by Mr. D. Copeland, of Hartford, that he had succeeded in putting a steamboat on the St. Lawrence, where the fall was much greater than at Enfield: but I was unable to get the particulars, in consequence of Mr. Copeland's being obliged to leave Hartford for New-York unexpectedly. Mr C. is an engine maker of high reputation, and a man of high standing. Mr. Blanchard has also succeeded (though not to the same extent that he has on the Connecticut) in putting steamboats on the Kennebec, Genesee, and Susquehanna rivers: in the latter, he informed me that he had ascended some half a dozen mill dams. This boat, however, did not run long, and she has not been repaired, or replaced by another.

Here, perhaps, with strict propriety, my communication should close; but some opinions must necessarily have grown out of what I have seen and heard—and I hope I shall be pardoned for expressing a few of them. This, however, considering the position of things, may do little else than draw forth a denial of the facts stated, an

unfriendly criticisms on the conclusion and reasons which I shall give. The improvements made by the Roanoke Company, have brought into existence so many rival schemes for monopolizing the trade of the upper country, that almost any opinion which may be expressed, will be *charitably* ascribed to a wish, to promote one, or put down another. I have what to me is a considerable interest in the Roanoke Company; and I am entirely unconnected with any other of the various and conflicting interests on, or pertaining to the river I have looked at this subject exclusively as a stockholder of the company—and every thing I have done, and what I shall say, will have no other end in view, but the advancement of its interest.

The most important conclusion I have come to, is, that steamboats can be put on the Roanoke and its two principal tributaries, with profit and success—whether they will be able to navigate the *whole* of the Roanoke, Dan and Staunton, remains to be tested by actual experiments; but that they can be successfully and profitably employed on a large part of all three rivers, and that too, without the company's incurring much expense in further improvements of the beds of the rivers, I have as little doubt as I can have of any thing not yet demonstrated. The facts above stated, I think, abundantly wararnt this conclusion. There is but one fall on the Roanoke greater than that of Enfield; there is not one on Dan or Staunton, for a considerable distance up both streams so great. Why, then, (it may be asked,) may we not ascend our rapids as well as they do those on the Connecticut?

From the head of Pugh's falls, almost to Danville, there is no rapid equal to the falls of Enfield by several feet to the mile—there are but three which can be considered as opposing any real difficulty—namely, the Horseford, Butcher's creek, and the Hyco falls. The Horseford has 8.95 feet fall in two miles, Butcher's Creek has a fall of 5.62 feet in one mile, and 5.59 in the other, and Hyco has 12.89 feet in one mile and three quarters. The only fall on the Staunton below Brookneal, of any magnitude, is Tally's falls, where the descent in one mile and three quarters is 15.23 feet—making in all only four places to be overcome, to render the rivers accessible to steamboats for largely upwards of one hundred miles, on the Roanoke and Dan, and about fifty miles on the Staunton. If nothing else could be done but to rescue these portions of the rivers from the state of comparative uselessness in which they at present are, would it be nothing? It appears to me that these improvements (if indeed any are required to be made) can be done by the company in a short time, and with but little expense. I am sensible that the board of directors, at their last meeting, directed that the work should be commenced at Rock Landing; but I think the policy of beginning at the head of Pugh's falls, and bestowing the first labor on the Horseford, Butcher's Creek falls, Hyco falls, and Tally's falls, is so obvious, that you ought to do, what I am sure the board would do, had they now to decide the question again. Our policy is certainly, to apply our labor so as to open as much of the river as we can, in the shortest time, and with the least expense: in what other way can it be done?

Let us consider for a moment, that these four obstacles are removed, and steamboats can navigate the rivers above supposed: there would be an immediate, easy, and expeditious communication between Danville and the Gaston railway, by running stages a short distance down the river, from Danville to the boat; and from the head of Pugh's falls (about seven miles) to Gaston And there would be nothing to prevent another boat's running from Brookneal to the same place. I do not think it improbable, in such a state of things, that a toll of one dollar for each passenger, would give the company more revenue, than all the other tolls put together.

As to the falls between the head of Pugh's falls and Rock Landing, and those high up on the Dan and Staunton, they would be attended to, after these four places should be put in order. I think it not improbable that the 12 miles below Pugh's fall, will require more labor and expense than all the others; if so, the river being improved above, would give us ample revenue to work on, and remove these obstructions.

But suppose we find some place on the river when steamboats cannot ascend? If steam cannot overcome it, machinery may, and to view it in its worst aspect, should we be obliged to change boats, and have passengers and baggage carried around such a place, still we shall have accomplished much.

All these remarks apply to passage boats, they are found to be capable of ascending worse rapids than tow boats. The latter, however, would soon follow the introduction of the former; and I have little doubt they can be turned to good account.

May I not hope, in conclusion, that this subject will engage the attention, draw out the energy, and stimulate the enterprise of the enlightened and patriotic sons of those lovely and fertile valleys! Ardently hoping it may.

I remain, dear sir, your obedient serv't,

E. B. HICKS.

M'GAULEY'S LOCOMOTION BY GALVANISM.

The announcement by the Rev Mr. M'Gauley at the meeting of the British Association at Dublin last year, that he had invented a method of applying galvanism as a motive-power, has excited considerable interest in the mechanical world. The whole scheme has, however, come to nothing, as will be seen by the following statement of the proceedings upon the subject, which we extract from the *Athenæum's* report of the second day's (Tuesday, August 23d) proceedings of the Association at Bristol:—

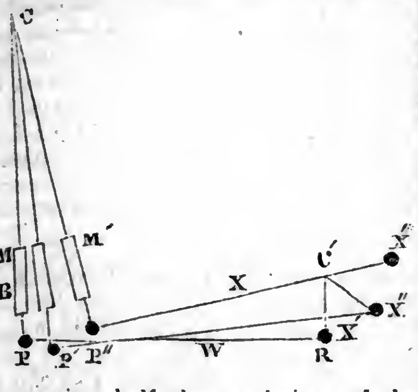
The Rev. J. W. M'Gauley read "A series of Experiments in Electro-Magnetism, with reference to its application as a Moving Power."

Previously to the detail of the experiments on this subject, he thought it might be interesting to the Section to relate what he had done since the last meeting of the Association, in the application of electro magnetism to machinery. He had intended, originally, to have exhibited the improvements, but should content himself, for the present, with the *detail*, rather than the *exhibition*. He was obliged to confess that he was the less anxious prematurely to publish results, since he found that the working model of last year, given to the Section, undoubtedly with the intention of its future improvement, or the pursuance of experiments by other members, had led, on several occasions, to the production of papers, and the exhibition of models, by those from whom it might not be expected—with a pretension to originality, but with no change in the principle, and almost none in the details.

The working model exhibited to the Sections at the last Meeting of the Association must be acknowledged as a proof, to some extent, at least, of the applicability and the manageableness of electro-magnetism as a moving power; but the question then remaining, was, whether or not it was likely to be applied to useful purposes, for this, several things remained undone.

Powerful magnets were to be constructed. The ordinary formation of electro-magnets furnishes us, at best, with an apparatus clumsy in the extreme and, as we shall see, of every limited power. This arises from the very nature of an electro-magnet; for the lifting power may be very great, although the attracting power at a small distance may be very trifling. There must be a limit, also, to the size of these magnets, for, if the mass of iron be too great for the helix, it is not saturated with magnetism, and the helix cannot be unlimited, as, beyond a certain distance from the iron, its action is nothing,—in some cases, perhaps, as we shall see, even injurious. The effective distance of the helix from the iron cannot be great, since its action, probably, decreases in the inverse proportion of the square of that distance. This difficulty cannot be obviated, as some have imagined, by causing the electrical currents to circulate through the mass of iron, uniting together a number of coiled bars. This would present an arrangement probably similar to a permanent magnet, the masses of iron acting on each other by induction, the reversion of the poles would be very slow, or altogether impossible. The *action* of the magnets, rather than their *masses*, must be united; but in this new difficulties occur. Their action must be simultaneous, or the machinery will be broken, or ineffective; the time *after* reversion, and during which a *bar can* be thrown off a magnet, is extremely short—hence one reason why it is difficult to unite the action of several magnets. But let us suppose that we have obtained a simultaneous reversion of the poles and throwing off of the bars—a thing totally impossible, he conceived, from the number and complication of circumstances by which it is influenced—how shall this action be applied to machinery? If the fly-wheel of a steam engine, from the shutting off of the steam, be not impelled by the engine while it continues in motion, it drags the piston, uninjured, through the cylinder; but suppose something to retain the piston in one position, without stopping the wheel, the effect were highly injurious; this is exactly what must frequently happen in electro-magnetism. It is impossible to reverse the poles even of one magnet, in such a manner that the position of the bars shall always correspond with the position of the crank and fly-wheel.

Let M M' be two magnets, M M' be the space through which B, the bar, travels



in causing half the revolutions of the crank C X, while B is moving, so that its extremity shall be at P'; then C' X shall have become C' X'' while it is going to P', C' X' shall become C' X''', but if when the crank C' X is in the position of C' X''', one of the dead points, the bar is not ready to leave M'; or, in other words, if the magnet which holds it be not ready at once to send it off—a thing very probable; the fly-wheel continues to revolve by its own inertia, and the machinery is broken, or the bar is torn from the magnet, which often has a curious and perplexing effect on the reversion of the poles.

A better reversing apparatus was to be obtained. The one of last year, though perfectly successful, required the agency of mercury, which, for many reasons, is objectionable; it becomes oxidated, then contact is imperfect, and the level in the cups, which is of the last importance, is destroyed: it is liable to a thousand accidents, not to speak of its destroying the wires of the apparatus itself.

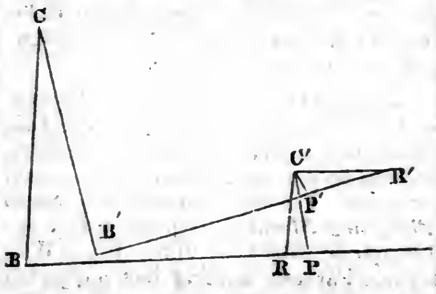
Again, the form of the apparatus, whether mercury be used or not, must be *changed*, and the *principle* of the one now exhibited to the Section adopted, since the apparatus, which will reverse the poles of one magnet, will not with speed or certainty reverse the poles of two or more, when worked by the engine itself. The apparatus shown to the Section had been used with great success in the reverson of the poles of four powerful magnets.

The attachment of the reversing apparatus to the machine becomes difficult, when more than one magnet is used, for reasons with which he would not then occupy the Section. He believed he might mention, that he possessed an engine of considerable power, in which these difficulties were overcome.

The experiments he should detail to the Section were numerous and complicated; he had taken every means to secure their accuracy; some of them appear anomalous, but were undoubtedly modified by circumstances, many of which are so obscure, that he has not been able yet to detect them. He remarked, that it was obviously important to make experiments in considerable number, and on a large scale, since the former secures a greater accuracy, the latter the notice of results which, from their minuteness, might otherwise escape observation. His inquiries resolved themselves into two points—the nature of magnetism—the best means of producing it. The means of overcoming the difficulty arising from the necessarily limited size of the iron and the helix, he might probably treat at a future period.

[Mr M'Gauley then entered into a detail of his experiments]

Mr. M'Gauley thought it would be unbecoming in him to suggest any thing to the British Association; but he believed nothing would be more conducive to the interests of science, than that the Association should cause to be instituted a series of experiments on the galvanic battery and its charge, which would set all questions on the matter at rest for ever. Before he left this part of the subject, he thought it well to recall the attention of the Section to the nature of the power obtained by electro-magnetism. In steam one great cause of the varying power of the engine arises from the varying leverage of the crank. Let B and B' be positions of the extremity of the piston-rod C' R and C' R' corresponding positions of the crank, the leverage of the crank is measured by the perpendicular C' P and C' P'. It varies as that perpendicular. But in electro-magnetism, the force at B, say the bar traversing between the magnets, is always varying. He would not then enter into some curious results obtained by calculation on this matter.



He had been anxious to satisfy himself, by his own experiment, of the truth of the law of magnetic attraction being in the proportion of the inverse square of the distance, but abandoned the inquiry for the present, when he found that a magnet, with a seemingly appropriate bar, would lift at one-sixteenth of an inch only, five pounds; though with a different bar it lifted the same weight at twelve times the distance; and that the greater the distance through which powerful attraction might be exerted, the less the lifting power appeared.

In examining the identity of electricities derived from different sources, it seemed to Mr. M'Gauley that we sometimes forget that electricity may be modified both as to quantity and intensity; and that if either be changed, or both, we cannot expect the same results. To test, therefore, the identity of any agent with electricity, we must not use those means which are the measure of, or dependent on, either quantity or intensity; for if in such experiments the electrometer or galvanometer be not effected, we only arrive at a negative conclusion—that if the agent under consideration be electricity, it differs from the ordinary electricity in quantity, intensity, or both. For though we never had been able with galvanism to cause the leaves of the electrometer to diverge, or with machine electricity to deflect the galvanometer, or with electricity to produce magnetism, or with magnetism, electricity, with electricity to produce heat, with heat, electricity,—their non-identity would by no means follow.—To examine with ease and certainty the identity of any thing with electricity, we must find some property of electricity, which is not modified by, nor dependent on, quantity or intensity. We know, and chemistry furnishes us with one proof, that the elements of things may be the same as to quantity and to the intensity of mutual action; and yet may be productive of vastly different effects. Thus we know, that from two equal volumes of carbon and hydrogen, may be formed at least three very different substances.

The following facts seem to afford additional evidence of the perfect identity of electricity and magnetism; and that magnetism does not require, nor suppose, the circulation of electrical currents.

1st. A shock and spark are obtained by means of an electro-magnet only after battery communication is broken; for no matter how long this communication is maintained, neither shock nor spark shall be perceived. 2ndly. The shock and spark are not the effects of the battery; for to obtain a shock—(this shock he had not seen remarked by any experimentalist)—it is not necessary to form a part of the communication between the *copper* and *zinc*, but merely between the extremities of the helix, or between either extremity of the helix and the copper *or* zinc of the battery. 3rdly. The shock and spark do not arise from the magnetism of the bar included in the helix, since the more perfectly the bar is de-magnetised in breaking contact the better. Besides, it is curious that a powerful shock and brilliant spark may be obtained without any iron, and from a heap of wire thrown without any heliacal arrangement. This, Mr. M'Gauley remarked, would lead to a very simple and effective electrical apparatus, one easily managed, and always ready for use; the length and number of the coils, with a given calorimeter, has an effect on the shock and spark. Mr. M'Gauley exhibited to the Section wire coiled with the greatest accuracy, by a machine he had constructed, which was capable of covering any wire, manufacturing piano forte strings, &c., in any length, without any care on the part of the operator, to the enormous extent, if necessary, of 7000 feet per hour. The wire which is exhibited as several in the Section knew, was not more perfectly manufactured than the many thousand feet he had covered lately. He thought the shock and spark might arise in this way: a current of electricity passes through the wire from copper to zinc; its inductive action on the wire ceases suddenly, by the contact with the battery being interrupted; the disturbed equilibrium of the wire is suddenly restored. The electricity of the battery seems, in passing through the helix, to acquire an augmented intensity; but from these facts it is evidently not so. 4thly. The spark and shock appear to demonstrate that currents do not circulate

around the magnet. If they do, as is evident, they are capable, as we know from secondary currents, of producing a spark and shock. The helix, of itself, is capable of these effects; let the helix and the magnet act conjointly; these effects ought to be doubled; the contrary is the fact; they may be annihilated, and they ought, for the magnet, by its electrical action, retains the helix in a state of excitation. The universal—at least in other cases—law of electrical induction, if applied to magnetic phenomena, easily explains them. He did not think it by any means certain, that electrical action consists in the *transmission of a fluid*, and not the mere arrangement of particles: this idea seemed opposed by an experiment he made some time ago. He never could believe that the action of the galvanic battery consisted in the passage of electricity through the fluid from zinc to copper, and along the connecting wire from copper to zinc; he thought that the repulsion which sent the electricity through the fluid—an imperfect conductor—ought to prevent its return along the wire. He constructed a small box of wood, being a cube internally of three inches, divided it into twelve waterproof cells by well-cemented glass plates; placed in the cells six copper and six zinc plates, one in each, in the usual galvanic order; filled the cells with a charge of 1 in 50 sulphuric acid, 1 in 100 nitric acid and water, and connected the extreme plates wtth a delicate galvanometer, but no effect was produced, except when the copper and zinc were in the same cell, or the cells were in conducting communication; but he did not deem this experiment conclusive against his idea, since, although induction might occur from particle to particle, through an imperfectly conducting fluid, it by no means follows this inductive influence should take place through the particles of glass, since the very insulating power of glass, or other substances, may arise from the incapacity of their particles for electrical arrangement.

If it be true, that electrical effect is the arrangement, and not the transmission, of particles, he thought we might easily understand the agitation of the muscles of a frog, caused in *breaking* contact with a galvanic battery, even of a single circle; the dangerous effects to those in the neighborhood of the discharge of lightning from cloud to cloud; and the spark and shock obtained from a quantity of wire—all of which probably arise from the same cause, and are the consequence of the same universal law.

Professor Ritchie rose to remark, that without intending to convey the least censure on the gentleman, he could not but observe, that he had been so entirely occupied with his own reseaches as not to have attended to any thing done by others, for there was really nothing new in this paper—and he gave examples.

Professor Stevelly, remarked, that if the only objection to it were the crank and magnetic pendulum not working together, in a large machine that could be at once remedied, by what was well known in practical mechanics, a slipping coupling, as, when the steam-engine and water-wheels were made to work together, was generally done, or as in the winding part of the common lock. The great objection was the small distance through which the power worked, one-sixteenth of an inch; thus, even if a magnet could be produced that would lift 1,000 lbs., would still render the numerical value of the horse-power almost evanescent compared with the steam-engine.

Items.

CENTRAL RAILROAD.

We are gratified to learn that the Assistant Engineer of the Central Railroad has been engaged recently in laying off a portion of the Road, commencing at the public lot at Spring Hill, five acres of which have been generously granted to the Company by the City Corporation for a depot.

There are now about seventy men at work on the Road, and others will be added to the number as rapidly as the surveys and location of the Road will permit. Mr. Randall, the Chief Engineer, is daily expected, and from his known character for energy and perseverence, we may look for the vigorous prosecution of this great work. We congratulate our fellow-citizens upon the active commencement of this favorite work, under circumstances which leave not the slightest doubt that it will be carried forward to its completion with as much celerity as any other work of the like magnitude, in any portion of our country.

New Application of Steam Power.—This is truly an age of wonders, and we should like to know to what purpose steam will *not* be put in the course of the next 50 years. The following account of *Steam Ploughing Machine*, is published in the Liverpools papers of June 1st. Wide awake, Farmers, nothing now a-days but steam;

"Some experiments were tried on Friday week at Red Moss, near Bolton, in this county, in the presence of Mr. Handly, M. P. for Lincolnshire, Mr. Chapman, M. P. for Westmeath, Mr. Smith, of Deanston, and other men interested in agriculture, with a complete and very powerful steam-plough, constructed by Mr. Heathcote, M. P. for Tiverton. About six acres of raw moss, were turned up in a few hours, and turned up in a most extraordinary style; sods eighteen inches in breadth and nine inches in thickness being cut from the furrow, and completely reversed in position, the upper surface of the sod being placed exactly where the under surface had been before. The possibility of ploughing by steam has thus been established, though, as the employment of the steam plough, in preference to one drawn by horses, will depend on the comparative cost of the two powers, and on that of the implements used, and as there are not at present any sufficient data for judging what the difference of the cost will be, it is not possible to say how far steam is likely to be applied to this department of agriculture. The plough of Mr. Heathcote, though a very powerful machine, appears to us to be much to complex and costly for common agricultural purposes, though we have little doubt that it might be used not only with effect but advantage, in redeeming large portions of moss land—such as the bogs of Ireland. Indeed, it is the opinion of Mr. Heathcote himself, that it would not at present answer to employ it in reclaiming a smaller portion of bog than 1,500 or 2,000 acres though it may probably be cheapened and simplified, so as to make it ultimately useful on a smaller scale."—[New Yorker.]

Erie and Kalamazoo Railroad.—We are authorised by one of the commissioners to say that this road will be in such a state of completion that cars will commence running by the 10th or 15th of next month, through the whole line from Adrian to Toledo. We are also informed that cars now leave Toledo every morning at 9 o'clock and arrive at Sylvania at 11 o'clock A. M., leave Sylvania at 2 P. M. arriving at Toledo 4 o'clock same day. Persons travelling between this place and Toledo would find it to their advantage to meet the cars at the above places.—[Adrian Watch Tower.]

Danville and Pottsville Railroad.—The Sunbury Advocate of October 22d says:—A new era is about to commence in Shamokin. We are much pleased to announce the arrival here, on Saturday last, of two cars on the Sunbury Railroad, laden with coal from the coal mines of Shamokin. The coal are of the best quality, and were promptly bought by Charles G. Donnel, Esq. and Geo. Prince, at \$3 50 per ton. The cars since run regularly, bringing coal for sale at the basin, in front of Sunbury. Many more cars, we are told, will shortly be placed on the road.

The London Grand Junction Railway.—The first general meeting of the Directors and Shareholders of the Company, since their incorporation, took place on Wednesday, at the city of London tavern, Bishopsgate street, to afford the Directors an opportunity of laying before the Proprietors a statement of the affairs of the company. The chair was taken by Sir S. Whalley, M. P., at which time there was a full attendance of the largest holders of scrip issued by the company. Sir S. Whalley addressed the meeting at great length in vindication of his conduct and that of the Directors, in reference to certain charges that had been brought against them for trafficking in shares. The report gave an estimate of the probable amount of traffic, and the cost of maintaining the railway, etc., from which it appeared that a profit of 20 per cent was expected to result from the undertaking. A resolution was unanimously agreed to, to the effect that the explanation of the chairman was most satisfactory, and that the Directors deserved unqualified confidence.—[Chronicle.]

Railroads in Russia.—A railroad has just been completed, and will be opened in October, from St. Petersburgh to Zarkejeselo and Pawlowsky; and in the spring two others are to be commenced from the capital to the imperial residences of Peterhoff and Oramenbaum. M. Gerttner is the engineer of these works, and has lately been in England to improve himself in railway matters.

Steam Engines in Belgium, and Comparison with the number employed in France.—There are at this moment in activity in the Province of Liege, 216 steam engines, exerting altogether 5445 horses' power. Of these 216 engines, 139 are on the right bank of the Meuse, exerting equa to 2176 horse power; and on the left bank, 79, or 3269 horse power. Of the whole of these engines, three only are of foreign manufacture. The largest engine is of 300 horse power; 20 from 50 to 10; 38 from 20 to 50; 139 from 5 to 20; and 1 of $1\frac{1}{2}$. If we join to the motive power of the steam engines of Liege, that of the engines in other Belgian provinces, a total would be formed of about 20,000 horse power. It is principally in Hainault, about Charleroi, and in Borinago that the largest engines are found. According to the reports published by the *Administration des Ponts et Chausees*, in France, there are 946 engines, representing not more than about 14,051 horse power. Belgium thus surpasses by about one third the power of all the steam engines in France. Upon this foundation, therefore, and comparing the respective population of the two countries, we find that Belgium industry is twelve times more developed than French!—[Receuil Inndusiriel]

Grand Junction Railway (connecting the Birmingham, and Manchester and Liverpool Railway.)—On Wednesday last, the 31st ult., the annual meeting of the Proprietors of this Railway Company was held. A very able Report of the proceedings of the Company since their last meeting was read by their Secretary, Mr. Chorley, which gave general satisfaction. The whole of the line is in so forward a state, that it is expected it will be open for travelling early in the summer of 1837.—Fourteen of the twenty arches of the splendid viaduct across the Weaver are finished; it, as well as the viaduct near Birmingham, will be completed next spring. There are several parts of the line ready for the iron rails being laid down. All the carriages are in a forward state, and 25 locomotive engines will be ready for action in March. The contracts for the rails and chairs were made at a fortunate period, being at 15 per cent. less than they could now be obtained for. The income derivable from the Warrington and Newton Railway, now forming part of the general line, yields a surplus after paying the recent proprietors the sum of 4 per cent. per annum, as agreed upon to be paid to them until the opening of the whole line. The proprietors were unanimous in their desire to support the line between Manchester and Crewe, and to assist the inhabitants of the Potteries to form a branch line to the Grand Junction Railway near Newcastle.

Navigation of the Delaware and Chesapeake Canal by Steam.—The steamboat Car of Commerce left the wharf on Thursday afternoon with a pleasant party of about fifty persons, of which we made one, on an excursion down the Delaware, to try this splendid boat. She is a prime affair, and passed down as far a Chester and back again, to the entire satisfaction of all on board, and fully answering the expectation of her enterprising owners, who have got up this experiment of navigating the Delaware and Chesapeake canal by steam; whereby passengers can step on board of this boat, and be landed in Baltimore in about twelve hours, without the trouble and expense of changing from boat to car, and from car to boat, as is the case in the old line between this and our city. We congratulate the citizens of Philadelphia and Baltimore on the prospect of a daily line of steamboats through this channel, to two large commercial cities, at a reduction of *one-half* of what they are now *compelled* to pay. If this boat will pass the locks of the canal without any difficulty, as we have every reason to believe she will, when this experiment will be successfully triumphant; and such is the sanguine expectation of the managers, backed by public opinion, that they have already commenced building another boat. The Car of Commerce has an engine of about 60 or 70 horse power, constructed on the locomotive principle, and was built under the eye of her projector, Captain E. W. Crocker, who has the command of the boat. She will carry about one hundred tons freight, and one hundred and fifty passengers, and is calculated to run from city to city in about twelve hours.—[Philadelphia Ledger.]

Boston and Nottingham.—This railroad appears to be a decided favorite with the public.

Brighton.—Another scheme is to be brought forward, founded on surveys taken in 1823, by a person who competes for the honor of originating the Liverpool and Manchester railway.

Communication with Ireland.—Great efforts are making to secure the shortest line between the capitals of England and Ireland. A considerable difference of opinion exists as to the best route and harbor. At present nothing seems to be fixed on.

Dover.—The line is commenced near Oxford. This looks like business. They find it necessary to apply to Parliament next session to amend their line between London and Oxford, it being said that the line granted by parliament is either such as could not be executed, or, if executed, could not be worked to any profit. Fifty thousand pounds is said to be a moderate estimate of the expenditure of this and the rival Companies before the bill was obtained.

Preston.—A railway is now forming from the harbor of Wyre to Preston, and at the former place a town will soon arise, named New Liverpool. Wyre is thirty miles from Liverpool. The difference in the respective port charges of Old and New Liverpool are considerable. The following account of dues at each are calculated on an American vessel of 300 tons, making two voyages a year, viz: Liverpool, £224 19s.; New Liverpool, £11 5s.

Grand Junction Railway.—It is proceeding with great rapidity towards its completion. The men are at work day and night, and the engineer (Mr. Locke) has it in contemplation to throw open the line for travelling next summer. Fifteen splendid carriages have already been completed.

Leeds and Selby.—At the annual meeting of the shareholders it was stated that the traffic in every department is steadily on the increase, and the prospects are good. The dividend for the year was declared at £1 10s. a share.

Manchester and Liverpool.—The company have discontinued the publication of their half-yearly reports.

Great North Railway.—A resolution has been passed to apply next Session for an Act to complete the line from Croft to York, so as to perfect the communication between Newcastle and London. The number of directors is eighteen, and they are to be paid eighteen guineas a week for attendance.

Northern and Eastern.—The works are to be commenced without delay, and completed within two years. The line from London to Waltham Cross will be completed within a year after possession of the land; and the whole distance to Cambridge in two years.

North Union.—There are upwards of 900 men employed between Wigan and Preston, and generally the works are progressing with rapidity; especially the magnificent bridge over the Ribble. It will be exactly like Waterloo Bridge, but with five arches. These will be 120 feet span, and are in a state that renders completion by the spring of 1838 almost a matter of certainty.

Mr. Pinkers has commenced operations on the formation of a line of the Pneumatic Railway, near the banks of the Kensington Canal, and he expects to be able, within two months to demonstrate his method of working a line of railway.

Bills were obtained during the late session of Parliament for near 1,100 miles of road, requiring for rails, chains, carriages, and other works, at least 220,000 tons of iron, independently of that required for roads for which Bills have been previously obtained, and are now in active preparation. These will amount to about 70,000 tons, making a total of 290,000 tons, probably in requisition for the next four years. Railroads in the United States, either actually under contract or in progress of survey, amount to more than 3,000 miles, and will take 750,000 tons. The whole of this iron must be taken from the British market.—[Railway Magazine.]

Power-Looms in Glasgow have increased greatly of late years—some idea may be obtained of the extent of their use when it is known that in 1831 four houses employed 3040 looms. These looms, on an average, weave 14 yards each per day. Allowing each loom to work 300 days in a year, these four companies would throw off 10,101,000 yards of cloth, which, at the average price of $4\frac{1}{2}$d. per yard, is 189,393*l.* 15*s.* per annum. The power and hand-looms belonging to Glasgow in 1831 amounted to 47,127, viz. steam-looms, 15,127; hand-looms, in the city and suburbs, 18,537; in other towns, for Glasgow manufactures, 13,463. Since that period power-looms have greatly increased—[Athenæum Report of Meeting of British Association.]

Cotton Trade in Glasgow.—The manufacture of linens, lawns, cambrics, and other articles of similar fabric, was in-

troduced into Glasgow about the year 1725, and continued to be the staple manufacture till they were succeeded by muslins. On the 21st of July, 1834, Mr. Leonard Horner, one of the Parliamentary Factory Commissioners, reported to Parliament, "That in Scotland there are 134 cotton mills: that, with the exception of some large establishments at Aberdeen, and one at Stanley, near Perth, the cotton manufacture is almost entirely confined to Glasgow and the country immediately adjoining, to a distance of about 25 miles radius: and all these country mills, even including the great work at Stanley, are connected with Glasgow houses, or in the Glasgow trade. In Lanarkshire (in which Glasgow is situated) there are 74 cotton factories; In Renfrewshire, 41; Dumbartonshire, 4; Buteshire, 2; Argylshire, 1; Perthshire, 1. In the six counties there are 123 cotton mills, nearly 100 of which belong to Glasgow."

Granite Polishing Machine.—We have for sometime past been watching the progress of a machine for polishing granite, worked by a steam engine, invented by Mr. Alexander M'Donald, stone cutter, of this town (Aberdeen.) Splendid pedestals, urns, tables, columns, and chimney pieces, have been polished and glossed in a most beautiful manner. It has hitherto been believed, that the blue grey granite from the best quarries in this neighborhood, Rubislaw and Dancing Cairn, would not receive such a fine polish as the red granite from Peterhead: but the operations of M'Donald's machine has completely belied this.—[Aberdeen Observer.]

IRON WORKS IN SCOTLAND IN JUNE, 1836.

Erected in or about year		Furnaces.	Tons.
1767,	Carron Comp.	5	8,000
1786,	Clyde	4	12,000
1786,	Wilsontown,	1	3,000
1790,	Muirkirk,	3	6,000
1790,	Cleland	1	2,500
1790,	Devon	3	7,000
1805,	Calder	5	15,000
1805,	Shotts	1	3,000
1825,	Monkland	3	8,000
1828,	Gartsherrie	5	15 000
1834,	Dundyvan	4	12,000
	Total.	35	92,000

Exclusive of the above furnaces, there are eight additional ones in a state of forwardness—viz. two at Gartsherrie, one at Calder, one at Monkland, two at Somerlie, and two at Govan. These eight furnaces will make about 20,000 tons annually.—These works are all in the neighborhood of Glasgow excepting five, and none of them are thirty miles distant from that city.—[Athenæum Rep. of Meeting of British Association.]

St. Rollox Chemical Works.—This manufactory, for the manufacture of sulphuric acid, chloride of lime, soda, and soap, the most extensive of any of the kind in Europe, covers ten acres of ground, and within its walls there are buildings which cover 27,340 square yards of ground. In the premises there are upwards of 100 furnaces, retorts, or fire-places, and in one apartment there are platina vessels to the value of upwards of 8 000*l.* In this great concern, upwards of 600 tons of coal are consumed weekly.—[Ibid.]

Submarine Illumination by the Drummond Light.—We find by the Irish newspapers, that Mr. Steele, who has devoted himself with so much ardor to the subject of submarine operations, and who is the inventor of the communicating diving-bell, has lately made a very important improvement in this department of physical science. This improvement consists in the substitution for the light which he originally proposed for the irradiation of objects under water, of what he calls "the piercing ray of the Drummond light in its gorgeous glory." He has consulted several highly distinguished engineers of this metropolis, and they have been unanimous in their opinion, that this new application of the Drummond light is an improvement of the greatest importance, and it is impossible that any thing can be more simple than the mode proposed by Mr. Steele for its application to his purpose. It appears from the Irish newspapers that this improvement in his theory was made by him while observing Mr. Deane's operations at Kilkse, on the coast of the county Clare. We have seen several of Mr. Steele's publications on this subject in the journals of our Irish contemporaries, and he writes in terms of measureless admiration of the infinite beauty and perfection of Mr. Dean's system of rapid diving. Among the London engineers who have expressed the highest approbation of Mr. Steele's new theory of submarine irradiation of the Drummond light, is, we understand, Mr. Alexander Gordon, who has particularly applied himself to the subject, and lately obtained a patent for a very beautiful mode of generating and applying the oxy-hydrogen gas.—[Sun.]

Irradiation of Light.—It is a curious fact, that if the same letters of the same size precisely are painted on two boards, the one white on a black ground, and the other black on a white ground, that the white letters will appear larger and be read at a greater distance than the black. This is owing to what is called the irradiation of light. It depends on this, that the impression made on the bottom of the eye by bright objects extends a little wider than the actual portion of the organ struck by the light, and invading the space occupied by the darker objects makes the brighter appear larger than they really are.—[Railway Magazine.]

Technological Collection of the Emperor Ferdinand of Austria.—A predilection for the study of rural economy and technology has induced his Majesty to form a collection of raw materials, of manufactures, and of objects of industry of the Austrian States. This he has executed with so much precision and care, that the collection may now be cited as one of the most perfect in the world. It comprehends three principal classes:—1st, a collection of raw materials; 2nd, a collection of manufactures; 3rd, a collection of models. The first consists of all kinds of unmanufactured products, to the number of 3300; the second, all articles of manufacture or labor, and is very complete; it is interesting not only in a technological point of view, but also for the manner in which the objects are arranged; that is, in the order of the different countries and different manufactures of the empire. The collection of models is divided into seven sections. The number of articles exhibited at the commencement of 1835 was about 40,000.—[Recueil Industriel.]

Steam Voyages.—The longest steam voyage undertaken at present is from Falmouth to Corfu, being 1,900 miles, and is accomplished at an average speed of seven miles and a half an hour.

Rapidity of Communication.—A late number of the Liverpool Courier gives us some extracts from the official log-book, kept at the Liverpool Telegraph Office, and by it we are in possession of instances of such extraordinary rapidity of communication, as appears almost incredible. It appears to be a rule in this office frequently to send a communication exactly at one o'clock, through the whole line from Liverpool to Holyhead, in order that the different signal men may regulate their time pieces; this is done by a peculiar signal made exactly as the clock strikes *one*, which notifies the time, and asks the question, "Is there anything to report?" An acknowledgement or answer to this is returned, either "yes," or "no," as the case may be. The distance from Liverpool to Holyhead, from station to station, is seventy-two miles, hence there and back 144 miles, and this signal and answer is considered unusually long if it occupies *one minute!*

Pigeon Despatches.—Much having been said about "pigeon expresses," and the cypher employed for the intelligence conveyed by them, a specimen of one of them may not be unacceptable. It was taken about two months ago from a pigeon shot near Folkestone, and was found fastened to the tail of the bird. The despatch was from London, intended for Paris, and runs thus:—

"London, August 2.
"pziy. pzig, pkim, pkky.
"35152316 ky.
"> gg a gz im.
"Do not forget 2534,242131.

"There have been fluctuations at Amsterdam, ascribed to the illness of Mr. Rothschild. Here it is said that he is dead, and to that is attributed 2214 35 15 23161634. The Paris prices were known here at 1¼, but I think the removal of Cordova the cause that there has not been a greater sensation. Perhaps coupons or 31112127241035, 1235,3424172617."

On the outside:—

"Aug. 3.—Sent off 3 pigeons; have 6 left."

History of Telegraphs.—Bryant P. Todd, Esq., an intelligent navigator and merchant of Boston, whose authority as a practical man gives the greater weight to

his statement and opinions, publishes the following:—

"The first time—by way of illustration—I experienced the advantage of flag conversation was in the year 1815. We saw five big ships spread in line, by signal orders, to prevent our passing them. Having proper documents to inform of peace, we ran up colors and stood for the centre ship. The boarding officer, on being satisfied, said 'Run up your ensign in the fore rigging: that is our signal agreed upon to inform the squadron that *peace between our nation has been made;* and it will save you the trouble of being overhauled and detention.'

"After informing the officer of Bonaparte's escape from the Island of Elba, he directed to hoist the ensign in the main rigging, saying, "that is a signal to *inform of news.*' The seventy-four, and four frigates, were at the time sailing in a lazy cruising manner, but immediately on seeing our last signal, the admiral began conversation with the fleet; and, as if by magic, up went top gallant yards and booms, and in twenty-four minutes they were under a crowd of canvass.' The officer, seeing the signals from the Admiral, said, '*That is for me to go on board, and for all hands to get to Old England as soon as we can.*' Without these *talking* flags, it would have taken hours to have communicated three such important points by means of boats or otherwise.

"One more instance happened a year before the last, when I was going in company with several English captains, from Macon to Whampoa, in an English schooner packet. When in sight of the shipping tide turned down river, and it being calm, we came to an anchor. Fortunately the packet had conversation flags, and, on signal being made, down came four boats to take us up to Canton, where, otherwise, we should not have reached until the next tide.

"Sometimes a boat cannot live upon the sea, and it may blow a gale, which prevents speaking. Our *conversation flags* in such cases, obviate all difficulties."

Traces of Ancient Civilization among the South sea Islands.—Amongst the Caroline Islands, only six weeks sail from Sidney, is Ascension (about 11 degrees north latitude,) discovered very lately by his Majesty's sloop of war Raven. Mr. Oug, now a resident of this colony, some years back remained there for several months, and we have our information from a friend, who conversed frequently with Mr. Oug on the subject. On the above named island of Ascension the language of the inhabitants is more harmonious than in the other islands of the South Seas, a great many words ending with vowels. There are at the northeast end of the island, at a place called Tamen, ruins of a town, now only accessible by boats, the waves reaching to the steps of the houses.

The walls are overgrown with bread, cocoa-nut, and other ancient trees, and the ruins occupy a space of two miles and a half. The stones of these edifices are laid bed and quoin, exhibiting irrefutable traces of art far beyond the means of the present savage inhabitants. Some of these hewn stones are 20 feet in length by 3 to 5 each way; and no remains of cement appear. The walls have door and window places. The ruins are built of stone, which is different from that occurring in the immediate neighborhood. There is a mountain in the island, the rocks of which are covered with figures, and there are far greater ruins eight miles in the interior. The habits of these islanders exhibit traces of a different social system; the women do not work exclusively, as is the custom in the other island. After the meals water is carried about by servants for washing hands, &c. Asked about the origin of these buildings; the inhabitants say that they were built by men who are now above, (pointings to the heavens.)—[Hobart-town Courier.]

Insects.—Dr. Imhoff, in a work presented to the Society of Natural History, at Bale, has estimated the number of insects now known at 560,000 species, Germany alone containing 14,000.

NATURAL HISTORY OF MISSOURI EARTHQUAKE.

We make the following extract from an interesting letter, recently written by Dr. Linn one of the United States Senators from Missouri, to the Hon. John Davis, Chairman of a Committee of the Senate, on the subject of removing obstructions in the St. Francis, White, and Big Black rivers, which, taking their rise in Missouri, run nearly parallel with the Mississippi for some hundreds of miles, and finally unite, far down in Arkansas, with the 'Father of Waters.'

The memorable earthquake of December, 1814, after shaking the valley of the Mississippi to its centre, vibrated along the cources of the rivers and valleys, and, passing the primitive mountain barriers, died away along the shores of the Atlantic ocean. In the region now under consideration, during the continuance of so appalling a phenomenon, which commenced by distant, rumbling sounds, succeeded by discharges as if a thousand pieces of artillery were suddenly exploded, the earth rocked to and fro, vast chasms opened, from whence issued columns of water, sand and coal accompanied by hissing sounds, caused perhaps, by the escape of pent up steam, whilst ever and anon flashes of electricity gleamed through the troubled clouds of night, rendering the darkness doubly horrible. The current of the Mississippi, pending this elementary strife, was driven back upon its source with the greatest velocity for several hours, in consequence of an elevation of its bed. But this noble river was not thus to be stayed in its course. Its accumulated waters came booming on and overtopping the barrier thus suddenly raised, carried every thing before them with resistless power, Boats that floated on its surface, shot down its declivity like an arrow from a bow amid roaring billows and the wildest commotion. A few days action of this powerful current sufficed to wear away every vestige of the barrier thus strangely interposed and its waters moved on in their wonted channels to the ocean. The day that succeeded this night of terror, brought no solace in its dawn. Shock followed shock; a dense black cloud or vapor overshadowed the land, through which no sunbeam ever found its way to cheer again the desponding heart of man, who in silent communion with himself, was compelled to acknowledge his weakness and dependence on the everlasting God. The appearance which presented themselves after the subsidences of the principal commotion, were such as strongly supported an opinion heretofore advanced. Hills had disappeared and lakes were found in their stead; and numerous lakes became elevated grounds over the surface of which vast heaps of sand were scattered in every direction, whilst, in many places, the earth for miles, was sunk below the general level of the surrounding country, without being covered with water, leaving an impression in miniature of a catastrophe much more important in its effect, which had, perhaps, preceded it ages before.

One of the lakes formed on this occasion, is sixty or seventy miles in length, and from three to twenty miles in bredth. It is in some places very shallow; in others, from fifty to one hundred feet deep; which is much more than the depth of the Mississippi river in that quarter. In sailing over its surface in the light canoe, the voyager is struck with astonishment at beholding the giant trees of the forest standing partially exposed amid a waste of waters, branchless and leafless. But the wonder is still further increased on casting the eye through the dark-blue profound, to observe cane-brakes covering its bottom, over which a mammoth species of testudo is occasionally seen dragging his slow length along, while countless myrids of fish are sporting through the aquatic thickets. But if God in his wrath has passed through this devoted land, if he touched the mountains and they disappeared in the abyss, his beneficient influence is still felt in the soft climate, the unexampled fertility of its soil, the deep verdure of its forests, and the choicest offerings of Flora.

FIRE PROOF STAIRCASES.

Sir,—Among the various schemes for preventing the sad havoc which is so frequently the consequence of fires, (in too many instances attended with loss of life or mutilation of limb,) that which to me appears the most simple and the most efficacious, is scarcely ever noticed, and I much fear will never be acted upon generally without legislative interference—I mean the construction of incombustible staircases. I am a builder in a small way, and being an operative mason, have always, without reference to the size of the house, put stone, or stone and brick to the first floor; even in fourth rate houses this

is quite easy, and little more expensive than wood. Two courses of brick for rise, and a rubbed York tread with the nosing rounded; the bricks faced with cement, and when dry painted stone color. This looks well, and is lasting. Nearly all fires originate in the lower part of the house; and a moment's reflection will convince every one of the difficulty of the flames reaching and burning through a ceiling eight or nine feet high, except by means of communication afforded by the wooden staircase. Above the first floor, stone staircases, unless geometrical, are more difficult, on account of the necessary support taking up too much room. My present object is, however, to point out the advantage of having the lower staircase fire proof, which perhaps would, in 99 cases out of 100, prevent the fire reaching higher if it commenced on the ground floor, or afford an easy mode of escape should the fire take place in an upper story.

I remain, Sir,
Yours, very truly,
P. RAYNER.

Obelisk, Sept. 5. 1836.

A SIMPLE METHOD FOR DRAWING ON BOTH SIDES OF A BOARD WITHOUT EITHER BEING RUBBED.

Sir,—If the simplicity of any plan do not take away from its utility, perhaps the following contrivance (which occurred to me from reading one which had the same object in view in your Magazine,) may on that score be acceptable. It is not at all unusual for draftsmen to be working at two different drawings at the same time; and in this case it would be very convenient to make one drawing board answer in the place of being obliged to have two.

To effect this, I think that two slips of wood of the same thickness, provided with pins, say two at each end, and these made to fit in corresponding holes in the drawing board at top and bottom, would be sufficient for the purpose. By these means a sheet of paper could be laid on both sides the board, and be used at the same time, by reversing the pieces of wood from one side to the other, as occasion may require. The holes should be near the edge of the board to allow as much room as possible for the paper.

I cannot vouch for the originality of the above, as being so plain it may have occurred to, and even been adopted by many; but it has not come under my observation.

I remain, Sir,
Very respectfully yours,
FREDERICK LUSH.

August, 1836.

SUBSTITUTE FOR LIGHTHOUSES ON THE SHORES OF THE BLACK SEA.

TRANSLATION OF A NOTE ADDRESSED TO THE BRITISH AND OTHER FOREIGN AMBASSADORS AT CONSTANTINOPLE, IN DECEMBER, 1829. BY COL. MACERONI.

From the highest antiquity, the Black Sea has had the melancholy celebrity of being the most dangerous of all those which have been, or ora at present, frequented by navigators! Thus it was named by the Romans, "AXENUS" *sive inhospitalis*. The nature and the direction of the winds which predominate – the formation of its costs and shallows—of its very ports and its atmosphere—present innumerable dangers, even in summer; in the winter these perils are augmented a hundred-fold! Since the 1st of last November, no less than eleven out of twenty-three vessels, which have sailed between this port and Odessa, have been miserably lost!

By the aid of lighthouses placed on dangerous places, or at the entrances of harbors, the navigation of ships in the vicinity of shores is greatly aided during the darkness of the night. But unless such lights be sufficiently refulgent and *elevated*, and unless the atmosphere be sufficiently clear to permit of the lights *being seen at a sufficient distance*, it often happens that the unhappy sailor does not discover them in time to avoid the dangers which they indicate, or to enter the harbor of which they announce the entrance!

The dangers of the Black Sea are greatly enhanced, and indeed mainly consist, in the dense and sudden fogs which cover its surface. It would be very easy to account for the formation of these fogs by referring to the currents of cold air, which, suddenly rushing from the north-east, meet the warm and moist atmosphere confined within the mountainous margins of the Black Sea.—But this disquisition is not to my purpose, because no remedy can be offered for an exhibition of the laws of nature depending on geographical features of locality. The fact is, that whenever a north wind blows, especially in the autumn and in winter, the Black Sea is covered with an almost impenetrable mist. The course of a vessel steering from Odessa to Constantinople is from north to south. If a strong wind prevails, and the mouth of the Bosphorus be missed, owing to mist or darkness, the rounding of the southern coast causes the unhappy vessel to find itself almost immediately with a lee-shore a-head, upon which it rarely escapes being driven and totally lost!

It is absolutely necessary that the entrance of the Bosphorus should be recognised *at a very considerable distance*, because if it is overshot, with a strong north wind blowing, perdition is sure to follow. The amount of lives and of property annually lost in this way is truly appalling! Twenty-seven vessels, and their crews, have thus perished since I have resided in this capital! It seems that, when in a gale of wind from the north (always accompanied by a mist) if the entrance of the Bosphorus be once overshot, there is no further hope.—The low, shelving southern coasts of the Black Sea offer no other refuge, or none can be discerned.

To the evils above sketched out I propose to apply a palliative. Lighthouses are admirable constructions; but they are expensive, and require time to erect. Moreover, on a low coast it is not easy to give them that degree of elevation which will ensure their being descried at a sufficient distance. Besides which, the case is urgent, and a remedy is called for *at this very moment*, while we daily and hourly receive the afflicting accounts of loss of life and property to an enormous amount.

The expedient which I propose is the use of rockets, projected vertically in the air during a storm, from such points as it is essential to designate to the bewildered navigator. A six-pounder rocket, properly made, will rise above 1000 yards perpendicularly in the air. At that elevation the head or pot is made to burst, and about half a pound of combustible composition, of a most refulgent brightness, is detached from the rocket, and burns suspended in the air for about one minute. This light is far more intense than any of the lamps of the best lighthouses; and its very superior elevation (being *thirty times* higher) causes it to be perceived at a much greater distance. Moreover, its sudden appearance, and the manner of its combustion, can never allow of its being mistaken for some fire on a mountain; and the same suddenness strikes more attention than any fixed light whatever. By means of a little parachute, invented by Sir W. Congreve, the cage containing the refulgent light is suspended in the air so as to fall a very few yards during the period of its combustion. I have discovered a composition which gives much more light than any hitherto used.*

Depots of such rockets should be formed at the necessary points, only to be sent up on the occasion of a storm by night. One may be fired every five or ten minutes; and as the number of stormy nights in the year does not average more than thirty, and that not during the whole night, the consumption of rockets would not be an expense of national importance. When rockets are projected from more points than one, the locality may oe indicated by a difference in the color of the light. Some may give a red, a green, a white, or a blue light. To cover the expense, a small tax or toll might be exacted from all vessels navigating the Bosphorus and the Black Sea; which I suppose they, or their respective Governments, would gladly submit to, in consideration of the great advantage received. I am ready to give directions and exhibit experiments to prove the merits of my plan quite gratuitously.

(Signed) MACERONI.

EXTINGUISHMENT OF FIRES AT ST. PETERSBURGH.—The following article, in relation to the extinguishment of fires, is from a new publication, by M. Von Tietz, Prussian Counsellor of Legation, to St. Petersburg Constantinople and Napoli di Romania:—"In every district in the city (St. Petersburgh,) there are several police stations, wherein fire engioes are placed, with high towers, upon the galleries of which there are two watchmen. So soon as these observe a fire break out, by ringing a bell, they apprise the firemen beneath, who immediately hasten to the spot.

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* His Excellency General Count Guilleminot, the French Ambassador here, has seen me set fire to and consume a cypress tree with one of my compound naval rockets, at 1000 yards distance, horizontal range.

whatsoever portion of the city the fire appens to be, it is indicated upon the tow-s alluded to. For every district a pecu-ar set of figures is exhibited as a kind of legraph ; at night this is done by lanterns. very body of firemen has its distinct time ppointed, even to a minute, by which to each the place of fire. The whole are rganized and equipped like a regiment ; nd have no other occupation besides this. hey are exercised every week, some-mes a wooden building of light construc-on, at some distance from the city, is set n fire, in order to instruct the men in the ractical service. The mounting of the achines is excellent, and the entire ar-angements for extinguishing fire appropri-te, and indeed elegant. Of these, the ost useful are the fire ladders, which can e drawn up with great ease, to the high-st story of a house. Equally servicable re the large nets, held extended to receive hose persons who can only be saved by pringing down into them : this manœuvre constantly practised by the firemen in rder to gain dexterity ; and hitherto, on dopting it, they have always been fortu-ate enough to save the individuals without ncurring any accident. In the severe frost f winter, in order to prevent the water om freezing, certain preparations are ade under the navigable reservoir, for re-eiving but hot coals. It is interesting to bserve at fires the strict regularity with hich the subordinates obey the orders of heir officers, and the death-defying intre-idity wherewith these grave, powerfully ormed men dash into the devouring ele-ment, fearlessly scrambling along the nar-ow paths on the tops of the flaming hou-es. The Emperor always remembers, fter each event of this kind, to reward hem by some liberal donation."

From the Poggendorf Annalen.

RODUCTS OF THE DISTILLATION OF PIT COAL.

By F. F. Runge.

From the oil of pit coal rectified over xide of copper, three bases and three acids re partly separated, or are partly formed, which differ in their chemical properties rom any substances hitherto observed.

BASES.

1. *Cyanol* (blue oil) is a volatile substance lmost destitute of any peculiar smell, eutralizing acids and forming salts which artly crystalize. It produces in a so-ution of muriate of lime a blue color, which is removed by an excess of chlorine. The salts of cyanol dissolve in solutions of muriate of lime, producing a fine violet blue color, which by free chlorine is converted nto orange. They impart to the colorless olution of the white pith of the elder and pine wood, an intense yellow color, which s not destroyed by chlorine, at least under he circumstances in which other organic colors disappear. Thus, a piece of Turkey red cotton speedily loses its color, when af-ter being moistened with oxalic or tartaric acid, it is immersed in a solution of muriate of lime. Paper, cotton, linen, wool, and ilk are not colored yellow. The effect o he salts of cyanol in coloring pine wood s so strong, that a drop containing only one five hundred thousandth part of cyanol produces a distinct yellow color in the wood. The yellow coloring is not imparted to the fibrous part of the wood, but to a peculiar matter in the wood which also exists in other species of trees. The resin has no connex on with this coloring power.

The oil of pit coal contains a great quantity of cyanol, whose presence is easily detected by mixin 1 part of oil with a solu on of 20 water and 1 part muriate of lime. The oil becomes dark red and the solution assumes a blue color, similar in intensity and appearance to the most ammonia sulphate of copper. It is changed by the muriate of lime into an acid which forms compounds possessing a blue color.

Cyanol is very readily detected by muriatic acid, when coal oil is mixed with the latter in the proportion of 3 volumes to 1. The acid becomes brown ; and a splinter of fir wood introduced into the solution, has the yellow color already described communicated to it, thereby indicating the presence of cyanol.

2. *Pyrrol.* Pyrrol (red oil) in a pure state is a gaseous body possessing the odour of turnips, (*markochen ruben*) and may be detected by dipping a stick of fir moistened with muriatic acid in a vessel containing pyrrol, when it is tinged purple red, and which like the effect of cyanol is not removed by chlorine. Paper, &c., treated in the same manner remains colorless. The coloring power of the compounds of pyrrol is not less strong than that of cyanol. Nitric acid produces in the aqueous solution of pyrrol a red color.

It is difficult to detect pyrrol in coal oil, as the cyanol and carbolic acid render its re-action indistinct, but it may easily be discovered in wa er which has been employed to wash common street gas, by saturating it with muriatic acid, and dipping into it a stick of fir. A purple red color is occasioned.

Pyrrol forms the principal constituent of emp reumatic ammonia, and when its peculiar smell is known, it may be distinguished among the od urs which are disengaged by the distillation of bones and horns. Pyrrol is also contained in tobacco oil.

3. *Leucol.* Leucol (white oil) has been so termed because its re-action is colorless. It does not produce a blue color in muriate of lime, nor does it communicate to fir any tinge. Leucol is an oily substance, and is well characterized by the salts which it forms with acids, it loses its smell by its combination with acids and forms with oxalic acid crystallized salt.

When brought in contract with the moist skin, acetate of Leucol emits a smell like phosphorus.

ACIDS.

1. *Carbolic Acid.* This acid is a colorless oily substance, sinking in water. Its smell is extremely empyreumatic ; it is caustic and burning, and has a strong action on the skin. When the skin is rubbed with it, a feeling of burning is felt, and a white spot is produced, which on being touched with water becomes red, and in some days desquamates. In this respect it corresponds with creosote, but differs in being acid ; in being precipitated by acetate of lead, and in not being altered by ammonia or the atmosphere, and in being converted by nitric acid, even diluted, into a reddish brown matter.

Carbolic acid dissolves in water. The solution is colorless and the acid is easily rendered conspicuous with nitric acid. The water is at first yellow or orange, and afterwards reddish brown ; a stick of fir plunged in dilute carbolic acid takes, after being moistened with muriatic acid, in half an hour a blue color. The vapour of muriatic acid also tinges shavings moistened with carbolic acid of a blue color. This tinge withstands the action of chlorine in a high degree.

The salts of carbolic acid are colorless and many of them can be crystalized : their aqueous solutions present the same appearances with fir as the solution of cabolic acid. Carbolic acid precipitates albumen, prevents organic substances from putrifying, and removes the putrid smell of meat, when digested with an aqueous solution, much better than chlorine. The presence of carbolic acid may be detected in coal oil by mixing it with lime water, filtering and evaporating to the consistence of a syrup. Muriatic acid separates impure carbolic acid from this mass, which is impure carbolate of lime.

2. *Rosolic Acid.* This acid (rose oil) is a product of the chemical decomposition of coal oil, and contains what is remarkable, a true pigment. It produces red and lake colours which are equal in beauty to saffron cochineal and madder.

Rosolic acid is a resinous mass which may be reduced to powder, and assumes an orange yellow color.

The principal from which rosalic acid is formed has not yet been detected ; but its presence may be easily demonstrated by mixing lime water with coal oil, filtering the watery solution, and allowing it to stand for some hours. The colorless or yellow solution now becomes red : which is occasioned by the precipitation of the rosolate of lime.

3. *Brunolic Acid.* Brunolic acid is formed in the same way as the rosolic. It is vitreous, shining, easily pulverized, and resembles asphaltum. Most of the compounds of brunolic acid are brown and insoluble, whilst those of rosolic acid are red and soluble.

Besides these six substances, there is still another which has not been obtained in a separate state.

Separation of Cyanol and Leucol.—Mix together and agitate 12 parts of coal oil, 2 of lime and 50 of water. After 6 or 8 hours pass the liquid through a filter. It is of a brownish yellow color and should be distilled one half. The liquid which comes over consists of a thick oil, and a solution of it in water contains carbolic acid in combination with ammonia, leucol, pyrrol, and cyanol. Five distillations are required to separate the cyanol and leucol from this mixture. The first distillation is conducted with an excess of muriatic acid, by which means the pyrrol and carbolic acid pass over into the receiver, and the process is continued till the liquid passing over is no longer red, brown, or yellow, when it is to be mixed with nitric acid. The retort now contains a mixture of ammonia, leucol, and cyanol in union with nitric acid. This mixture possesses a bright yellow color, and should now be distilled with an excess of caustic soda. The three bases pass over into the receiver with the water, and in the retort remains the yellow ley with nitric acid. The matter is to be re-distilled with an excess of acetic acid, and the process is to be continued till the liquid passing over tinges fir wood. Acetate of cyanol and leucol collect in the form of a colorless solution in the receiver, while a great portion of the ammonia remains in combination with acetic acid forming a residum. The acetic acid salts are now to be converted into oxalates by distillation with oxalic acid.

When the liquid which passes over tinges wood yellow, it is a proof that the bases are saturated. The liquid in the receiver is now to be gently evaporated by dryness. The mass consisting of oxalates of cyanol and leucol mixed with a little coloring matter and ammonia, should be reduced to powder digested with spirits, and thrown on a filter, the spirits and coloring matter pass through the filter and leave the salts. This digestion and filtration should be repeated till the liquid passing through is colorless. The funnel should then be transferred to another vessel, and spirits digested on the salts as long as any are dissolved. Oxalate of ammonia now remains upon the filter, and the spirits contain in solution oxalates of cyanol and leucol, which by the evaporation of the spirits are obtained in crystals. These are to be dissolved in water and laid aside to crystalize. Fine needle crystals of oxalate of leucol first appear, and after some time crystals also of oxalate of cyanol make their appearance. The latter are in broad plates of a brownish color, and change with muriate of lime to a violet blue, and turn wood to a yellow color. Should the two salts after separation not be quite pure, they should be repeatedly dissolved in alcohol and crystallized. To separate the two bases from the salts, it is only necessary to distil them with soda ley, when they pass over into the receiver with the vapour of the water.

Separation of Pyrrol.—It is extremely difficult to obtain pyrrol in a separate state, in consequence of its affinity for carbolic acid. To obviate the effects of the acid, it is best to saturate the empyreumatic ammonia which passes over from the distilled bones with an acid The matter which passes into the receiver should be mixed in the first Woulf's bottle, after being filtered, and the discharged gases absorbed by caustic potash, or lime water. By distillation, the pyrrol is carried into the receiver, forming a colorless solution, which produces a purple red in wood. To purify the pyrrol, it should be distilled with muriatic acid, when muriate of pyrrol passes over. When distilled with caustic ley the pyrrol comes over pure.

Separation of Carbolic Acid.—Agitate together 12 parts of coal oil 2 of lime, and 5 of water, at intervals, for six or eight hours. The filtered liquid should be boiled down to a fourth part, filtered after cooling, and mixed with an excess of muriatic acid. Impure carbolic acid collects at the bottom of the vessel, in the form of a brownish oil. The supernatant liquid should be removed, the brown oil washed with water, and subjected to distillation. A milky liquid passes over, from which some colorless oily drops separate, which are pure carbolic acid. As much water is now to be added to the receiver as will dissolve the oil, and then the liquid precipitated with acetate of lead. Carbonate of lead is formed, which, after being well washed, is subjected to dry distillation. The carbolic acid collects in the receiver in the form of a yellow oil, which after rectification, appears as a thick liquid, consisting of pure anhydrous carbolic acid. When the lead salt is not properly dried, water passes over with the acid.

This process is necessary to free it from the heterogenous compounds in the coal-tar, which are ammonia, cyanol, pyrrol, and leucol. These are removed by the boiling. Creosote and sulphur are partly precipitated by the lead, and the rosolic and brunolic acids remain in the retort, while the latter is separated by rectification.

Separation of Rosolic and Brunolic Acid.—The residue in the retort, after the last process, is to be boiled with water, dissolved in spirits, and mixed with lime water. A rose colored solution of rosolate of lime is formed, and brunolate of lime remains at the bottom, as a brown precipitate. From the rosolate of lime the rosolic acid is separated by acetic acid, and again combined with lime, whereby brunolic acid separates. The decomposition, by means of acid and repeated solution, should be continued as long as brunolic acid is observed. The rosolic acid is then collected on a filter, and dissolved after edulcoration and drying in alcohol. There remains on evaporation, a vitreous, hard, orange colored mass The rosolic acid may also be separated by evaporating the solution of rosolate of lime to the thickness of syrup, and mixing it with one third spirits. In the course of a day red crystals of the salt appear on the sides of the glass, which are to be removed, well washed, dissolved in water, evaporated, and treated with acetic acid and lime water. The brunolic acid is separated from the brunolate of lime by digestion with an excess of muriatic acid. The brunolic acid separates in brown flakes, which for complete separation from the roslic acid, must be repeatedly treated with lime and acid. The acids separated from the lime by muriatic acid, are dissolved in soda ley, and the solution is mixed again with muriatic acid, when a pure precipitate of brunolic acid falls, which may be completely purified by solution in alcohol.

Apprentices.—The Mechanic Arts.—If we should desire to counteract the pernicious influence of Trades Unions and radicals from abroad, we must teach our sons the Mechanic Arts and bind more of them as apprentices to substantial and profitable employments than we are now in the habit of doing. We are all wrong in underrating the value of mechanical occupations—we are all wrong in making all our sons Doctors Lawyers, Divines and Merchants. Some branches of the family should be mechanics, and if when they are out of their time, we can give them some money to commence business, with we at once set them on the road to independence—to solid independence, weight and influence. Employment, labor, healthy, refreshing, constant labor, is the grand secret to keep boys correct and moral, to keep them out of vice in every shape to make good sons and good citizens of them. There are many poor widows with boys from ten to thirteen years of age, who are not probably aware that if they are good and industrious can earn from one hundred to one hundred and fifty dollars per annum, and have steady employment. This is much more profitable in every respect, than running about the streets after soldiers or fire engines.

We have often wondered that so few sons of gentlemen of fortune, offer as apprentices to some mechanical pursuit to the Printing business—a business which is light and agreeable, and combines so many advantages It may be asked what are the benefits of this branch of the Mechanical Arts. The sons of persons in easy circumstances who can board and lodge them without cost until they are out of their times—who will superintend their comforts and morals, and feel, as they ought to feel, an interest in their advancement may realize the following advantages.

1st. They learn a business which ranks high in the cultivation of the human mind; a business by which they at once become familiar with the moral and political condition of the country—the advancement of the mechanic arts—the progress of internal improvements—a business which made Dr. Franklin the great man he is, by the whole world allowed to have been.

2d. The Printing business includes a knowledge of proof reading, some acquaintance with the art of paper making—and in a newspaper office where a boy is intelligent, quick, ambitious to excell, he becomes familiar with editorial pursuits—and when out of his time, becomes proprietor, or part proprietor of a city or country paper, and if prudent, temperate and industrious, may become a conspicuous politician, and fill any of the high offices of the country, as we see at present in beholding Printers, Senators in Congress and members of the House of Representatives. So much for our profession, but there are many noble mechanical pursuits which should be cultivated by young men of good family and education. The Builder, which includes the beautiful science of architecture, the ship builder; a first rate and respectable calling. Workers in gold, silver, copper and other metals. Cabinet Making. In short, we could name fifty occupations—more valuable—more enduring—more healthy; more positively independent, than the range of professional callings, and the sickly, poverty stricken labor of the midnight lamp.

By this course we shall bring into the line of mechanics an intelligent, well educated, highly respectable class of American citizens, free from radicalism, combinations, unjust extortions or disreputable associations.—[New-York Evening Star.]

Dr. Arnott's New Stoves.—At a meeting of the Philosophical Society of Edinburgh, which took place lately, one of Dr. Arnott's new stoves was exhibited. It is an oblong box, about three feet long, two broad, and two deep, carefully made air tight on every side A partition within divides it into two parts, apertures above and below enabling them to communicate with each other. An apperture is arranged for the free admission of air, and another for carrying off the smoke; an air-tight door admits fuel. A stove made of earthenware, and placed on one side of the partition, contains all the fuel required, and the hot air circulates round and round the partition before it is eventually carried off by the small tubular chimney. An extensive surface of 32 square feet is thus presented to the air at a moderate elevation of temperature, about 212; and accordingly, scarcely any thing passes up the chimney which has not been almost entirely exhausted of its heat. This stove saves equally time, trouble and fuel, and is quite free from the dust of a common fire.

During the present recess several valuable additions have been made to the British Museum; among others a very splendidly engraved sarcophagus of green basalt, presented by the Duke of Hamilton, who was present on its arrival at the Museum on Monday. Shortly after the opening in October next, two new rooms, situated over the gallery of Antiquities, will be opened, in which are deposited many curious and interesting relics from Upper and Lower Egypt. An immense tank for water has been sunk in the court yard, with a very powerful engine in case of fire. [Chronicle.]

We cannot forbear copying the following sound remarks, from the Philadelphia Commercial Herald. Quackery is so common now a days, and in other branches of science than that of medicine. And that a very slight change of them will render the application universal.

A WORD FOR THE FACULTY.

We have already mentioned the mighty discovery of vaccination, as one signal instance of the benefit conferred upon mankind by the scientific researches of regular physicians. We could fill a volume in mentioning others. The wonderful discoveries in chemistry within the last fifty years, nearly all of which have been made by members of the faculty, and by which the practice of medicine has undergone many important changes, afford another mighty proof of the value of these scientific researches so much contemned by the ignorant. Not one of these discoveries could have been made by a quack; and for the simple reason that a quack never generalizes, or reason by induction. His practice consists merely in the application of supposed specifics. He makes a certain application in any one disease, because he supposes or leads the patient to suppose that the thing applied possesses some secret virtue, some mysterious power over the disease in question. But if sincere in this belief, he knows not in what this power consists; for not understanding the principles on which the human system is constructed and acts, or the construction and action of his remedy, he knows not how one can reach or effect the other. Hence he can draw no conclusion from one case to apply to another. He has no THEORY, no set of general ideas or principles upon any disease. His whole practice consists of a collection of detached unconnected facts, of partial experiences, from no general conclusion can be drawn, and which consequently furnish no guides in new cases. For instance; a well informed physician would administer bark or other powerful stimulant in an intermittent fever; but only in a particular stage of it. The time chosen would be before the access of its cold stage; because according to his philosophical reasoning upon general principles, the cold stage arises from deficiency of action, and the hot stage is a consequence of it, or a return of the tide after its ebb. Hence if the action of the system can be roused before the cold stage, that stage will be prevented, and its consequence also. The quack, ignorant of the principle that action and reaction are equal in physiology as well as mechanics, that excessive action is always followed by proportionate relaxation, and in many cases that undue relaxation is succeeded by undue action will imitate the regular physician in prescribing bark in an intermittent form, but without regard to the time of application. That bark is good in fevers is all he knows. His general knowledge is not sufficient to tell him how or when it is good, and he may therefore give it at the wrong period. He may administer it during the hot stage, and thus aid the disease in exhausting the energies of the system. He may give it during the healthy interval, immediately after the hot stage has subsided and thus produce an undue excitement, to be followed by a proportionate relaxation at the very access of the cold stage. In either case, the system is reduced at the period of the cold stage, when excitement is most needed, and thus the disease is aggravated.

This single instance is sufficient to illustrate the difference between the learned physician and the quack. The first collects facts, then classifies and composes them, thence attains a knowledge of general principles, and by reasoning upon these principles, draws correct conclusions concerning new facts. The second collects facts, but does not classify or arrange them, or deduce from them general principles. His facts are deposited in the store house of his memory without arrangement, no one is connected with any other by any bond of union, each is distinct and independent, and if made the basis of a conclusion concerning a new fact almost inevitably misleads. The one draws his conclusions from a principle, the other from a solitary fact. A principle is proved by a multitude of facts, but a solitary fact proves nothing beyond its own existence. The difference between the two is the same that is exhibited between the man and the monkey in regard to a fire. The man maintains the fire by adding fuel, because he knows that fire consumes wood and produces heat by the process, and he hence infers that so long as he can supply fuel he can have the means of warming himself. The monkey knows from experience that a fire produces warmth, and will therefore approach it to keep warm; but his sagacity reaches not to the conclusion that fuel is necessary to maintain the fire.

WOODEN PAVEMENTS.—An intelligent correspondent of the Bulletin, in his argument in favor of wooden pavements, adduces the following facts:

In 1807 Mr. Pierre Percy, of the faubourg Saulet, was called upon by Mr. Lafon, city surveyor, to assist in running the line between the suburbs Saulet and Annunciation, which they were enabled to do by tracing the old plantation fence, made of cypress pickets, the buts of which under ground were free from decay, although they must have been there for about 40 years. Mr. Percy further states, that most of the pickets have been dug up in cultivating a garden, or he could have still traced the fence, although it must now be seventy years at least since it was erected.

Mr. Pilie city surveyor, can produce a still more striking instance of the durability of cypress when covered with earth.

On the 19th July, 1819, on digging the ground in or near Canal street, he discovered the butts of the palisades of the old French fortification, which he believes were at the time upwards of one hundred years old! The ends of the pickets were in a sound state; and he believes that even at the present day he could trace the whole alignment of the palisades.

I regret not having the History of Lousiana to refer to for the probable date of this fortification; but as it was prior to the occupation of the country by the Spaniards, I presume that the *durability* of cypress will no longer be contested.

Should any fears be entertained that the increased demand for cypress would too much enhance the price, it is proper to state that mulberry timber is equally durable, and can be procured in any quantity on the Ouachita river, from whence it can be brought down in rafts.

In 1815 the posts of an old saw mill at the mouth of Bayou Moreau, in the parish of Point Coupee, were perfectly sound, though Mr. Poydras believed the mill to have been built 40 or 50 years. If they have not been subsequently cut down, it is probable they may exist at the present day in an undecayed state.

At Bristol it is anticipated that the advantages of the railway from that place to London will be immense to the agricultural interest. The *minimum* velocity is to be 40 miles an hour, and therefore, at the *slowest* rate of travelling, cattle landed at this quay at five in the morning may be it. Smithfield market when the clock striked eight.—[Chronicle.]

The attention of Contractors is called to the following notice. The district of country is one highly favorable as we believe to works of this nature.

Early application should be made as it will be perceived that the time expires on the 20th of December.

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Bray's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Deckertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at No 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is \$500,000 with liberty to increase to \$800,000, divided into shares of \$100 each.

The sum of \$5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I BLAIR,
JOSEPH E. EDSALL,
COMMISSIONERS

Dated Oct. 3rd, 1836 41—9t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice. the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whittemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Beoz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long.

Rochester, May 22d, 1836. 19y-tf.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

WESTERN RAILROAD.

PROPOSALS will be received at the Office of the Western Railroad Corporation, in Worcester, until the 20th November, for the grading and masonry of the first division of the Road, extending from Worcester to East Brookfield, a distance of 15½ miles.

Plans, profiles, etc., will be ready for examination after the 10th November. W. H. SWIFT, Resident Engineer.

Worcester, Mass. Oct. 19, 1836 43—tnov20

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

AMES' CELEBRATED SHOVELS, SPADES, &c.

300	dozens	Ames'	superior	back-strap Shovels
50	do	do	do	plain do
150	do	do	do	caststeel Shovels & Spades
50	do	do		Gold-mining Shovels
100	do	do		plated Spades
50	do	do		socket Shovels and Spades.

Together with Pick Axes, Churn Drills and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York
BACKUS, AMES & CO.
No. 8 State street, Albany

N. B.—Also furnished to order, Shapes of every description, made from Salsbury refined Iron. 4—ytf

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2¼	by	⅝,	15 ft in length,	weighing		4 $\frac{68}{100}$	per ft.
280 "	2	"	½,	"	"	"	3 $\frac{50}{100}$	"
70 "	1¾	"	½,	"	"	"	2¼	"
80 "	1½	"	½,	"	"	"	1 $\frac{35}{100}$	"
90 "	1	"	½,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2¼, 2½, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.
28-tf Philadelphia, No. 4, South Front st.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR

TO RAILROAD CONTRACTORS.

PROPOSALS will be received until the 8th day of December next, for the graduation and masonry of the first ten miles of the Gainsville and Narkeeta Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Gainsvill, for ten days previous to the time of letting and all other information given, on application to the subscriber or to the Assistant Engineer. Recommendations will be expected in all cases, of persons not known to the officers of the company or to the Engineer

For the information of persons at a distance, it may be remarked, that this road commences at the town of Gainsville, on the Tombeckby river, and extends twenty-two miles south-west to Narkeeta in the State of Mississippi. The Tombeckby is navigable for Steamboats the greater portion of the year and having a direct communication with Mobile and New-Orleans, will afford facilities for procuring the supplies necessary for the hands employed on the work, or for their ready conveyance hither, if procured from a distance. The country through which the road is located, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season renders the contract peculiarly desirable to those wanting winter employment. To an enterprizing and energetic contractor the construction of this road offers the prospect of a profitable job.

D. H. BINGHAM, C. E.

Gainsville, Ala. Sept. 21, 1836. 42—tDec1

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, DECEMBER 3, 1836. [VOLUME V.—No 48.

CONTENTS:

NEW-YORK, DECEMBER 3, 1836.

The gentleman inserting the following advertisement has references to men of the highest standing. Desirous of procuring employment, and having but few acquaintances in the United States, he has taken this method of obtaining a situation.

We should feel happy in receiving any communication for him.

It will be found that the line of the La Grange and Memphis road presents unusual facilities to contractors, the ground being high and healthy and the climate favorable for winter work.

The attention of Contractors is called to the following notice. The district of country is one highly favorable as we believe to works of this nature.

Early application should be made as it will be perceived that the time expires on the 20th of December.

An extra number of copies of the Railroad Journal is issued this week. It is intended to send a copy to each of the exhibitors at the American Institute. Should any be overlooked, they are desired to apply for copies at our office.

The object of this Journal being the extension of knowledge in relation to improvements in our country, its usefulness will be increased in proportion to its patronage.

Our readers will perceive that this number is in a new type, this and other arrangements in progress will enable us to improve the appearance of our columns—while every exertion is made to increase the value as a Journal for practical and scientific news.

With this number will be sent an extra, published in the month of July last, containing much matter in relation to Railroads and a fine wood engraving of a new locomotive, by H. R. Campbell, civil engineer.

TO SUBSCRIBERS.

Those indebted to us for the past year, and years, are informed that circulars containing their account, will be forwarded to them. They are also requested to remit at the same time the subscription in advance for 1837.

Subscribers in general are reminded that on January 1st, 1837, their subscriptions for the year become due, they are desired to remit the proper amount as soon as possible.

Price of subscription, $5 in advance.

Pambour on locomotives, will be ready for delivery to subscribers and others in a short time.

Orders left at this office will receive prompt attention.

AMERICAN ALMANAC FOR 1837.

We have received this work, and have already found it of much use to us. The amount of valuable statistics, is greatly increased this year, by a very capital collection of information in regard to internal improvements, the best that we have seen in any work.

No Engineer should be without the book, if only for the sake of the professional information, independent of its general value.

Highly as the editor is esteeemed as a practical astronemer, we must confess we had no idea of the amount of his labors until we read over the observations on latitudes in the early part of the work. Modestly as it is set forth, we think that these observations alone entitle him to encouragement in a national point of view.

We fancy that in this, is contained the gem of a greater than the Nautical Almanac.

Extract of a letter from Oswego.

The Oswego and Utica Railroad Company was organized the 10th instant, by the Directors appointing, with a unanimous vote, Christian J. Burkle, President; George H. McWhater, Treasurer, and Joseph E. Bloomfield, Secretary.

Mr. J. D. Allen was confirmed in his appointment as Chief Engineer, and is now pushing on his preliminary surveys, with three corps in the field, and as the weather is now remarkable fine, (truly the Indian summer,) the Company hope to complete their surveys before Christmas. They have nearly run one line from Rome to this place, and so far, there is every reason to expect, that a very direct line can be obtained, from this place to Utica, at no point to exceed 20 feet to the mile, and generally 5 to 15 feet—in fact, a better line for a Railroad cannot be obtained in any part of the United States, owing to the formation of the ground on this summit level.

Fair of American Institute.

The exhibitions of the American Institute furnish a yearly test of the advance of American industry, as pleasing to the visitor as to the contributor.

During the past exhibition, we spent much time in examining the various articles, and in conversation with many of the exhibitors, among whom we found some of the most ingenious and celebrated mechanics of this or of any country, some of them having procured in Europe a reputation as distinguished as that earned in their native land.

Indeed, we never can witness a display of this kind, without feeling our natural pride strongly excited—we find the national products of our favored country inferior to none, our mineral riches greater, our agricultural results at least equal to those of the old world.

But when we regard the *mind* employed, the ingenuity displayed, particularly in the construction of the more intricate branches of manufactory machinery, we then indeed feel that we are a favored people.

The last, being the Ninth Annual Fair of the American Institute, has exceeded in variety every other exhibition of this Society.

The Fair continued open for nine days, during the whole of which, the spacious grounds of Niblo's Garden were crowded by thousands of visitors, who expressed unanimously their satisfaction.

The display of machinery was most extensive, and arrangements being made by means of a suitable steam engine, the whole apparatus was set in motion. A walk between and around these automatic wonders, gave us constant occupation in preserving our integrity, a step to one side and we should have been transformed into a shoe last by Mr. Blanchard, a turn the other way, and Mr. Cornell would have converted us into staves, without benefit of clergy.

The address delivered before the members and others, by the Hon. Caleb Cushing, was a production of singular merit, the audience one of the largest ever assembied on a similar occasion.

We are indebted to the Journal of the American Institute for the list of Premiums awarded by the Managers of the Fair. We shall insert our own remarks, and afterwards give a description, with cuts, of several of the most important machines.

WOOLLEN GOODS.

The exhibition in this line was highly gratifying. We cannot conceive why prejudices against American broad cloths should exist in the minds of any who have seen these specimens. For our own part, we should feel proud to wear such in preference to any other—indeed it is more than suspected that our fashionables often purchase splendid English cloths *made in this country*, for high prices.

The flannels, both plain and colored, were much admired, and by the ladies and other good judges, pronounced to be of superior quality.

The blankets, absolutely brought on a drowsy fit, so comfortable, so luxurious did they seem.

Northampton Manufacturing Company, Northampton, Mass., for the best specimen of broadcloths, manufactured from American wool, Bond, Whitwell & Co., agents, 64 Pine-street. *Gold Medal.*

Beecher Manufacturing Company, Waterbury, Conn., for the second best specimen of broadcloths, Steele, Wolcott & Co., agents, 62 Pine-street. *Silver Medal.*

Dudley Woollen Manufacturing Company, Dudley, Mass., for extensive specimens and variety of colored cloths and cassimeres, of daily manufacture, Wales & Plimpton, agents, 40 Pine-street. *Silver Medal.*

Middlesex Manufacturing Company, Lowell, Mass., for a fine specimen of colored broadcloths, and plain and fancy cassimeres, Steele, Wolcott & Co., agents, 62 Pine-street. *Silver Medal.*

Middlesex Manufacturing Company, Lowell, Mass., for a fine specimen of goats' hair cloth, sample of 500 pieces, Steele, Wolcott & Co., agents, 62 Pine-street. *Silver Medal.*

Ballard Vale Company, (John Marland, agent,) for the best specimen of white flannels, Tucker, Dorr & Co., agents, 33 Pine-street. *Silver Medal.*

Buffalo Woollen Manufacturing Company, Buffalo, N. Y., for a superior specimen of blankets, S. Grosvenor & Co., agents, corner of William and Pine streets. *Silver Medal.*

Salisbury Manufacturing Company, for very fine specimens of various colors plain and printed flannels, Burns, Hilliburton & Co., agents, 24 Broad-street. *Silver Medal.*

Wm. De Forest & Co., Naugatuc, Conn., for the best specimen of sattinets, Goodwin, Fisher & Spencer, agents, 46 Exchange Place. *Gold Medal.*

Wolcottville Manufacturing Company, Conn., for an excellent specimen of buckskin and other sattinets, made of Mogadore wool, Wolcott & Goodwin, agents, 29 Pine-street. *Gold Medal.*

WOOL.

The samples of wool were of fine quality, to both of them Medals were awarded.

Charles B. Smith, Torringford, Conn., for the best specimen of wool, sample of 1200 fleeces, Wolcott & Goodwin, agents, 29 Pine-street. *Gold Medal.*

Samuel Lawrence, Boston, Mass., for the second best specimens of wool, sample of a flock, Steele, Wolcott & Co., agents, 62 Pine-street. *Silver Medal.*

SILK AND COTTON GOODS, &C.

How carefully this infant branch of domestic industry has been reared, the articles exhibited during this Fair can testify. No more pleasing sight has been presented to us for a long while. The specimens of Messrs. Du Bouchett & Durant were of great beauty.—

The article of *silk worm gut* prepared by the latter, though known to the disciples of Old Isaac Walton, is a new manufacture in this country.

Mr. Durant exhibited his divers articles neatly disposed, and presenting the various stages of the insect from the egg to the perfect moth, the cases also contained specimens of the gut, of raw and sewing silk of different degrees of fineness. It would be unfair to particularize, as all the articles in this department were deserving of commendation, both in the raw material and the various fabrics.

Charles Du Bouchett, New-Haven, Conn., for the best specimen of sewing silk. *Gold Medal.*

Charles F. Durant, Jersey City, N. Jersey, for the first silk worm gut known to the Institute as having been manufactured in the United States. *Gold Medal.*

Charles F. Durant, Jersey City, N. Jersey, for the best specimen of cocoons, and a fine specimen of sewing and raw silk. *Silver Medal.*

Peninah Mabbett, Saratoga County, N. Y., for the second best specimen of cocoons. *Diploma.*

Livingston, Livingston, N. Y., for a fine specimen of reeled silk (second crop). *Diploma.*

Valentine Silk Company, Providence, R. Island, for a fine specimen of silk and cotton goods, silk handkerchiefs, &c., Charles Dyer, agent. *Silver Medal.*

Northampton Silk Company, Northampton, Mass., for a superior specimen of reeled and raw silk, Charles St. John, agent, 118 Broadway. *Silver Medal.*

Mrs. Samuel Church, Bethlehem, Conn., for a fine specimen of reeled silk, S. P. Church, agent, 129 Water-street. *Silver Medal.*

Nantucket Silk Company, for fine specimens of silk and cotton cloth. *Diploma.*

Poughkeepsie Silk Manufacturing Company, B. Arnold, agent, for a beautiful specimen of silk vesting, silk for printing, and silk stock frames. *Silver Medal.*

Brown, Brothers & Co., agents, 63 Pine-street, for the second best specimen of silk and cotton goods. *Diploma.*

Doctor James Manerry, North Carolina, for a fine specimen of raw silk, Brown, Brothers & Co., agents, 63 Pine-street. *Diploma.*

Eliza Evans, Waterford, N. Y., for fine specimens of sewing twist, reeled and raw silk, and cocoons. *Diploma.*

Mrs. Seth Wakeman, Salisbury, Conn., for a fine specimen of cocoons. *Diploma.*

John W. Chambers, N. Y., for fine specimens of cocoons, raised at the Repository of the American Institute. *Diploma.*

John A. May, 554 Broadway, for the best specimen of silk umbrellas. *Silver Medal.*

American Print Works, Fall River, Mass., for the best specimen of chintz prints, Goodwin, Fisher & Spencer, agents, 46 Exchange Place. *Diploma.*

Rahway Print Works, Rahway, N. Jersey, for the second best specimen of chintz prints, B. F. Lee & Co., agents, 54 William-street. *Diploma.*

Benjamin Marshall, New-York Mills, Oneida county, for the best specimen of ginghams and satin jeans, Marshall, Carvil & Taylor, agents, 26 Pine-street. *Silver Medal.*

Louisdale Manufacturing Company, R Island, for a fine specimen of America nankeen, N. Lord & Co., agents, 39 Broad street. *Silver Medal.*

A specimen of American or Forsyth Nankeen, formed from the nankeen colored variety of cotton, no dye being used, and the color being original in the article, washing can have no effect. This is a comparatively new article of domestic produce.

Silas Shepard & Son, Taunton, Mass., for a superior specimen of Canton flannel, Holbrook, Nelson & Co., agents, 53 Pine-street. *Silver Medal.*

A fine sample of a popular and useful fabric.

HARDWARE AND CUTLERY.

The appearance of the hardware was fine, in the opinion of the judges, the good qualities were more than skin deep. The first five articles on the list obtained Silver Medals, each excelling in its kind. The articles presented by R. Hoe & Co., presented the greatest variety, the reputation of the firm has been established for a long time.

D. Simmons, Cohoes, N. York, for the best specimen of axes, hammers, and hatchets, Pierson & Co., agents, corner of Front and Broad streets. *Silver Medal.*

Pierce & Wood, Middleborough, Mass., for the best specimen of shovels, Gay & Galloway, agents, corner of Old Slip and Water-streets. *Silver Medal.*

R. Hoe & Co., 29 and 31 Gold-street, for the greatest variety of fine specimens of saws, trowels, cutting knives, cotton gin, and veneering saws. *Silver Medal.*

Thomas W. J. Groves, Southington, Conn., for a fine specimen of hand and back saws. *Silver Medal.*

Blake Brothers, New-Haven, Conn., for a superior mortice lock and latches, Parker, Wilson & Co., agents, 8 Platt-street. *Silver Medal.*

Poughkeepsie Screw Company, Poughkeepsie, N. Y., for the best specimen of wood screws, made by improved machinery, Witherell, Ames & Co., agents, 2 Liberty-street. *Gold Medal.*

The best of all the improved screws of improved times. We have in our possession specimens of the article in every stage, and have compared them with others. They are far superior in strength and neatness of finish—qualities that are wanting in screws prepared by other modes.

The machine is the invention of one of our best mechanics, and does credit to him.

Solomon Andrews, M. D., Perth Amboy, New-Jersey, and 175 Broadway, for a superior combination bank lock. A Silver Medal having been awarded at two former Fairs. *Diploma.*

Holmes & Co., Utica, N. Y., for a superior bank lock. *Diploma.*

Thomas R. Hicks, Wallingford, Conn., for a bell hanger and cutting plyers. *Diploma.*

Harvey & Knight, Poughkeepsie, N. Y., for a fine specimen of flange railroad spikes, Boorman & Johnson, agents, 119 Greenwich-street. *Silver Medal.*

In the mass of articles, some of smaller size were overlooked by us, and this was among the number. We should have taken great pleasure in examining a specimen found worthy of the silver medal.

Israel Coe, Wolcottville, Conn., for a fine specimen of rolled copper and brass, and brass battery kettles. *Gold Medal.*

The specimens of rolled brass and copper were beautiful, while the texture of the article appeared to be of great uniformity; the judges, it appears, were as well pleased; they gave them the gold medal.

Rochus Heinisch, Newark, New-Jersey, for the greatest variety of superior cutlery, John Andrews, agent, 147 Fulton-street. *Gold Medal.*

The samples of American cutlery were beautifully finished; they are said also, to be as useful articles as most that we procure from abroad. To the Bowie knives the term *useful* should not be employed, unless bears and other such *varmint* are to be their victims. They certainly make a handsome article.

W. Wild, 162 Division street, for a superior specimen of penknives. *Silver Medal.*

The specimen of penknives by Mr. Wild, are entirely of his own manufacture, from the handle to the blade, and from close inspection we can answer for the superiority of both.

Eagle Factory, 87 Attorney-street, for a fine specimen of anvils, a superior article. *Silver Medal.*

John Smith, 217 Water-street, for an elegant specimen of jappanning. *Diploma.*

Pettibone & Long, 4 Liberty-street, for a fine specimen of scythes, (Harris, manufacturer.) *Diploma.*

Pettibone & Long, 4 Liberty-street, for a handsome specimen of hoes. *Diploma.*

James Bogert, 472 Pearl-street, for a mill saw sett. *Diploma.*

M. Merriman, Jr., New-Haven, Conn., for a window spring and sash fastener, Atwater & Pomeroy, agents, 115 Maiden-Lane.

Andrew Drysdale, Jr., corner of Liberty and Washington-streets, for a superior specimen of horse shoes on hoofs. *Silver Medal.*

There was a neatness in the arrangement of these articles that gave satisfaction, independent of that derived from the superior utility of the shoe itself. Neatly placed upon prepared hoofs they gave a clear insight into their modus operandi.

James Drysdale, 8 Fifth-street, for a good specimen of horse shoes. *Diploma.*

Julius Davis, 92 Chatham-street, for joiners' plains of superior workmanship. *Diploma.*

T. I. Newland, Utica, N. Y., for one brass teakettle. *Diploma.*

New-England Glass Company, Peter

Morton, agent, for a superior specimen of glass knobs. *Silver Medal.*

We were struck by the variety of ingenious patterns displayed in this article. The Medallion Knob is to us a new article, and in its different forms, cannot fail to become popular, or what is still better, fashionable.

BUGGY RAILINGS, COACH SPRINGS, &C.

In these articles we are again reminded of the perfection of modern mechanics. Strength and symetry of form are combined, and we now can have a carriage of proper strength, without the former awkwardness of size and weight.

Joseph W. Lees, Newark, New-Jersey, for the best specimen of coach springs. *Silver Medal.*

Lewis Alling, Newark, New-Jersey, for the 2d best specimen of coach springs. *Diploma.*

James N. Joralemon, Newark, New-Jersey, for the best specimen of elliptic springs, coach steps and railroad springs. *Gold Medal.*

George Dunn, Newark, N. J., for the best specimen of buggy railings, and dash frames of excellent mechanism and workmanship. *Silver Medal.* And $30 deposited with the Institute for the successful competitor.

Wm. H. Sanders, Hastings, N. Y., for a good specimen of coach axles. *Diploma.*

GRATES, KITCHEN RANGES, STOVES, &C.

Ward, Goadby & Co., 137 Grand-street, for the best specimen of German silver, reflecting grates, (Doct. William Anderson's patent.) *Silver Medal.*

A beautiful contrivance for reflecting the heat into the room, executed in a beautiful metal. This grate appears to be getting into favor, many of our new houses are being fitted up with them.

Edward Smylie, 73 Henry-street, for the 2d best specimen of grates. *Silver Medal.*

S. Pierce, for the best kitchen range, Lockwood & Andrews, manufacturers, 364 Broadway. *Gold Medal.*

"The proof of the pudding is the eating." This adage was verified by the proprietor, who kept his range in constant operation and puddings and pies, as well as more subsubstantial fare, were turned out in great abundance.

This is certainly the best arranged cooking apparatus that we have seen; those who use it, speak well of it.

James Atwater, New-Haven, Conn., for the best specimen of stoves, Atwater and Pomeroy, agents, 115 Maiden-Lane. *Silver Medal.*

These stoves, likewise, kept in operation, were among the most beautiful in appearance, and possessing several capital qualities, obtained the silver medal.

Smith & Sherman, 207 Water street, for the 2d best specimen of stoves, (Olmstead's patent.) *Silver Medal.*

We consider that Prof. Olmstead has become a public benefactor in giving to the community this form of stove. When men of science turn their attention to such matters, we may confidentially expect some happy result.

We think the principal of this stove is the best for inhabited apartments, of any that we have ever seen; we have made trial of the article ourselves and speak from experience. The perfect management of the heat is a great feature in the stove, the circulation of the warm air, is another.

This, too, is the only stove fit for sleeping apartments, if we must have fire to sleep by.

For a detailed account of the principle of operation of the stove, as well as drawings, &c. We refer to the recent No. of the Railroad Journal, containing Prof. Olmstead's article on the subject.

Jordan L. Mott, 233 Water-street, for an excellent specimen of coal cooking stoves. *Diploma.*

Wm. Morrison, 54 Bowery, for a fine specimen of coal cooking stoves. *Diploma.*

M. N. Stanley & Co., 244 Water-street, for a fine specimen of rotary coal cooking stoves. *Diploma.*

J. S. Gold, 84 Nassau-street, for a fine specimen of Franklin office stoves and union oven. *Diploma.*

George J. Lorton, 200 Canal-street, (apprentice,) for a hall stove of good workmanship. *Diploma.*

HOLLOW WARE AND CASTINGS.

Bartlett Bent, Jersey city, New-Jersey, for the best specimen of hollow ware. *Silver Medal.*

Wm. Cumberland, 421 Munroe-street, for the best specimen of enamelled hollow ware. *Diploma.*

We are not aware that the manufacture of enamelled hollow ware is carried on elsewhere in this country.

The art is a curious one known but to few—though its applications are numerous and useful.

Richards & Damorel, 143 Perry-street, for a cast iron sash and frame. *Diploma.*

SILVER PLATED WARE AND JEWELRY.

The plate and Jewelry furnished a tempting display.

The Silver ware of Messrs. Gardner & Marquand was the most brilliant collection in the room, their beautiful finish and rich desingn giving pleasure to all the ladies, the best judges of such matters.

The watch dials of Mr. Mullen were highly pleasing evidences of the perfection to which this gentleman has carried his art.

Baldwin Gardner, 39 Nassau-street, for the best specimen of silver work, a pair of superb pitchers. *Gold Medal.*

Marquand & Co., 181 Broadway, for the 2d best specimen of siver work, elegant pitchers, vase tea set, cake baskets, spoons and forks. *Silver Medal.*

G. M. Usher, 60 Reade-street, for the best specimen of jewelry. *Silver Medal.*

William J. Mullen, 175 Broadway, for the best specimen of gold and silver watch dials. *Gold Medal.*

Henry Withers, 157 Broadway, for a most beautiful specimen of gold and silver pencil cases. *Silver Medal.*

PRINTING MATERIALS, BOOKS AND STATIONERY.

Next to the pleasure of reading a well written work, is that of sliding the eye over a clean and handsome page.

In blank books the same pleasure exists in writing on the right sort of paper, nicely bound, with good pens filled with rich ink.

All these and "more too" were furnished under this head.

The specimens of wooden type were well made.

The ink we had no chance to try, but presume that as Mr. Davids obtained a silver medal, his "fluid" was not found wanting in any of the important requisites of good ink.

Now that blue ink has become fashionable every wash, dye, decoction or stain that has the proper color is used for ink, neither penetrating the paper nor turning black, both of which are among the prominent properties of the real stuff. Mr. D. is, we believe, the real simon pure in this matter.

David Felt & Co., 245 Pearl-street, for the best specimen of blank books. *Silver Medal.*

Joseph Hegeman, cor. Wall and William-streets, for the 2d best specimen of blank books. *Diploma.*

Thaddeus Davids, 222 William-street, for the best specimens of sealing-wax, wafers, black and red ink, and writing fluid. *Silver Medal.*

Griffin, Willcox & Co., 114 and 116 Nassau-street, for a fine specimen of writing fluid. *Diploma.*

D. Wells & Co., 61 John-street, for fine specimens of wood type. *Silver Medal.*

Linen & Horn, 80 Vesey-street, for a superior specimen of book binding, (Sunday Morning News,) *Silver Medal.*

Samuel Jenks Smith, cor. Beckman and Nassau-streets, for well executed newspaper printing, (Sunday Morning News.) *Silver Medal.*

Conner & Cooke, cor. Ann nnd Nassau-streets, for handsome specimens of bookbinding, from Turner's bindery. *Diploma.*

George Bruce & Co., 13 Chambers-street, for a book of specimens of type, ornaments, borders, &c. *Diploma.*

William Blanc, cor. Duane and Rose-streets, for fine specimens of colored and marble paper. *Diploma.*

James Maxwell, 259 Bowery, for the eagle printing press. *Diploma.*

J. Lemuel Kengslep, 212 Greenwich-street, for the Jefferson printing press.—*Diploma.*

CARPETING AND OIL CLOTHS.

Thompsonville Carpet Manufacturing Co., for the best specimen of carpeting and hearth rugs, Thompson & Co., agents, 13 Spruce-street. *Gold Medal.*

D. Powers & Co., Lansingburg, N. York, for the best specimen of floor oil cloths,

Albro Hoyt & Co., agents, 105 Bowery.—*Silver Medal.*

Norwalk Patent Capet Co., Norwalk, Conn., for a fine specimen of felt carpeting, Jessup Swift & Co., agents, 66 Pine-street. *Silver Medal.*

While all the specimens of carpeting and oil cloth were of the first quality—we cannot forbear, giving a more extended notice of the last and least known article *Felt Carpeting.* The stuff itself as the name implies is felt, strongly prepared.—The consequence is that no grain, or thread exists in the carpet, which is nothing but a homogenous mass of fibre twisted and wrought in every direction until its great strength and compactness is attained.

One of the greatest advantages of this carpet appears to us to exist in its power of resisting the entrance of dust and dirt—none of which can penetrate. It must also be much warmer than other carpeting, as it prevents any draught from a leaky floor passing through it.

The colors being printed upon it, can be varied at pleasure, and are as firm and lasting as the felt itself.

The pieces that we have seen have the appearance of Brussels carpet, with a very great superiority over that article—they cost about half as much.

LAMPS.

But few specimens of lamps were presented—such as were exhibited were of good quality. There is certainly no domestic comfort equal to that of a good astral lamp, and like certain other domestic blessings, when bad there is no greater curse. Mr. Wignell's lamps are as unlike bad wives as possible.

The specimen of coach lamps attracted great attention. They were finished in the most costly manner, appearing rather to belong to parlor, than stable appointments.

Samuel Wignell, 245 Grand-street, for the best specimen of astral and mantel lamps. *Silver Medal.*

J. L. Gourlay, Newark, New-Jersey, for a most beautiful specimen of coach lamps. *Silver Medal.*

Alonzo Platt, Middletown, Conn., for a union lamp. *Silver Medal.*

SADDLERY, MILITARY EQUIPMENTS AND TRUNKS.

The remark in regard to coach lamps will apply to the articles in this department.

The plated harness was really elegant, it does seem to us that no further progress can be made in this line, without putting upon horses what might better be expended upon human beings.

H. Carter, Newark, New-Jersey, for the best specimen of saddles. *Silver Medal.*

Darcy & Gray, Newark, New-Jersey, for the best specimen of harness and trunks. *Silver Medal.*

Alfred Edwards, Newark, New-Jersey, for the best specimen of forged hames, and a good specimen of saddlery plated ware. *Silver Medal.*

Jude & Ennis, Newark, New-Jersey, for the best specimen of plated saddlery ware. *Silver Medal.*

Isaac Fryer, 275 Pearl-street, for the best specimen of bridle bitts, stirrups, &c.—*Diploma.*

F. W. Widman, Philadelphia, for a most beautiful specimen of swords. *Silver Medal.*

GUNS AND PISTOLS.

Wm. J. Lane, (Tutenburg Manufacturer,) for the best specimen of double barrelled guns. *Diploma.*

John W. Cochrane, New-York, for a specimen of many chambered and non recoiling Rifles. *Gold Medal.*

There could have been but little discussion among the judges as to the award of the Gold Medal to Mr. Cochrane.

The history and details of Mr. C.'s invention have been generally published throughout the Union.

His flattering reception by the different European powers is well known, but no idea of the greatness of his invention can be formed, equal to that derived from his own explanations of his own piece, concluded by a trial with his own hands. Gentlemen of great experience in such matters have assured us that Mr. Cochrane's marksmanship is unequalled—of that we were most firmly convinced, when we saw him drive 9 bullets into the same aperture, in rather less than a minute.

By means of a revolving series of Chambers, with a separate touch hole to each, 9 or 11, or any number of charges that can be placed in the revolving chambers, can be fired in immediate succession.

The impossibility of fire communicating to the other charges was proved by Mr. C., who placed a quantity of loose powder about one percussion cap while he fired off the next. The powder remained unburnt.—The circumstance of the absence of recoil, was satisfactorily accounted for by Mr. Cochrane—indeed his notions on this subject are peculiar, and we shall take a more fitting opportunity to detail them, especially in regard to the economy of powder in his gun.

Gibbs, Tiffany & Co., Southbridge, Mass., for a fine specimen of pistols. *Diploma.*

Col. North, Middletown, Conn., for carabine. *Diploma.*

ENGRAVING AND DYE SINKING.

John Allinson, 20 Mercer-street, for the best specimen of wood engraving. *Diploma.*

W. W. Hooper, 114 Nassau-street, for the 2d best specimen of wood engraving.—*Diploma.*

J. P. Henrich, 5 Tryon Row, for a specimen of bookbinders' stamps. *Diploma.*

S. Stiles & Co., 4 Spruce-street, for a beautiful map of the city of New-York.—*Gold Medal.*

Stephen H. Gimber, 46 Hudson-street, for the best specimen of mezzotinto engraving. *Diploma.*

Frederick Woodcock, Brooklyn, for an excellent specimen of engraving, (blocks for calico prints.) *Diploma.*

George Endicott, 359 Broadway, for the best specimen of lithographic engraving.—*Diploma.*

A. Hanford, 6 Little Green-street, for a specimen of xylographic engraving. *Diploma.*

W. D. Redfield, 123 Mott-street, for a fine specimen of engraving. *Diploma.*

PIANO FORTES AND MUSICAL INSTRUMENTS.

There is no branch of the fine arts more worthy of cultivation with us, than music.—It will soften our asperities of character, and render us more and more attached to social intercourse and enjoyment. In our opinion, this among all classes, is the strongest temperance measure that can be "got up."

Now good music can only be cultivated where good instruments can be procured at moderate prices.

In this view of the case, Messrs. Torp & Love doubly deserved their Gold Medal.—The tone of the various pianos was pleasing. While on this subject we have a suggestion to make to all of our manufacturers of musical instruments. Let them expend in addition one half as much on the interior—upon that part which gives the character as an instrument—as they *throw away* upon unnecessary ornament on the exterior—ornament causing positive injury to tone and durability.

The best pianos, that we have ever seen, though made of the finest wood, finished in the most beautiful manner, were rigidly plain in every other respect.

A much better piano could be made for $250 than many that sell for $500, as handsome pieces of furniture.

This is a matter to be looked to by all purchasers, and we advise those who desire to patronize American industry in this branch of manufacture, to procure such instruments only as are specimens of excellence in the musical department, leaving rich and highly ornamented cabinet ware, if they must have it, to shine out in some other and more suitable shape.

The Flute seemed the admiration of all lovers of this popular instrument, the tone for excelling ordinary instruments—it very deservedly obtained the Gold Medal.

Torp & Love, 465 Broadway, for the best specimen of horizontal grand action piano fortes. *Gold Medal.*

John Abbott & Co., Bowery, for the 2d best specimen of horizontal grand action piano fortes. *Silver Medal.*

T. Kearsing & Son, 259 Broadway, for the 3d best specimen of horizon[illegible] piano fortes. *Diploma.*

Stoddart, Davies & Brothers, Broadway, for a piano forte of fine tone and good action. *Diploma.*

G. & H. Barmore, 120 Barrow-street, for a piano forte of a very fine touch. *Diploma.*

C. H. Eisenbrant, Baltimore, Maryland, for an elegant specimen of clarionets, and a superb brilliant toned flute. *Gold Medal.*

William Mitchell, (apprentice,) 72 Eldridge-street, for a neatly constructed octave flute. *Silver Medal.*

John Rosenbeck, Utica, New-York, for a trombone. *Diploma.*

Barnard & Prior, Sauquoit, New-York, for one harmonist. *Diploma.*

INDIA RUBBER GOODS.

Eagle India Rubber Company, Boston, for the best specimen of india rubber drillings and aprons. *Silver Medal.*

Roxbury India Rubber Company, for an India Rubber camblet cloak, and 2d best specimens of drillings. *Silver Medal.*

New-York India Rubber Company, for the best specimen of India Rubber shoes and 2d best aprons. J. L. Warner, agent, 41 John-street. *Silver Medal.*

Charles Goodyear, New-York, for a fine specimen of India Rubber cloth, not liable to decomposition from exposure to the sun, also maps. *Silver Medal.*

India Rubber has been applied to so many articles of domestic economy, that it is difficult to keep pace with the inventions or rather patents relative to this substance.

The preparation of Mr. Goodyear is novel, and founded upon principles totally different from those practised upon, in other applications of gum elastic.

It resists many of the agents, having an injurious effect upon crude caoutchouc.—Maps and various specimens of printing and engraving upon this substance were exhibited, giving promise of great durability.

From this article and others exhibited at the Fair, we are confident, that articles of dress can be made, combining the many advantages without any of the disagreeable effects of India Rubber. Its great lightness, will soon cause it to find a place in the wardrobe of our fashionables, who would as soon perish as wear any thing looking like comfortable clothing.

S. C. Smith, 66 Chatham-street, for a fine specimen of India Rubber bootees. *Diploma.*

H. Percivell & Co., Belleville, N. Jersey for a fine specimen of India Rubber balls and rings. *Diploma.*

GENTLEMEN'S BOOTS AND SHOES.

The articles in the Boot and Shoe line were extremely well made, but we must confess, that from them we obtained a very different notion of the shape, structure, and use of the human understanding, than we did from the study of anatomy. This, however, is the fault of the wearer, not of the maker, who has done every thing in his power, to render this modern instrument of torture, tolerable.

Lorin Brooks, 24 John-street, for the best specimen of cork sole boots, and single sole boots. *Silver Medal.*

Uriah Ryder, 5 Beekman-street, for the best specimen of pumps, and 2d best specimens of single sole and cork sole boots.—*Silver Medal.*

Wilson & Oviatt, Utica, Oneida county, for the best specimen of boot trees and lasts. *Diploma.*

P. G. Nagle, Newark, New-Jersey, for a fine specimen of water-proof boot legs. *Diploma.*

Edward Townley, 148 Canal-street, for a fine specimen of boots and shoes. *Diploma.*

LADIES' BOOTS AND SHOES.

Benjamin Shaw, 71 Canal-street, for the best specimen of ladies' boots. *Silver Medal.*

Wm. J. Watson, 67 Fulton-street, Brooklyn, for the 2d best specimen of ladies' boots. *Diploma.*

Wm. J. Watson, 67 Fulton-street, Brooklyn, for the best specimen of ladies' satin slippers. *Silver Medal.*

Benjamin Shaw, 71 Canal-street, for the 2d best specimen of ladies' satin slippers, and children's shoes. *Diploma.*

MANUFACMURED FURS.

The specimens of skins and caps were very creditable, combining the comfortable with the elegant.

Shepherd Brown, 421 Grand-street, for the best specimen of otter skins, and superior finished hair seal skins and caps. *Silver Medal.*

F. K. Boughton, 168 Water-street, for the best specimen of otter caps. *Silver Medal.*

F. K. Boughton, 168 Water-street, for the 2d best specimen of otter skins. *Diploma.*

Charles C. Plaisted, Brooklyn, N. York, for a fine specimen of otter caps. *Diploma.*

BEAVER AND SATIN HATS.

We plead ignorance in regard to satins, satin beavers, chip, straw, &c. Those who understand them, admired the display.

Isaac M. Henderson, 251 Division-street, for the best specimen of satin beaver hats. *Silver Medal.*

D. W. Clark McClosky, apprentice, 404 Broadway, for the second best specimen of satin beaver hats. *Diploma.*

Willington & Tombs, 329 Broadway, for the best specimen of ladies' and misses' satin and beaver hats. *Diploma.*

S. Tuttle, 208 Chatham-street, for the 2d best specimen of ladies' and misses' satin and beaver hats. *Diploma.*

Edward Mullen, 98 Bowery, for a fine specimen of military hats. *Diploma.*

William H. Wright, cor. West and Spring streets, for a fine specimen of satin hats.—*Diploma.*

LADIES' HATS.

Mrs. Harrison, 43½ Division-street, for the best specimen of split straw bonnets.—*Diploma.*

Mrs. Harrison, 43½ Division-street, for the 2d best specimen of Florence braid hats. *Diploma.*

George Dryden, 63 Canal-street, for the best specimen of Florence Tuscan bonnets and Dunstable hats. *Diploma.*

Mrs. M. D. Hodge, 353½ Grand-street, for a fine specimen of Florence braid hats. *Diploma.*

FINE ARTS.

Bass Otis, Philadelphia, for full length painitings of Gen. Wm. Henry Harrison, and mechanic and work shop. *Silver Medal.*

John Baker, 350 Houston-street, for a model in clay, (Death of Bushfield.) *Silver Medal.*

A very fair piece of modeling, this and other exhibitions of the same artist show a strong constructive talent, of the results of which we hope to see more.

Frederick Bashard, 219 Cherry-street, for a model of the origin of Corinthian capital. *Diploma.*

Wm. H. Miller, 16 Rivington-street, for specimens of miniature painting. *Diploma.*

Thomas Thomas, 136 Spring-street, for a most beautiful specimen of stained glass. *Gold Medal.*

We have heard much said of the loss of the ancient art of staining glass, we do not much regret it, for the modern art is certainly its rival. The windows and other pieces exhibited were most brilliantly colored, one pane we considered a perfect gem. Nothing can be more appropriate for hall and sky lights, than such glass—the art deserves encouragement, and we have those, able to give this stimulus.

Thomas W. Hope, 6th Avenue, for a painting in oil, (a moonlight scence.) *Diploma.*

F. J. Swinton, (aged 17 years,) Quarantine, Statin Island, for a specimen of painting in water color and ink drawing. *Diploma.*

George Heisher, 33 Grand-street, (self taught) for a beautiful oil painting. *Silver Medal.*

William Warren, 35 Warren-street, (17 years of age,) for a fine specimen of miniature painting. *Silver Medal.*

J. Bennett, 205 Broadway, for a view of the city of New-York. *Diploma.*

John F. Holgate, 10 Barclay-street, for a fine specimen of pencil drawings. *Silver Medal.*

W. & J. Gibson, Bowery, for a landscape painting in oil. *Diploma.*

Richard Sealy, 3 Sheriff-street, for a fine specimen of window curtains. *Diploma.*

John Hulme, Newark, New-Jersey, for a fine specimen of painting, (an engine back.) *Diploma.*

James H. Farrand, 219 Hudson-street for a beautiful specimen of transparent window blinds. *Diploma.*

J. Johnson, 149 Spring-street, for a drawing of Hotel, St. Josephs, Florida. *Diploma.*

William Clover, 294 Broadway, for a miniature painting. *Diploma.*

Lewis P. Clover, 294 Broadway, for views of the great fire. *Diploma.*

Francis Carter, 176 Fourth-street, for a fine imitation of Chinese drawing. *Diploma.*

John Whitehead, 15 Chrystie-street, (self taught,) for one portrait. *Diploma.*

FANCY ARTICLES.

Under this head there were many articles entirely out of our sphere. The quilts certainly made a very fine show and so did the embroidery, but—perhaps it is because from sad experience, we have an unusual dread of unnecessary exercise of those delicate organs—the eyes of those performing such feats of needle work, have called largely upon our sympathies. We notice, indeed, that one was executed by a blind person, whether this misfortune was prior to, or consequent upon, the practice of the art, we are not informed. In the former case, great advantage might be obtained from employing the blind in the exercise of this *beautiful* art, instead of increasing their number by improperly exercising the vision of others.

Nothing could delight us more than a diminution in the specimens of this branch of industry, and a diversion of skill to some, less hazardous employment.

Mrs. George Roberts, Brooklyn, N. York, for a handsome quilt and aprons. *Diploma.*

Madame B. Cohn, 231 Grand-street, for the best specimen of worsted embroidery on cloth, (a piano cover.) *Silver Medal.*

Miss A. L. Cohn, 231 Grand-street, for a fine specimen of worsted work. *Diploma.*

Miss Caroline Barnes, Baltimore, Maryland, for a quilt containing 27,314 pieces. *Diploma.*

Miss R. A. Hunt, 123 Chatham-street, for a fine specimen of worsted work. *Diploma.*

Orphan Asylum, New-York, for fine specimens of needle work, ottomans and embroidery. *Diploma.*

Miss L. D. Eisenbrant, Baltimore, Maryland, for a beautiful flower basket. *Diploma.*

Mrs. G. Vultee, 114 Chatham-street, for the 2d best specimen of plain needle work, (shirts, bosoms, and collars.) *Diploma.*

Mrs. J. C. Smith, 44 Lumber-street, for beautiful imitations of flowers in wax, superior to any ever before exhibited. *Silver Medal.*

When we first saw these flowers, we supposed them to be real dahlias, so perfect was the imitation. We understand the group represented the prize flowers of the exhibition of dahlias, they certainly could not have fallen into better hands, their beautiful colors and delicate shades being accurately represented.

The following article was also very prettily executed.

Miss Dunlap, 44 Lumber-street, (a pupil to Mrs. J. C. Smith,) for the 2d best specimen of wax flowers. *Diplma.*

S. Butterfield, Oneida county, New-York for a splendid woven counterpane. *Silver Medal.*

James Graham, Oneida county, for one cotton counterpane, woven by a person 78 years of age. *Diploma.*

Miss M. Hawkes, 140 Mott-street, for an imitation rose bush. *Diploma.*

Mrs. L. Gerring, 185 Fourth-street, for specimens of iron and lamp mats. *Diploma.*

Miss Blandina Smith, (Mechanics' school,) for a beautiful worsted landscape. *Diploma.*

James Mahoney, 451 Broadway, for the 2d best specimen of shirts and bosoms. *Diploma.*

Miss Julia Jacobs, 457 Broadway, for a beautiful specimen of children's embroidered dresses. *Silver Medal.*

Miss K. Minns, New-Jersey, for a fine specimen of wax fruit. *Diploma.*

J. B. Thompson, 170 Broadway, for the best specimen of ready made linen. *Silver Medal.*

Louisa Agers, (blind) 68 Grand-street, for a curious quilted bed spread. *Diploma.*

Miss Inglis, for the best specimen of worked rugs. *Diploma*

Miss Gedney, 51 Sixth Avenue, for the 2d best specimen of ladies' embroidered dresses. *Silver Medal.*

Charles Eyre, 603 Broadway, for a specimen of leather gloves cleaned. *Diploma.*

Mrs. Petit, Scipio, Cayuga county, for a beautiful pair of knit wollen stockings.—*Diploma.*

Mrs. Bishop, 154 Cherry-street, for the best specimen of worsted work, (a basket.) *Diploma.*

Miss Thompson 14 Watts-street, for a handsome specimen of white flowers. *Diploma.*

Carl King, 265½ Broadway and 17 Division-street, for a fine specimen of millenery. *Diploma.*

Miss S. Phelps, New-York, for the best specimen of embroidery, (an infant's dress.) *Silver Medal.*

Mrs. M. E. Dyer, Providence, Rhode Island, for an elegant embroidered merino table cover. *Diploma.*

Mrs. Ross, 14 Thompson-street, for a superior specimen of bread and cakes. *Diploma.*

Mrs. Cooke, New-York, for the best specimen of silk embroidery. *Silver Medal.*

Miss Catharine Coles, (Mechanics' school) for a beautiful specimen of worsted embroidery. *Diploma.*

Mrs. Rridgeway, Brooklyn, New-York, for a handsome thread and bead bag. *Diploma.*

Mrs. Charles Dyer, jun., Providence, R. Island, for a gossimer cape, woven by the silk worm, a great curiosity presented to the American Institute.

Miss Julia Fitz, 26 Rivington-street, for beautiful worsted mat and flowers. *Diploma.*

H. Blanc, 574 Pear-street, for a fine specimen of inlaid straw work. *Diploma.*

Edward Norris, 11 Pearl-street, for a beautiful shell miniature church. *Diploma.*

Mrs. Shults, Lispenard-street, for a fine specimen of animal work. *Diploma.*

Miss M. B. Van Tuyl, New-York, for beautiful colored atlasses. *Diploma.*

Thomas J. Crowen, 567 Broadway, for one case of fancy articles. *Diploma.*

Mrs. C. Nichols, 17½ Division-street, for a beautiful specimen of millenery. *Diploma.*

Mrs. C. Nichols, 17½ Division-street, for a superior silk hat. *Diploma.*

Martha Ann Woodward, 206 Church-street, for a fine specimen of embroidery.—*Diploma.*

Mrs. Mary A. Boughton, Brooklyn, N. York, for a beautiful feather cape made from the feathers of an owl. *Diploma.*

George Peuscher, 121 Fulton-street, for a beautiful specimen of fancy boxes. *Diploma.*

READY MADE CLOTHING.

Mrs. M. Boniface, corner Broadway and Lispenard-street, for the best specimen of boy's clothing. *Diploma.*

Paul M. P. Durando, 60 Chatham-street, for the 2d best specimen of boy's clothing. *Diploma.*

Gilpin & Ferdon, 200 Chatham-street, for a fine specimen of vests. *Diploma.*

PENMANSHIP.

Charles Edwin Ely, 180 Broadway, for the best specimen of drawn penmanship.—*Diploma.*

Stephen F. Baldwin, (aged 14 years,) 101 Sixth Avenue, for fine specimens of penmanship. *Diploma.*

James F. Crawford, 441 Bowery, for the 2d best specimen of drawn penmanship.—*Hiploma.*

Wm. Jones, 79 Franklin-street, for the best specimen off-hand penmanship. *Diploma.*

John J. Hinchman, 274 Bleecker-street, (aged 15 years,) for specimens of penmanship. *Diploma.*

James W. Davis, 168½ Spring-street, for specimens of penmanship. *Diploma.*

John Cromwell, 114 Wooster-street, for specimens of penmanship. *Diploma.*

LEATHER.

H. Halsey, Windsor, Conn., for the best specimen of seal skins, Brown & Burke, agents, 7 Ferry-street. *Silver Medal.*

A well prepared article.

T. & J. Greene, 3 Jacob-street, for the best specimen of morocco leather. *Diploma.*

Allen Peacock, corner Pearl & Beekman streets, for the best specimen of belt leather. *Diploma.*

TURNING.

John P. Collard, 9 Frankfort-street, for a fine specimen of fancy turning. *Diploma.*

Richard Burnton, 189 Hudson-street, for a fine specimen of fancy turning. *Diploma.*

Aaron E. Cogswell, New-York, for a good specimen of plain turning, (tool handles.) *Diploma.*

STOCKS.

Mrs. P. Van Dyke, for the best specimen of stocks. *Diploma.*

W. H. Rodgers, Boston, Mass., for the 2d best specimen of stocks. *Diploma.*

James Buckridge, 175 Nineteeth-street, for the best specimen of bristle stock frames. *Diploma.*

New-York Stock Frame Manufacturing Company, a large and excellent specimen of stock frames made on Goodell & Harvey's power loom. *Silver Medal.*

A great improvement in manufacturing a useful article. We find the enterprize and ingenuity of these gentlemen, exercised upon many of the most common articles in-

present use, a field of labor inviting many.

MACHINES AND MODELS.

Hiram Phelps, Williston, Vermont, for the best mortising and tenoning machine. *Silver Medal.*

Among the very many mortising and tenoning machines, not before exhibited, the judges gave this the medal. The operation is very beautiful, and in an establishment using steam or water power, we have no doubt that it would prove a useful machine.

John McClintoc, 7½ Bowery, for the 2d best specimen of mortising and tenoning machine. *Diploma.*

Andrew Morse, jun, Boston, Mass., for the model of a ship's capstan. *Diploma.*

H. C. Roberts, Seneca Falls, New-York, for the best churning machine. *Silver Medal.*

J. J. Halsey, New-York, for the 2d best churning machine. *Diploma.*

Samuel S. Allen, for a good specimen of ordinary lever horse power. *Silver Meda.l*

Sewell Gleason, Franklin county, for r revolving plane or horse arch power. *Silver Medal.*

A very good method of applying the weight and strength of a horse, for intermitting labor.

Exchange Engine Co., No. 3, Newark, New-Jersey, for the best fire engine. *Gold Medal.*

These engines were most splendidly finished, we hope for the good people of Newark, as well as of New-York, that they may be more looked at than used—in our own case, we fear, we hope without much prospect of success.

Fire Engine Co. No. 15, New-York, for the 2d best fire engine. *Silver Medal.*

E. S. Scripture, Paris, Oneida county, New-York, for a superior notarial press.—*Gold Medal.*

A press possessing decided advantages for the particular use for which it is intended.

A. B. Smith, 7½ Bowery, for a church steeple clock, a good article. *Silver Medal.*

M. N. Stanley, & Co. 244 Water-street, for an excellent hoisting machine, on a new principle. *Silver Medal.*

J. & C. Bruce, Jersey city, for the best cracker and biscuit machine, a gold medal awarded last fair. *Diploma.*

Thomas Blanchard, New-York, for a self directing turning lathe. *Gold Medal.*

One of the most elegant inventions of modern times. The turning of gunstocks and shoe lasts, was a thing unheard of, and much laughed at when proposed.

We have witnessed the application of the same lathe to the turning of ship blocks—the machine for which purpose, (and also for dead eyes,) we had the pleasure of seeing in operation last spring. The block machine does Mr. B. the greatest credit—more especially as we all have before us, the the apparatus of Brunel at Portsmouth, Eng. which has hitherto been considered the ne-plus ultra of art; but which must now yiell to that of Blanchard.

Benjamin Lapham, Waterford, Saratoga county, for an improved power loom. *Gold Medal.*

We were highly delighted with the operation of this loom. It appears to possess several important advantages over other forms. For a detail of the proposed gain in this machine, we refer to the descriptions following this list.

W. P. Brayton, New-York, for an improved throstle spinner. *Diploma.*

A. M. Wilson, Rhinebeck, New-York, for a mowing machine, or grass and grain cutter. *Gold Medal.*

By this machine much time is gained, and labor saved at a critical season of the year.

See description, written by an agriculturist of some note; a cut is also given of the machine in operation.

Benjamin Brundred, Paterson, New-Jersey, for a blowing machine. *Silver Medal.*

John Peckham, Newport, Rhode Island, for a mortising and tenoning machine.—*Diploma.*

D. K. Minor, New-York, for (Page's) mortising machine. *Diploma.*

This machine is in great request among carpenters, being portable and of simple construction.

A cut and description will be found on another page.

Wandle Mace, 249 Elizabeth-street, for a post mortising and rail sharpening machine, (a model.) *Diploma.*

This machine will be of great service to armers, saving the labor of 8 or 10 men a day. Portable and simple in its construction.

Nathan P. Bean, for a winnowing machine. *Diploma.*

Tucker, Baldwin & Co., Guilford, New-Hampshire, for a shingle and clapboard machine. A. Wakeman, agent, 187 Broadway. *Silver Medal.*

This machine invented by Mr. Gors, of Millford, N. Hampshire, is intended to cut lath, shingles and clap boards, by slightly altering certain adjustment in the same machine. The simplicity is a great recommendation to this saw. It is of great service in sawing up slabs and waste stuff.

John Folsom, Hallowell, Maine, for a rotary brush machine. *Diploma.*

D. L. Sherwood, New-Windsor, New-York, for a patent windlass. *Diploma.*

Alfred Thompson, 58 Orchard-street, for a churn of beautiful workmanship. *Diploma.*

Charles H. Baldwin, 185 Hester-street, for two churns of beautiful workmanship.—*Diploma.*

Samuel S. Allen, for a threshing machine. *Diploma.*

Andrew Luke, Broadway, for a cider mill. *Diploma.*

S. Kibbe, Esperance, Schoharie conuty, New-York, for one cheese press. *Hiploma.*

Bates, Hyde & Co., Bridgewater, Mass. for a hand cotton gin. *Diploma.*

T. & N. Sawyer, 235 Bleecker-street, for an improved copper pump for wells and cisterns. *Silver Medal.*

John Burt, Tall River, Mass., for a patent self adjusting water wheel, manufactured by J. S. Anderson, 163 Chapel-street. *Diploma.*

E. Whitfield, William-street, for a frictionless pump. *Diploma.*

Thomas C. Barton, New-Jersey, for a forcing and suction pump. *Diploma.*

Erastus A. Holton, Westminister, Vermont, for a hoop shaving machine. *Diploma.*

A very useful apparatus for coopers.—With proper attendance it is said that 1000 hoops a day can be turned out.

The machine costs but 12 or 15 dollars, and we should think would save its cost in a short time.

Isaac Wiltberger, 47 Robinson-street, for a machine for corking bottles. *Diploma.*

Charles Parke, 71 Hammersly-street, for a rope serving machine. *Diploma.*

A. B. Smith, 7½ Bowery, for a watch clock. *Diploma.*

Henry Sperry, 204 Bowery, for a specimen of eight day clocks. *Diploma.*

Erastus A. Holton, Westminister, Vermont, for a portable grist mill and vegetable cutter. *Silver Medal.*

The advantages of the vegetable cutter to farmers will be great. A boy, we are told can cut two bushels of potatoes, or turnip per minute, leaving the pieces ¼ of an inch thick.

Ira Gay, Nassau, New-Hampshire, for a sash planing machine. *Diploma.*

W. H. & S. Nichols, 252 Water-street, for a pair of scales of good workmanship. *Diploma.*

E. & T. Fairbanks & Co., St. Johnsbury, Vermont, for a platform scale. *Diploma.*

Wm. R. Nevins, corner Greenwich and Christopher-streets, for a model of a biscuit machine. *Diploma.*

Cornell Machine Company, office 180 Broadway, for the best stave machine. A Gold Medal having been awarded last year. *Diploma.*

Decidedly the best stave machine in the country. There is the least possible waste of stuff, while the staves are very neatly finished. In a former number of this work we have given cuts and description of the machine to which we refer.

No one having timber of the proper sort, and spare power, should be without this machine, it would return a very handsome profit.

H. & C. Ripley, West Springfield, Mass., for the 2d best stave machine, first time exhibited. *Silver Medal.*

Another stave machine on an entire different principle. It is more simple than the last, but it appears to us that the saw is of a shape, and size, difficult to make; the waste of stuff considerable, and the conumptions

of power great, while the staves are not delivered in a smooth state.

In many situations however its superior portability, and simplicity, might render it very desirable.

American Hydraulic Company, for a rotary pump, Wm. C. Wilcox, agent. *Diploma.*

James Maxwell, 259, Bowery, for a self feeding corn sheller. *Diploma.*

Duncan & West, 2 Little Green-street, for one patent mangle. *Diploma.*

Thomas Blanchard, New-York, for a new method of boat fastening. *Diploma.*

A curious invention. A boat was exhibited that had been in use for two years in our harbor, the sides of which were only *three sixteenths of an inch thick*, and through which *we thrust a pin.*

Sockets are fastened upon the sides, through which a transverse iron wire is passed giving the shape to the boat—the sides are strung, as it were, upon this, and secured by a screw and nut on the gunnel.

A boat so constructed, can be taken apart and put together, using only a screw wrench. This boat has an advantage in being able to resist all twisting or blows upon the side, reminding one of a basket, rather than a boat.

This and the following invention, designed to remedy some of the defects of the common circular saw, are both contrivances of the fertile brain of Mr. Blanchard.

Thomas Blanchard, New-York, for a model of a circular saw mill. *Diploma.*

Daved M. Cradit, Ithaca, New-York, for a lathe cutting machine. *Diploma.*

The advantages proposed to be gained in this lath cutter, are the rapidity with which they can be made—the saving of stuff, no saw being used, and the superior quality of the lath. Cross grained, or knotty wood, works up well in this machine.

A. F. Bright, Onondaga county, New-York, for a washing machine. *Diploma.*

H. Huxley, 79 Barclay-street, for a hand power corn sheller. *Diploma.*

J. R. Newell, Boston, Mass., for a knitting machine. A Gold Medal having been awarded last year. *Diploma.*

A very pretty and ingenious knitting machine, on which caps, stockings, shirts or drawers can be wrought, as well as suspenders and other narrow articles. The operation is a beautiful imitation of hand knitting.—The contrivance by which the delivery of the yarn is regulated is very ingenious.

We are afraid that the knitting ladies will look upon this as a formidable rival.

George Swan, Oneida county, for a patent forge back. *Silver Medal.*

Herrick Aiken, Dracut, Mass., for a leather splitting machine. *Diploma.*

Robert Rankin, Baltimore, Maryland, for a machine for moulding bricks. *Diploma.*

Thomas H. Dollay, for a naval fid for stretching straps for blocks. *Diploma.*

P. N. Pease, Brainbridge, New-Jersey, for a model of a machine for threshing clover. *Diploma.*

S. Spinning, Eighth-street, for a machine for cutting sausage meat. *Diploma.*

J. S. Shuler, Lockport, New-York, for a straw cutter. *Silver Medal.*

Greenleaf, Shepard & Cumberland, Paris, Oneida county, New-York, for a rotary steam engine. *Silver Medal.*

A rotary engine not differing (as far as we can perceive) in principle from most others. Its action was very pretty, and the power over it, as to stopping and reversing complete. We did not have an opportunity of seeing it while attached to one of the saws.

Warren P. Wing, Troy, New-York, for a mill bush and lubricator. *Diploma.*

P. Williamson, Division-street, for a model of a newly invented sofa and settee bedstead. *Diploma.*

John C. Blauvelt, Rockland county, New-York, for a stone eradicator and grind stone. *Diploma.*

Paul Stilliman, for a model of a steam engine. *Diploma.*

Two working models and one miniature model of steam engine—the working models, very well made.

Henry H. Storms, 47 Robinson-street, for a steam engine. *Diploma.*

John M. D. Keating, Peck-slip, for a miniature model of a steam engine, weighing 3 ounces.

John Landmark, 3 Roosevelt-street, for a fine lemon squeezer. *Diploma.*

Curtis, Babbitt & Stafford, Utica, New-York, steam hydraulic engine. This is an apparatus for raising water by the application of steam for the purpose of using the water when so raised as a water power applicable to an ordinary over-shot or other wheel. The examination of this process—which has been in operation during the Fair, has excited a deep interest. The committee in their endeavor to arrive at a just conclusion as to the utility of this ingenious contrivance, have availed themselves of the suggestion of several scientific gentlemen who attended the fair. Its operation would seem to promise valuable results—at the same time, the committee find that no means existed, owing to the hasty manner of putting the machine in operation, of truly testing the power and quantity of steam used in raising and supplying a given quantity of water. While, therefore, the committee are not prepared to say that by this arrangement a greater effect can be produced in propelling machinery by using water as an intermediate agent, than by the direct application of the steam itself,—they cannot deny but such may, on a more thorough test, prove the result. Without therefore giving a decided opinion, and recommending the invention of this mechanical arrangement by a premium, on the part of the Institute, the committee regard this effort evidence of great genius and as giving such high promise of ultimate beneficial results, as to warrant the continued perseverance of the enterprising and scientific gentlemen, who have so laudably embarked in this enterprise.

The judges had not sufficient data for ascertaining the economy of this machine—it appeared to us a revival of the Margins of Worcester's first method of using steam.

SIGN PAINTING AND IMITATIONS OF WOOD AND MARBLE.

Kennedy & Alford, 505 Grand-street, for the best specimen of manuscript sign painting. *Diploma.*

John Gibbs, 151 Front-street, for the best specimen of ordinary sign painting. *Diploma.*

John J. Roach, 76 Cedar-street, for a block letter sign, (American Institute.)—*Diploma.*

W. & J. Gibson, Bowery, for the best specimens of imitation wood and marble, ground glass, damask, and silk tapestry.—*Silver Medal.*

The imitations of wood are the finest we have seen, excelling in beauty the common specimens of the wood itself.

The marble was likewise very well done.

John Frost, 50 Roosevelt-street, for specimens of ornamental sign painting and imitations of marble. *Diploma.*

Imitations of marble on glass—a very good idea, and very neatly executed. The deception is perfect.

MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, &C.

E. N. Byram, Sag Harbour, Long Island, for the best large orrery, or planetary machine. *Gold Medal.*

We have understood that this orrery is the work of a young man, disabled for many years in his lower extremities, and who, without any of the usual instruction, constructed this suspended orrery—a most ingenious piece of mechanism.

Brown & Francis, 252 Broadway, for the best orrery, tellurian, and models of the human eye, for the use of schools. *Diploma.*

The school apparatus, designed to carry out the more improved systems of education, now adopted in our seminaries, will prove a powerful auxiliary to the well informed teacher.

The workmanship is good, and the prices are moderate.

Brown & Francis, 252 Broadway, for the best electrical machine, and air pump. *Silver Medal.*

The electrical machine was very well made—the air pump, as far as we could judge from inspection, a very creditable article. It has a very great advantage in combining the exhausting and condensing power in the same machine.

Doct. Jonas Humbert, junior, 14 Roosevelt-street, exhibited a magnificent electrical machine, which attracted great attention, and was almost continually surrounded by crowds of admirers. This machine, with the accompanying apparatus, was constructed, and is employed for medical purposes. Doct. Humbert deserves the thanks of the

committee for his enterprise and ingenuity in getting up this costly and useful apparatus, so appropriate to the purposes for which it was intended.

Dr. Humbert was decidedly the most popular man at the fair.

John Roach, 4 Wall-street, for the best specimen of thermometers, barometers, and surveyor's compasses. *Silver Medal.*

Mr. Roach's instruments are characterized by great neatness and accuracy of construction.

His barometer we have heard highly praised—he uses a glass cistern, thereby ensuring a correspondence between all his instruments, a point of vital importance in meteorological observations.

Timpson & Swan, 259 Water-street, for the 2d best specimen of surveyor's compasses. *Diploma.*

Mark E. Swain, 67 Division-street, for a specimen of glazier's diamonds, for cutting glass, and surveyor's chains. *Silver Medal.*

The chain we considered a very fair piece of workmanship.

GLASS AND EARTHEN WARE.

Cut glass is one of the most elegant of modern luxuries, and the specimens exhibited were beautiful—we particularly admired the taste displayed in the form and pattern of the various articles.

The stone ware, also displayed a variety of substantial vessels.

Joseph Baggott, Liberty-street, for the best specimen of cut glass and cutting.—*Silver Medal.*

Bonnell & Bradley, 149 Broadway, for the 2d best specimen of cut glass and cutting. *Diploma.*

Michael Lefaulon, Salamander works, for a beautiful specimen of stone ware. *Diploma.*

MISCELLANEOUS.

R. & W. Robinson, Attleborough, Mass., for a most splendid specimen of buttons.—*Gold Medal.*

These buttons are well characterized in the catalogue as splendid; the beauty of these patterns, added to the richness of their finish, will go far to render them fashionable.

D. Berrian, 357 Pearl-street, for a beautiful specimen of brushes and bellows.—*Silver Medal.*

Mr. Berrian has certainly displayed great ingenuity and taste in this line. No articles belonging to the household and toilet, comes more frequently under the eye than the brush, and neatness of form is consequently a great commendation. If any one will take the trouble to count up the various brushes in use about him, he will be astonished at the number—we were truly so when first called to notice it. Among others we consider the flesh brush in itself a complete medicine chest, and as indispensable as a hair brush.

Johnson & Co., cor. Cedar and William-streets, for the best specimen of perfumery, Cologne water and fancy soaps. *Silver Medal.*

Josiah Burton, 390 Pearl-street, for the best specimen of confectionary articles.—*Diploma.*

T. G. Hodgkins, 49 Courtland-street, for the 2d best specimen of confectionary articles. *Diploma.*

Benjamin Sherwood, 321 Fourth-street, for the best specimen of fire proof safe or chests. *Silver Medal.*

Truly a safe. This was one of the first articles at the fair that attracted our attention.

We have always considered a double chest as the true form for protection against fire. The communication being only established in two points, and the interior of the outer chest being a very bad conductor of heat, the most perfect degree of safety is attained. A chest was exhibited which had undergone a severe heat in a furnace.

At the end of the article, we shall give an account of the experiment in the inventor's iron works.

Jesse Delano, 97 Water-street, for the 2d best specimen of fire proof iron chests.—*Diploma.*

T. W. Whitley, Paterson, New-Jersey, for an improved window sash and show case. *Diploma.*

Robert Morrison, 159 East Broadway, an apprentice, for a small mantle piece. *Silver Medal.*

Mrs. Susan Newell, 64 Gold-street, for a specimen of flags. *Diploma.*

Mrs. C. Pierson, 124 Nassau-street, for a specimen of flags. *Diploma.*

U. Warren, 350 Houston-street, for one septanataria table top. *Diploma.*

A very rich piece of furniture—the border was of Scagliolia.

Henry Durell, 216 William-street, for specimens of metallic combs. *Diploma.*

Ward & Bell, 227 Washington-street, for the best specimen of preserved birds. *Diploma.*

Mrs. S. Little, 440 Washington-street, for the 2d best specimen of preserved birds.—*Diploma.*

E. Guillanden, for fine specimens of preserved birds. *Diploma.*

William McDougal, 85 Sullivan-street, for a specimen of repairing china or earthenware. *Diploma.*

New-Haven Verd Antique Marble Company, New-Haven, Conn., for fine specimen of marble, (a chimney piece.) *Silver Medal.*

No country can vie with ours in beauty and variety of marble. The discovery of this quarry is of recent date—and the marble bids fair to come into general use.

The chimney piece attracted universal attention.

Mrs. Gould, 1½ Ann-street, for fine specimen of pickles. *Diploma.*

Mrs. Gould seemed determined to make our mouths water, crowds stood admiring the tempting display of sour luxuries.

Harris & Wynans, 65 Canal-street, for fine specimens of paper hangings. *Silver Medal.*

E. & S. S. Rockwell, 192 Broadway, for fine specimens of vault lights. *Silver Medal.*

If any one has had the misfortune to slip upon, or fall though one of the old fashioned vault grates, (and who has not,) he needs no recommendation of this neat and popular light.

Henry Hannington, 290 Broadway, for a variety of splendid transparencies. *Silver Medal.*

Mr. Hanningtons luminous conceptions are well known to every inhabitant of Gotham.

John McCoy, apprentice, 205 Duane-street, for one cedar pail of superior workmanship. *Diploma.*

Robert Lawrence, apprentice, 205 Duane-street, for one cedar pail of superior workmanship. *Diploma.*

J. B. Roberts, 452 Broadway, for fine specimens of chimney tops. *Diploma.*

Barnard Slate Company, Bangor, Maine, Walter Janes, agent, for a fine specimen of slate. *Silver Medal.*

Joseph Richards, 175 Broadway, for fine specimens of gold spectacles. *Diploma.*

Robert Usher, 513 West-street, for fine specimens of preserved beef and hams.—*Diploma.*

Boardman & Hart, 6 Burling-slip, for superior specimens of Brittania ware.—*Silver Medal.*

This firm has long been known, and their ware highly esteemed, but we think the pieces of Brittania ware, displayed on this occasion, were finer than any we have before noticed.

Pupils of the Assylum for the Blind, for a handsome specimen of rugs. *Silver Medal.*

Creditable alike to the "blind," and to those benevolent individuals, who have with praiseworthy zeal, give their whole time to the improvement of the condition of their unfortunate brethren.

John Smith, 217 Water-street, for a superior specimen of jappaning. *Diploma.*

Samuel Judd, Water-street, for beautiful specimens of sperm candles. A Silver Medal awarded last year. *Diploma.*

Henry W. Oliver, 280 Division-street, for a portable meat safe. *Diploma.*

Doct. J. Francis, Chambers-street, for a fine specimen of artificial eyes. *Diploma.*

Eyes for the blind, as good in appearance, at least, as the original organ. This branch of manufacture should prosper in those parts of the world where gouging is practised.

Marble Cement Company, 180 Broadway, for fine specimens of marble cement, N. H. Gale, agent. *Silver Medal.*

Not satisfied with the genuine marble, we must have imitation, possessing, however, this advantage, that marble cement can be applied to the exterior of a building, in cases where marble could not be afforded for even a part.

Wm. Chandless, 6 Clarkson-street, for specimens of manufactured German silver. *Diploma.*

Doct. Lewis Feuchtwanger, 377 Broadway, for specimens of German silver in the crude and prepared state, of his own manufacture. *Silver Medal.*

The silversmiths must look to Dr. Feuchtwanger. His display of forks, spoons, ornaments, &c., was very fine—a casual observer would be deceived, and suppose them to be of genuine silver. This composition is becoming daily more popular. For mathematical and astronomical instruments, it is decidedly the best material.

Mr. Morton, for a design of a certificate of membership for the chamber of trade.—*Diploma.*

Martin G. Johnson, Jamaica, Long Island, for specimen of maps executed with the pen. *Diploma.*

Francis Murphy, 756 Broadway, for the best specimen of water proof blacking. *Silver Medal.*

Charles Thompson, 28 Pitt-street, for the 2d best specimen of water proof blacking.—*Diploma.*

W. & J. Crolius, 400 Water-street, for a model of a club boat made from old iron sides. *Silver Medal.*

The beauty of this model together with the association, with the name of Old Ironsides, rendered this an object of great curiosity.

Joseph C. Kent, 734 Greenwich-street, for a model of a boat. *Diploma.*

The Redford Glass Company, for a specimen of window and crown glass, Charles Goff, agent, Maiden-lane. *Diploma.*

Miss Jane Stewart, has exhibited two paintings in oil, viz. a lady in the costume of Charles the Second, and a serenade by moonlight on the lake. Although too late for competition, are considered beautiful specimens.

Mrs. Wm. Niblo, for a superior pumpkin pie, made of the great pumpkin exhibited during the Fair, weighing 140 lbs. *Diploma.*

American Cement Company, for two busts and a lion made of cement, Obadiah Parker, Syracuse, agent. *Diploma.*

Alfred T. Serrell, Sixth Avenue, for fine specimen of ornamental inlaid boards for piano fortes. *Diploma.*

Very pretty workmanship from a young artist—in whose whole family the constructive talent is prominent.

James E. Serrell, Sixth Avenue, for fine specimens of brush blocks. *Diploma.*

S. W. Stockton, Philadelphia, for the best specimen of incorruptible teeth, maxilary bones, skull, &c., and of mechanical dentistry. *Silver Medal.*

These teeth were good substitutes for that necessary apparatus, which from disease or accident we sometimes lose prematurely—but we were partcularly pleased with the skull, showing the provision of nature in reference to the first and second teeth.

We dare to say that many received from it much more correct notions than they formerly entertained in regard to their teeth, even though they are always in their mouths.

CABINET WARE.

Bishop & Breckells, 450 Broadway, fo the best sofa bedstead, of superior workmanship. *Silver Medal.*

H. Brunswick, 7½ Bowery, for a sofa bedstead, approved for its design, convenience and usefulness. *Diploma.*

G. & W. H. Jennison, cor. Charlton and Varick-streets, for an improved refrigerator. *Silver Medal.*

A neat piece of furniture, and a most desirable article of household economy—particularly when the thermometer indicates 80° or 90° Fahr.

Brown & Ash, 191 Bowery, for a double action revolving and self acting chair.—*Silver Medal.*

This chair affords facilities for every change of position calculated to relieve the tedium of a sedentary life.

The perpendicularity of the books to the axis of vision is ensured, while the chest can be fully expanded.

Decidedly the greatest luxury to be found in a study.

CHEMICALS, &C.

J. J. Tobin, (Fort Lee Chemical Works,) for the best specimen of chemicals. *Silver Medal.*

Kipp & Cordes, 55 Forsyth-street, for a handsome specimen of starch. *Diploma.*

Wm. Sturdivant, 474½ Broadway, for the best specimen of white sperm oil. *Diploma.*

W. H. & S. Nichols, 252 Water-street, for scales for apothecaries'. *Diploma.*

Jones & McDonald, 83 Fulton-street, for a fine specimen of apothecaries' scales. *Diploma.*

CARVING AND GILDING.

Kreps & Smith, 22 Rivington-street, for the best specimen of gilding. *Diploma.*

Solomon Pancoast, 54 Spring-street, for a fine specimen of polished white and mahogany doors. *Diploma.*

Thomas Godwin, 169 Maiden-lane, for the best specimen of gilding on glass. *Diploma.*

AGRICULTURE, &C.

We are glad to find the Institute paying particular attention to agriculture. The corn of Mr. Johnson was examined on the ground by a committee, several stalks of unusual size were exhibited.

The mammoth vegetables raised our standard of comparison in regard to size. As large as a pumpkin, we shall interpret in a very different manner, after having seen the one at the fair.

The various samples of honey, were quite deserving of notice, the beauty of the article, and the ingenuity displayed in the construction of the hives pleased us much.

Barret Johnson, Brooklyn, Long Island, for a specimen of corn from a field of about 10 acres, on the farm of Gen. Jeremiah Johnson. *Silver Medal.*

Robert Thompson, Flushing, Long Island for early Dutch drum head cabbages of uncommon growth, weighing from 35 to 42 lbs., each. *Diploma.*

James H. Colyear, Newtown, Long Island, for a bunch of 100 onions, weighing 120 lbs. *Diploma.*

C. Bergen, Brooklyn, Long Island, for specimens of white and red beets of an uncommon large size. *Diploma.*

N. Cowenhoven, New-York, for a specimen of pound pears, 13 on a twig, of 8 inches in length, weighing 8½ pounds, from his farm on Long Island. *Diploma.*

James Durham, Harlaem, New-York, for an enormous pumpkin, the seeds of which sold for 12½ cents each. *Diploma.*

Charles T. Butting, for an uncommon sized pumpkin. *Diploma.*

David Ruggles, Newburgh, for a specimen of leaves from the Russia mulberry tree, of various years' growth cultivated by him. *Silver Medal.*

Francis Kelsey, Lodi, New-Jersey, for a fine specimen of honey and bees, the honey made from inferior Southern honey, as also an improvement for increasing the quantity. *Silver Medal.*

Levi H. Parrish, for a specimen of patent bee-hives, beautiful, convenient, and well arranged. Considered a meritorious article. *Silver Medal.*

Wilcox & Cone, West Bloomfield, Ontario county, N. Y., for the greatest quantity of first rate honey, part of a lot of 3700 lbs.—*Silver Medal.*

James Van Dyke, Brooklyn, Long Island, for the best specimen of mustard. *Diploma.*

John Spry, 596 Broadway, for the best specimen of flower stands. *Diploma.*

Specimens of ploughs, exhibited by John Weaver, of Maryland, Minor & Horton Peekskill, N. Y., and Andrew Drysdale, sen. of this city, will hereafter be tested by actual experiment, and the result published in the Journal of the American Institute.

CARRIAGES AND SLEIGHS.

In this line there were not many specimens, but they all obtained medals. The miniature carriage, and the sleighs were finished in a superior manner.

Daniel M. Grummon, Newark, New-Jersey, for a child's landau, a beautiful piece of workmanship. *Silver Medal.*

James Flinn, New-York, for a light pleasure waggon. *Silver Medal.*

Robinson & Vanderbilt, Albany, N. Y., for a Stanhope carriage and four sleighs, of superior workmanship. *Gold Medal*

SURGICAL INSTRUMENTS, &C.

Doctor A. G. Hull, 4 Vessey-street, for the best specimen of trusses. A premium having been awarded at three former Fairs. *Diploma.*

Doctor A. G. Hull, 4 Vessey-street, for an utero abdominal supporter. *Diploma.*

James Jones, Providence, R. Island, for a patent relief bedstead for invalids, an invention of great importance to the afflicted.—*Gold Medal.*

These sickbeds were so well liked, that the judges awarded medals to each.

Marcus T. Moody, Northampton, Mass., for an elevating spring bed, highly approved for its simplicity of structure, cheapness, and great utility. *Silver Medal.*

Williams Woolley, 422 Broadway, for an

invalid bedstead, possessing many advantages over those now in use. A gold medal having before been awarded. *Silver Medal.*

We saw several articles during the fair, that have not been noticed in the catalogue.

The machine—wrought Stockbridge marble, Clark and Boynton patentees, was among the number; this was brought in too late for competition for the premium.

The block of marble was in a state ready for use, and as nearly 700 pounds had been lost in dressing, it is easy to imagine the saving in transportation. From the description and cut, on another page, the reader will perceive that the machine is original, and superior in its operation, to that of Hunter, patented in England. There is no danger of breaking off the corners, as in that machine, while more work can be performed in an hour, than a man by hand, can do in a day.

It is also said to leave the surface of the stone in a better state for polishing, than when dressed by hand.

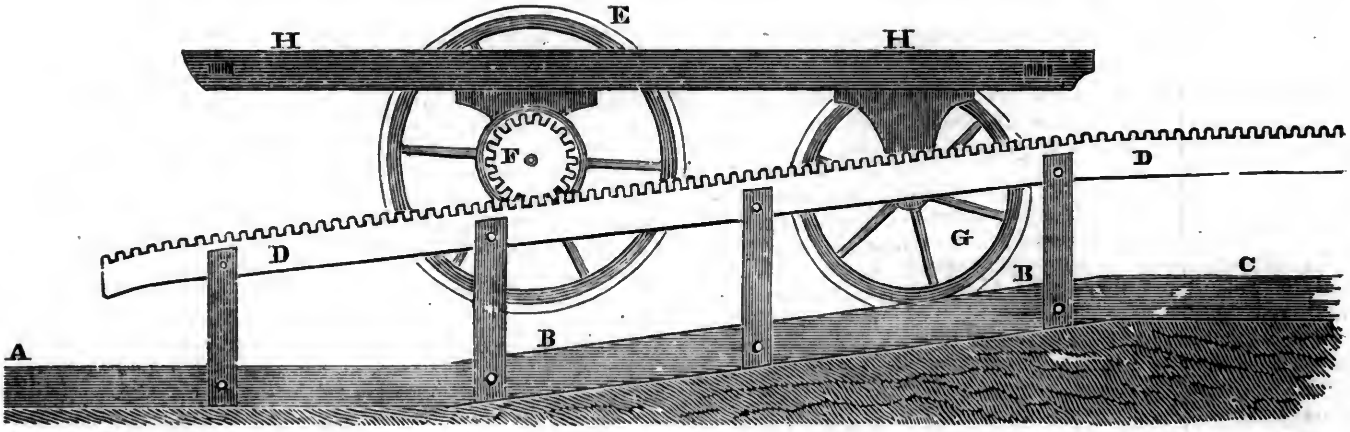
We refer our readers to the figure, and its description.

There was also an ingenious wire cutting, and sharpening machine, by Mr. Thorp, of Cambridge, Mass. This engine is intended for preparing wire for calico printers, and pianoforte makers; is ingenious in its mode of operation, and a great labor saving apparatus.

A few machines would suffice for those purposes in the whole country; though it can be adopted to a variety of uses, of a similar nature.

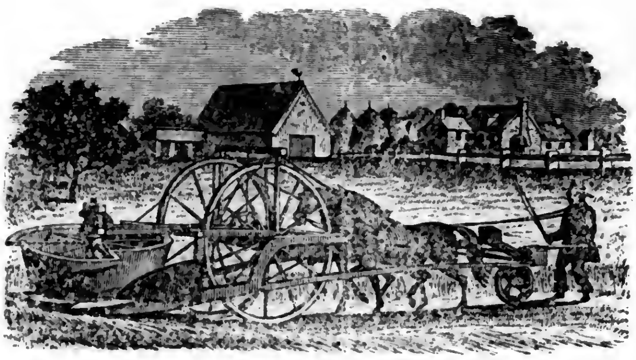
We also noticed several books, printed for the blind; no label was attached to them, and we do not know whether they were printed in this country, or Europe. If of domestic origin we should have thought them worthy of a notice, at least, if not a medal.

A preparation entitled Vegetable Skeletons, representing the seed vessels, of the Datura Stramonium, cleared of every thing but fibre, was to us an attractive object. The extreme neatness of the preparation, and the beautiful taste of the printed card, gave indications of our unusual talent for nicety, and order. We are entirely ignorant of the exhibitors name or sex. We should think that some thing of female style was shown in the arrangement, but are not certain. This same hand directed by such skill, would produce most beautiful preparations in different branches of natural history.



The above cut represents a new plan of ascending and descending inclined planes upon Railroads. A, B, C, represents the main track of which B, B, is the inclined plane. D. D. represents a rack rail, which is raised above the main track, to a sufficient heigh to receive the pinion or cogg wheel F. The rack rail may be attached to the main track or otherwise constructed, as may be found most expedient; the wheel F, is to be attached to the axle of the running wheel of the locomotive, as the wheel F, runs upon the rack rail, it raises the back of the engine to a sufficient height, that the frame H, H, is kept in a horizontal position, and consequently the water in the boiler keeps the same position in ascending and descending, as though the machine were running upon a level track. G, is the forward wheel of the engine, which runs upon the main track. In ascending or descending, the rack rail should be extended at the summit of the plane, to a sufficient length to drag up the train of cars, and just high enough to let the large wheel E, clear the main track. It appears to me, that engines constructed on the above plan may be made to ascend considerable declivities; it is evident that by decreasing the size of the cog wheel F, almost any amount of power that would be requsite can be obtained; and likewise it is an easy matter to make all planes of the same inclinations.

A Young Mechanic.



WILSON'S MOWING AND GRAIN-CUTTING MACHINE.

The above wood engraving represents the machine exhibited by Capt. Alexander M. Wilson, of Rhinebec, for mowing and for cutting grain, by the power of one or more horses, or oxen. It would be needless to attempt giving such a description of this machine as would serve to aid in its construction, as it has been secured to the inventor, by letters patent, and no one will, of course, attempt to construct it without consulting him or his agent; in which case, they will not only examine the machine, but receive the instructions necessary.

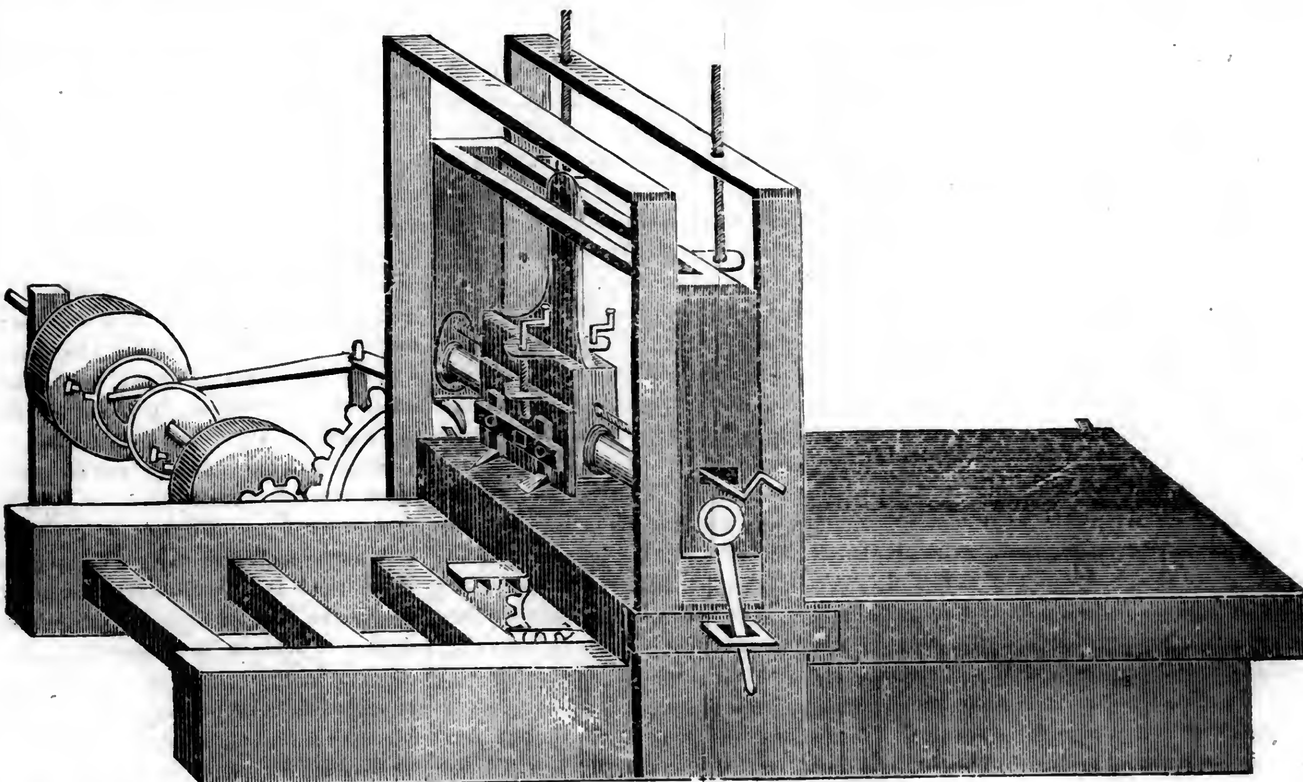
The machine now exhibited, is propelled

by two horses or oxen, going in the rear and pushing it forward. It moves on two large wheels similar to the hind wheels of a coach, the axle of which, communicates a rotary motion to a wheel which revolves horizontally, around which are knives projecting from the edge, under such angle as to cut the grass or grain with a constantly drawing stroke, and a superstructure is erected on this cutting-wheel, which carries it out and deposites it in the swarth.

We have not seen this machine in operation, cutting grass or grain, as the place of exhibition, of course, afforded none to cut; but from the testimony of gentlemen whose veracity and judgment in the case, cannot be questioned, and from the appearance of the machine, we feel warranted in our belief that it cannot fail to mark a new and important era in the system of agriculture. The machine can certainly be propelled forward by a common team, and if it goes forward we cannot see how it can fail to cut the grass or grain, where it is not interrupted by stumps or stones; and if the team walks two miles an hour, and cuts a swarth six feet wide, which is the width calculated, it must, cut a fraction over fourteen acres in ten hours; there being no time lost in sharpening, as the knives are provided with a self-sharpener, which operates when wanted.

The business of agriculture, is the first and noblest employment of the human family, and the two most important labors of the agriculturist are, the cutting the grain to feed himself and his fellow-creatures, and grass to feed his cattle. This labor owing to its vast importance, and the critical time when it must be performed, generally commands a higher price than other agricultural labor; and often, owing to the scarcity of hands at that time, the farmer is put to great inconvenience, and sometimes subjected to loss. With this machine the farmer with one man, and team of horses or oxen, can cut his grass and grain in the time they could be cut by ten men, and one machine would be sufficient for a considerable neighborhood. If this is not one of the most important and valuable improvements in the useful arts, we can scarcely conceive what would be.

The inventor will be found at Rhinebec, Dutchess Co. N. Y., where application may be made, or to George Hanford's, Market-Street, Albany.



CLARK AND BOYNTON'S STONE-CUTTING MACHINE.

This machine of which the annexed engraving presents an accurate representation, and for which Letters Patent of the U. S. were granted last Summer, was contrived with particular reference to the building marble of the West Stockbridge quarries. As yet only one machine has been erected, yet the principles upon which it operates has been so thoroughly tested, as to leave no doubt that most, if not all of the American marbles and sand stones, can be wrought by it with an accuracy, rapidity and beauty of finish, which cannot be equalled by manual labor. Thus far, it has been only tried upon the West Stockbridge marble, and it has been found that where no more than one inch in thickness is to be taken from the side of a block, the machine by passing once over it, will produce a level surface ready for the polisher. And experiment has also demonstrated, that a stone wrought by the machine, is more easily finished than one which is cut by hand. The machine, while in actual operation, cuts at a rate varying from 16 to 40 superficial feet per hour, according to the texture and size of the block; short and narrow pieces requiring more time in proportion, than thos which nearly fill the platforms. The machine now in operation, will cut a block 10 feet long and 3 feet square, or one 10 feet by 3 feet in width, and any thickness less than 3 feet down to 2 inches. It cuts the edge of the blocks as well as the face; preserving the corners entire. It will cut all descriptions of straight mouldings, as for steps and cornice, and it will round or flute a column. The steady and uniform manner in which the tools are applied to the stone, not only prevents them from breaking, but the wear and loss of steel is much less than in tools that are used by

hand. The great strength and simple construction of this machine, render its liability to get out of repair extremely small, and for the same reason any practical mechanic can operate it, without the slightest difficulty

The following is the specification of the patent.

To all to whom these presents shall come. Be it known that we, Anson Clark and Charles B. Boynton, of West Stockbridge, in the County of Berkshire and state of Massachusetts, have invented certain new and useful improvements in the cutting or planing marble, and other stone. Upon a suitable foundation, are placed two sticks of timber, about 12 inches square and at least twice as long as the longest block of stone which is intended to be cut or planed; these timbers are designed to support the other parts of the machine, and are framed together about five feet apart. A platform to hold the blocks which are to be planed, is formed by bolting plank, two or more inches thick, upon longitudinal timbers about eight inches square. This platform, for common purposes, should be about five feet in width and about 12 feet long, it is placed upon the foundation timbers, and may slide thereon upon ways or slides, or upon friction rollers. In the centre of the foundation timbers, are placed four upright cast iron posts about seven feet in height and of any required strength. These posts serve for guides, in which the frame that holds the tools, is moved up and down by screws, or by a rack and pinions, according as the blocks to be planed vary in thickness. The tool frame is an oblong cast iron frame, fitted to move accurately in the guides of the upright posts, and is raised and lowered by screws, passing through the cross bar that connects the tops of the upright posts. In the lower part of this tool frame, is hung a horrizontal cylinder of cast iron, about five inches in diameter. This cylinder or shaft, rests in the tool frame upon journals turned on each end, so as to permit a motion on its axis, and one end of the cylinder or shaft, passes through the tool frame, far enough to allow the attachment of a lever upon the outside of the upright posts. This cylinder is acurately turned through its whole length, so that the cast iron block to which the tools are screwed, may slide upon it from one side of the platform to the other. Upon the under side of the cylinder, is cut a groove of about half an inch in depth, through its whole length, and to this groove is fitted a tongue in the tool block that prevents it from turning round upon the cylinder. The tool block is of cast iron, about eight inches square, and is bored out so as to be nicely fitted to the horrizontal cylinder, and a strong screw passes from one side of the tool frame to the other, and through the tool block above the cylinder, by which screw the tool block is moved upon the cylinder from one side of the platform to the other. Two sliding cast iron plates of about an inch in thickness, and of the same width of the tool block, are fitted to the tool block one upon each side. To these plates the tools are secured by screws, and the plates are moved up and down on the tool block by screws, so that the tools may be accurately adjusted to the surface of the stone, or to the depth required to be cut. There are projections both on the tool block and the sliding plates, through which these screws pass. A strong bar of iron, either cast with, or bolted to the top of the tool block, runs upwards about 12 inches, and between the cross bars that form the upper part of the tool frame. The use of this bar, is to steady the tool block, by resting alternately upon each cross bar of the tool frame, as one or the other set of tools is brought into operation. The screw which runs through the tool block horizontally, for the purpose of sliding it back and forth, along the cylinder, has a crank upon one end, and it may be moved either by hand or by machinery Upon the under side of the center longitudinal timber of the platform, is a toothed rack into which works a pinion hereafter described, by which rack and pinion the platform is carried backwards and forwards beneath the tools. The pinion which works into the rack, is fixed upon a horrizontal shaft, lying beneath the platform, and across the foundation timbers. Upon one end of this shaft is placed a cog, wheel, which is moved by another cog, wheel, upon a second shaft, lying, like the first, across the foundation timbers, and parallel to the first named shaft. Upon this second shaft are two pulleys with a clutch between them. One of these pulleys is worked by an open, and the other by a cross band, so that they revolve in opposite directions, and by shifting the clutch, a reciprocating motion is communicated to the platform. The clutch is shifted from one pulley to the other, by means of a lever moving horizontally upon a joint or pin; one end of this lever lies in the clutch, the other bent like an elbow, is so placed as to be struck by pins projecting from the edg, of the platform. Upon one end of the horrizontal cylinder, is attached a lever on the out side of the tool frame and upwright posts. This lever hangs in a perpendicular position, and is used to shift the position of the tool block, by rolling the cylinder, so that the tools being placed upon opposite sides of the tool block, may be brought alternately into operatton, as the platform moves back and forth, and likewise to prevent the tools upon one side from dragging upon the stone, while those upon the other side are cutting. The lower end of this lever is attached to a clasp upon one of the upwright posts opposite the edge of the platform. This clasp is several inches longer than the width of the post, so that it can slide a short distance back and forth upon the inner side of this clasp is fastened a forked spring, which runs in a groove in the edge of the platform. The compression of the spring in the groove causes sufficient friction not only to move the lever as far as the clasp will permit, but also to hold it steady in its place.

Since the above was in type, we have received the following account of the mode of working, from the patentees.

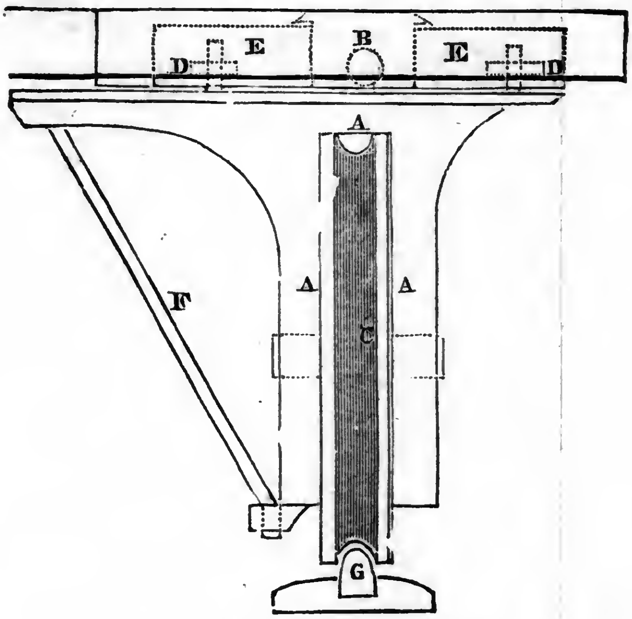
In the description of our stone-cutting machine, we omitted to mention one method of working, which we then thought of but little consequence, but which subsequent experiment and reflection have convinced us, forms one of the most important features of the invention. Instead of using a tool-block, with two tools upon each side, which block is moved as you will see by the cut, across the blocks as its surface is cut away, we dispense with the tool-block, and the screw which moves it, and construct our cylinder, so as to set a row of chisels or points forward across the whole width of the platform of the block is so wide—thus enabling our machine to take off a portion of the *whole surface* of a block, at a *single cut*, or we effect the same object, by using a single tool, as wide as the stone to be cut. By lessening the depth of the cut, and increasing its width, we diminish the risk of fracturing the stone, and produce a better surface, at the same time, that we increase the capabilities of the machine. Thus a chisel, or sett of chisels, 8 inches in width, and cutting one eighth of an inch deep, works with the same rapidity as one, one inch wide, and cutting one inch deep, producing a better surface, and without any danger of fracture. This arrangement, as you will at once perceive, allows us to increase the strength of the machinery and power used, at pleasure, increasing in a corresponding ratio, the quantity of work performed in a given time. In the method of working the machine, which we described before, this could not be effected. We could not increase the motion beyond a certain speed, (about 15 feet per minute,) with-

out destroying the temper of the tools, and we could not increase the depth of the cutting, without injuring the stone.

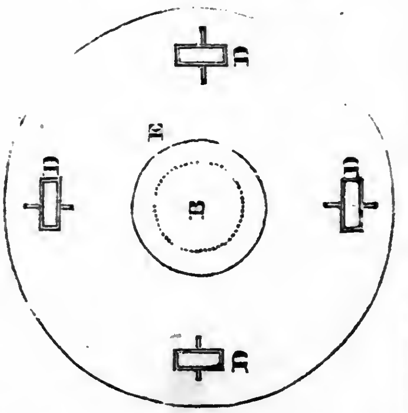
By the use of the wide tool, or many tools at once, no limit, other than the power at command, and the strength of the machinery, can be assigned to the rapidity with which stone can be wrought. We have used as wide a tool as we could secure in our present tool block, and with results that warrant all I have written above.

This also distinguishes the machine still more clealy than before, from the English or Scotch one, and I am the more pleased with this, because there are those, who not being able to purchase our patent at their own price, are making arrangements with Mr. Hunter to patent his machine in this country, thinking thereby to destroy our patent, or at least, affect its value, and this they do without understanding the principle of either machine, or the difference between them. Very respectfully,

CHARLES B. BOYNTON.



Top view of the metal plate E.



IMPROVEMENT IN RAILROADS.

The following letter from Judge Wright was intended for the November number of the Journal of the American Institute, but was excluded by the press of matter in relation to the 9th annual fair. The model is still at the repository 187 Broadway. As it is important, if it is an improvement, that it should be immediately known, you will do a service by publishing the letter, that practical engineers may examine and hear the explanations of Dr. Plantou, who will continue in town a few days.

NEW-YORK, Nov. 4, 1836.

Dear Sir. I have examined the model of a Railroad car and rails adapted thereto, now at the American Institute, invented by Dr. A. Plantou, of Philadelphia.

The action of the car whereby the forward motion given to it, adapts itself to curves of small radius, as well as tangent lines, is new to me, and appears to possess the very valuable property of greater security against running off the track, and also against breaking the axle. These are the cause of nearly all the injuries to limb and loss of life, which happen on our present Railroads.

If Dr. Plantou succeeds in introducing his improvements in the form of cars and rails suited to them, he will be entitled to be called a public benefactor, and will place the public under very great and lasting obligations.

Very respectfully,
I am dear sir,
Your ob't ser't
BENJ. WRIGHT.

T. B. WAKEMAN, Esq.
Corresponding Secretary
American Institute.
[Com. Adv.]

DESCRIPTIONS OF THE ENGRVINGS.

A The standard for the Wheel.
B Neck of ditto acting as a Pivot.
C Grooved Wheel working in the fork A.
E Metal plate at the bottom of the Cars.
D Friction rollers in the metal Plate.
F Side braces to steady A.
G Rail with rounded edges.

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Nov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Bray's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th Nov., at H. Vibbert's, Dechertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at no 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is $500,000 with liberty to increase to $800,000, divided into shares of $100 each.

The sum of $5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I. BLAIR,
JOSEPH E. EDSALL,
COMMISSIONERS

Dated Oct. 3rd, 1836 41—9t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE

33—tf.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio.
John Rodgers,	Louisville, Kentucky.
John Tilslon,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicabl eextent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long

Rochester, May 22d, 1826. 19y-tf.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)
NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—ytf

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

								lbs.	
350 tons	$2\frac{1}{2}$ by	$\frac{5}{8}$,	15 ft in length,		weighing			$4\frac{68}{100}$	per ft.
280 "	2 "	$\frac{5}{8}$,	"	"		"		$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$ "	$\frac{1}{2}$,	"	"		"		$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$ "	$\frac{1}{4}$,	"	"		"		$1\frac{25}{100}$	"
90 "	1 "	$\frac{1}{4}$,	"	"		"		$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet $2\frac{1}{4}$, $2\frac{1}{2}$ 3, $3\frac{1}{8}$, $3\frac{1}{4}$, $3\frac{1}{2}$, and $3\frac{3}{4}$ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and ston block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

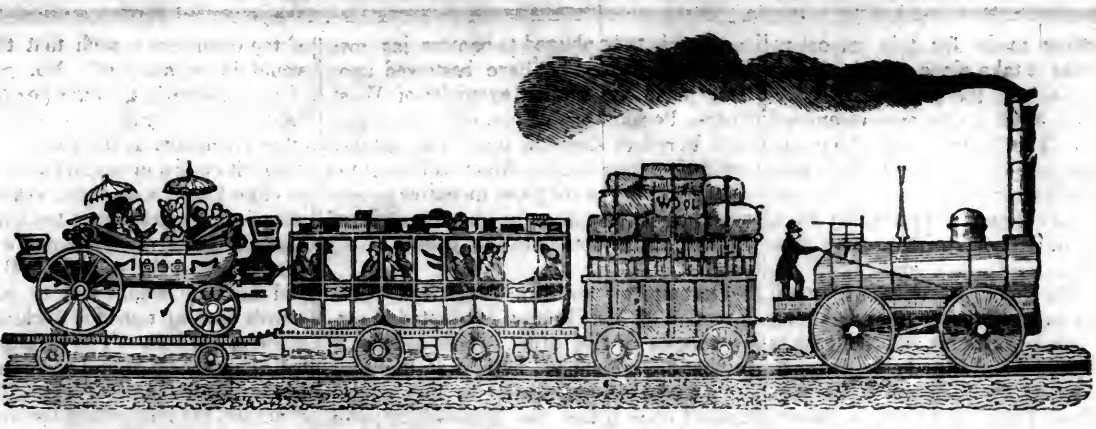
TO RAILROAD CONTRACTORS.

PROPOSALS will be received until the 8th day of December next, for the graduation and masonry of the first ten miles of the Gainsville and Narkeeta Railroad. A profile of the route, with plans and specifications of the work, will be exhibited at Gainsville, for ten days previous to the time of letting and all other information given, on application to the subscriber or to the Assistant Engineer. Recommendations will be expected in all cases, of persons not known to the officers of the company or to the Engineer.

For the information of persons at a distance, it may be remarked, that this road commences at the town of Gainsville, on the Tombeckby river, and extends twenty-two miles south-west to Narkeeta in the State of Mississippi. The Tombeckby is navigable for Steamboats the greater portion of the year and having a direct communication with Mobile and New-Orleans, will afford facilities for procuring the supplies necessary for the hands employed on the work, or for their ready conveyance hither, if procured from a distance. The country through which the road is located, being perfectly healthy, and the mildness of the climate admitting of operations throughout the winter season renders the contract peculiarly desirable to those wanting winter employment. To an enterprising and energetic contractor the construction of this road offers the prospect of a profitable job.

D. H. BINGHAM, C. E.

Gainsville, Ala. Sept. 21, 1836. 42—tDec1



AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, DECEMBER 10, 1836. [VOLUME V.—No 49.

CONTENTS:

AMERICAN RAILROAD JOURNAL.

NEW-YORK, DECEMBER 10, 1836.

TO CONTRACTORS.

PROPOSALS will be received from the 1st to 10th January, 1837, for the graduation of the 2d and 3d Divisions of the Long Island Railroad, comprising a distance of 20 miles beyond Jericho.

The line will be ready for inspection on the 1st of January, when plans and profiles of the routes may be seen at the Engineers Office, Jamaica.

WM. GIBBS McNEILL, Eng.
JAMES P. KIRKWOOD, Res. Eng.
Jamaica, Dec. 6, 1836. 2t*

A few cuts and descriptions of machines exhibited at the Fair of the Institute, were omitted in the last number.

They will be found complete in the number of this week.

VAN DE GRAAFF, on Railroad Curves, and a Description of the Thames Tunnel with engravings, are for sale at this office.

PAMBOUR on Locomotives, and NICHOLSON's Architecture, will be ready for delivery in a short time.

EFFECTS OF ELECTRICITY ON VEGETATION.—M. Baric states, that "last year, in the month of July, the lightning struck one of the poplars in my avenue—the fluid breaking off at the time a few branches at the summit of the tree, followed down the tree without breaking the bark, and at last passed into the earth, throwing up two cubic feet of earth. The poplar at the time was about a foot in circumferance: at the present time it is double that size, whilst those near by have made no preceptible increase in size.—[L'Institut, No. 155.]

Fair of American Institute.

(Continued from p. 767.)

MR. COCHRAN'S IMPROVEMENT IN FIRE ARMS.

We copy the following account of Mr. Cochran's invention, and Adventures. It will be found highly interesting.

"COCHRAN'S MANY CHAMBERED NON-RECOILING RIFLE.—This extraordinary invention of a young American, native of New-Hampshire, and which is now being for the first time exhibited to the public, at the Fair of the American Institute, Niblo's Garden, deserves more than a passing notice. There are circumstances connected with it, which give a peculiar, if not romantic, interest in the history of the arts of our country. If any thing were wanting amidst the multitude of extraordinary inventions which have, for the last half century, been recorded in the archives of our patent office, to illustrate and establish the pre-eminent claims of our country-men to genius of a high order, it would be that which forms the particular subject of our remarks.

Mr. Cochran's father was a lawyer, and afterwards a merchant of eminence in Enfield, N. H.; and the son, John Webster Cochran, was born there, and has invented the species of fire arms in question, was brought up to no particular business. At the very early age, however, of 16, he discovered a strong taste and passion for mechanical experiments, and was consiantly occupied in the construction of machinery, which his father approving of, unlike many other fathers, encouraged, and to further the wishes of his son, expended several thousand dollars in his behalf, in the cost of the different kinds of apparatus required.

When only 18, he made the discovery in question, but did not perfect it until three years after. He then went to France and England, and exhibited his model cannon to Louis Phillipe and William the IV. While at Paris in 1833–'34, he was requested by the Turkish Ambassador to explain it to the Turkish Minister at London, and accordingly went to Woolwich, and performed a series of experiments before the latter personage, which gave so much satisfaction that he urged Mr. C. to visit the Sultan at Constantinople, & for that purpose provided him with the most flattering recommendations to the Court of the Sublime Porte. Mr. Cochran arrived at Constantinople Febuary 11, 1836, was received with great distinction, and introduced to the Sultan by the Grand Vizier. His Turkish Majesty was highly pleased with the experiments made with the model, told Mr. C. he was satisfied it would be generally adopted, and requested him to cast twelve pounders on the same principle. He was provided with elegant apartments in Pera, raised to the dignity of Master of Cannon, and furnished with as many workmen as he required for the accomplishment of his task. The treatment, in fact, which he received, was equivalent to that of the rank of an ambassador.

Mr. Cochran, however, finding there was no good foundry or mechanics, was obliged to undertake the work with his own hands; and though not brought up to the business of making machinery of any kind, by dint of much labor and perseverance, made himself all the necessary implements, the augers and the wooden apparatus for boring with horse power, and the preparations required for procuring the proper castings. By good fortune he succeeded entirely to his wishes, and cast and bored three cannon, two of one pound each, and the third a *twelve pounder*, which last was finished in a style as perfect as he could have desired. On the 14th September following, he proved this last piece to his entire satisfaction, in the presence of all the chief officers of the Turkish government, who were delighted with its execution, and made a highly flattering report to the Sulton. He fired it off in the presence of those officers to their utter astonishment 100 times in fifteen minutes. The Sultan, when he heard of it, would scarcely believe it, and directed Mr. C. to perform the same experiments in his presence. The most extensive preparations

were according made for this important trial, which was to take place at Tarache, on the European side of the Bosphorus.

No less than 3000 troops were assembled at this spot. The Sultan at the hour appointed, came over from his summer residence on the Asiatic shore, rowed in one of his splendid *caiques*, and preceded by a long line of other boats of the same description. The one which announced the approach of the Sultan was manned by 40 oarsmen and came with even more lightning speed than that in which his august highness himself was seated. As the latter was seen nearing the wharf, Mr. Cochran, at the suggestion of Halil Pacha, the Su'tan's son-in-law, and commander-in-chief of the land forces, fired off a salute of 21 guns (the customary number) with the experimental cannon, which consumed less than two minutes and struck the assembled multitude with the utmost amazement.

As the Sultan at this moment stepped on the wharf, Halil, accompanied by the Grand Vizier, and other dignitaries, ran to His Majesty, and the former, making the usual salaam of kissing the Sultan's foot, announced to him with feeling of exultation that could scarcely be repressed, the wonderful success of the machine cannon, as they appropriately named it. The Sultan arrived at his tent, then sent for the ***master of the cannon***, the title which was given to Mr. Cochran, and after a short conference with him, in which Mr. C. conversed chiefly in the Turkish language, which he had partially acquired, the Sultan renewing his expressions of kindness, requested him to perform the experiment in his presence. His Majesty placed himself within a few feet of the piece, and Mr. Cochran commencing rather sooner than was anticipated, the Sultan, then with his back towards the cannon, was somewhat startled at hearing the explosions suddenly succeeding each other with such inconceivable rapidity. The cannon was fired 100 times as before in 15 minutes, during which the barrel acquired 650° of heat while the revolving cylinder which contained the charges was comparatively cool, being only 250° of the temperature. The Sultan's exclamation expressive of his delight was "God save the Americans—if such boys as you (Mr. C. being then but 21) can invent such things, what can your men do!"

He then asked him for the bill of expenses, and being told by Mr. C. it was left at his own pleasure, he went the next day at the request of the Sultan to visit him at his palace. The bag of gold he there received was truly an imperial present, and enough to make his fortune. The amount would scarcely be believed should we name it, and we do not feel ourselves authorized to specify the sum more distinctly than may be inferred from what we have said.

Mr. Cochran soon after returned to America, with an understanding that he should have a contract for supplying a large number of cannon of the pattern exhibited, whenever it could be agreeable to him to execute it.

These adventures of Mr. Cochran, yet a youth, seeking in a foreign land that patronage and encouragement which were the proper measure and appreciation justly due to his pre-eminent talents, and which it is lamentable to be obliged to confess, his own countrymen would not have bestowed upon him, recall the similar examples of West, Fulton, Perkins, and others, and are calculated to reflect discredit upon our national reputation, inasmuch as Americans ought to be the first to reward these incentive powers which are so emphatically characteristic of, as well as honorable to the genius of our people.

Description of the invention.—The invention of Mr. Cochran is adapted to every species of fire arms. The articles at present being exhibited by him at the Fair, are a model cannon, similar to that experimented upon before the Turkish Emperor, and a rifle complete, which we shall now proceed to describe. He has fired this rifle 1200 times, 500 of which discharges were in rapid succession, and without producing any expansion whatever in the chambers of the cylinder, or giving it a greater temperature than 100 degrees of Fahrenheit. As many as 2000 discharges are required before the rifle will have been properly tested after the rule of the war department. Mr. C. is ready at any time to fulfil this compliment and go beyond it. This afternoon he will fire it at Niblo's Garden 500 times in succession. The cylinder is a solid piece of iron, revolving in the plane of the barrel, and occupying a position directly at the base of the barrel which it is in close contact with.—The dimensions of the cylinder are in diameter about 4 inches, and in thickness seven-eighths of an inch. There are in this one, nine open chambers for the charges, which chambers are perforated upon the periphery and converge, like the radii upon the centre. The cones on which the percussion caps are placed, form another series of radii concentric and within the circuit of the chambers—a solid metallic partition dividing all the caps from each other. Each cone for the cap communicates with its appropriate chamber, and opens in the centre of the chamber, so that the whole charge of powder is ignited at once, by which the explosion of all the powder is made in one half the time of ordinary rifles, and therefore so much the more force given to it, and consequently a much less charge is required—the weight of the charge being only ***one grain and a half***.

As each chamber in its revolution comes in exact line with the tube of the barrel, the cock strikes the percussion cap, and the explosion takes place instantaneously. The chambers, as they successively come into a line with the barrel in the revolutions of the cylinder, are momentarily retained firm in this position by the ***regulating dog*** connected with the cylinder where it joins the breach, and the pin of which dog catches in the small perforations made at equal distances for its reception. Nor can the cock strike the percussion cap until it is in exact position, for if the chamber is not in its proper place, the socket into which the hammer of the cock falls has presented to it only the metallic partitions between the cones, and therefore on striking these no explosion can take place. Nor can any accident happen from explosions of the other chambers contiguous to the one in connection with the barrel. Such an accident never did happen with this rifle, and if it should, the direction of the chambers is such that their charges would do no mischief. Nor can the flash of the powder in the chamber in a line with the tube of the rifle be communicated to the other chambers, as the joint of the cylinder where it comes in contact with the barrel is so close that it is air tight, and will not permit of such extension of the ignited powder. The charge of one grain and a half of powder requires a size of ball of 50 to the pound, and the force is sufficient to perforate eight boards each of one inch thickness at the distance of 60 feet. The arrangement of the ball is another beautiful and ingenious invention. Their diameter is exactly fitted to the chamber, but larger than the diameter of the tube of the barrel by an incremen equivalent to the depth of the spiral creases on the inside of the tube. So that no patch is required as in other rifles, for it is forced into the tube of the barrel and exactly fitted to it by becoming compressed into a cylindrical shape, and its sides grooved by the creases of the barrel, whereby it is kept firmly in its course, and move steadily and with such precision, and so closely wedged that there is no ***windage*** can get before the ball, and give an irregularity to its motion—a serious inconvenience to which all other rifles are liable. The aim of Mr. Cochran's rifle therefore is always deadly and sure.

By this arrangement there is another additional power acquired, for you have the entire force of the charge behind the ball until it leaves the muzzle, and in the same proportion is the velocity augmented, and, therefore, a less charge required on this account, as well as on account of the manner in which the percussion caps communicate with the chambers, as already stated. The creases of the barrel, as we before said, keep the ball exactly in its place throughout its whole course to the muzzle, whereas the patch, always used in ordinary rifles, is constandly liable to tear, which causes the irregularity in the ball's motion, and defeats the very object for which rifles were intended. The manner in which the percussion cones communicate with the middle of the chambers, causes the powder to explode in one half the time it would if the ignition took place at the end, of, and posterior to the chamber.

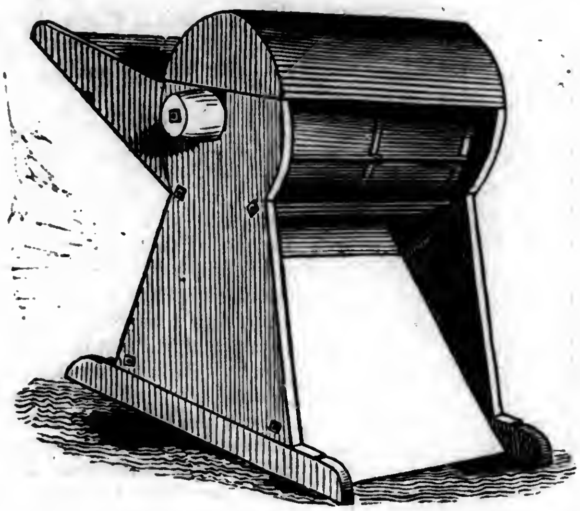
As an evidence of the accuracy and effectiveness of this rifle, Mr. Cochran related a bear hunt, in which he took part, a few days since, on the Moose Mountains, in his native state of New-Hampshire. He fired at the animal with the rifle now at the Exhibition, and lodged nine balls in his brain, while he was under full way, at the distance of some four or five rods from him. The bear was brought to the ground, and the nine balls recognized and identified from the others lodged near them, by the grooves made in them by the creeses of the tubes, and by their cylindrical shape. His brother sportsmen who had, until then, deemed themselves in possession of good sporting pieces, expressed themselves in raptures at the superiority of their young countryman's magic rifle.

Another remarkable property in this rifle is, that it has not the least recoil whatever, so that there is not the slightest jar or irregularity in the direction.

The rifle will be fired at Niblo's 500 times in succession this afternoon. The patent right for the rifle and pistol, for the United States, has been sold by Mr. Cochran to the trustees of a company in this city, for $300,-000. Richard & Richardson, No. 41, South Street, are the agents for the company, and have a large manufactory at Springfield, Massachusetts, and are selling the rifles faster than they can make them.

Col. Bomford, at the head of the ordnance department, U. S. army, who was present a the Fair, was so much pleased with Mr Cochran's rifle, that he ordered him to make one, and bring it to Washington for experiment.

WARREN'S PATENT THRASHING MACHINE.



This machine is formed for convenience, as it receives the unthrashed grain on either side, by a change of the hopper.

It cannot be injured by any stones or sticks passing through it, as it has no spikes to be broken or bent. The operating parts are of substantial wrought iron.

It thrashes all sorts of grain clean from the straw, and leaves the straw in a whole state, fit for binding. It requires but few hands to tend it, and but little power is necessary to thrash 200 bushels in a day.

Four horses will thrash 300 bushels in 12 hours, by having relief at half the time. One horse will do good business with the $25 Machine; that is, from 75 to 100 bushels, according to the nature of the grain.

Directions for Using.—Let a band from a drum or wheel of any power be put on the whirl to run easy. Let the tender push the grain in, and it will pass through in one second. It is thrown about fifteen feet. The cylinder must be raised, (by putting a piece of leather under the boxes,) for dry grain, to about half an inch, and let down to one-fourth of an inch for wet grain. The boxes should be oiled or greased often.

Price of Machines.—$20 for hand power, $25 for one horse power, $30 for two horse power, $40 for three or more horses, and $50 for extra sizes. A liberal discount at wholesale. All orders post paid will be punctually attended to: Address the inventor at 79 Barclay-street New-York.

E. WARREN.

N. B. Any man wishing to buy the patent (which was granted May, 1835,) for his county, shall have the same on very reasonable terms.

The Machines are easily made, being of the most simple construction and any Blacksmith and Woodworkman can build them. Draughts of an exceedingly strong and cheap horse power, which will not cost more than $20, and is made in the simplest manner, will always be given if reqired.

LAPHAM'S IMPROVED POWER LOOM, INVENTED BY BENJAMIN LAPHAM, OF WATERFORD, SARATOGA COUNTY, NEW-YORK.—PATENT.

The advantages of this improvement are, 1st. The shuttle is thrown with the same force and velocity, whether the motion of the loom is slow or quick; and the quantity or quality of the work is not affected by any irregularity in the speed of the loom,

2d. The saving of the expense of pickers, picker strings, and picker rod, and avoiding the loss of time consequent on the frequent regulating, breaking, and mending of the picker strings.

3d. By means of the whip roll above the warp beam, and over which the yarn passes, the tightness of the web is regulated, and kept constantly uniform; and, as the whip roll yields a little when the lathe beats up, the warp is mnch less liable to break.

The whip roll is so connected with the ratchet wheel that, when the loom makes cloth, the warp is uniformly delivered from the warp beam; and, if the web becomes too tight, it causes the whip roll to descend, and take a new notch on the ratchet wheel which turns the warp beam; while, if the web is too loose, the warp beam remains stationary till the proper degree of tightness is restored by weaving. By these means the cloth is rendered perfectly even, and of uniform thickness.

4th. The temples are so attached to springs as to be thrown back in case the shuttle or lathe strikes them, thus avoiding the danger of breaking the shuttle or the temples.—These temples also hold the web better, and form better selvedges than those in common use.

For further particulars, inquire of WALES & PLIMPTON, 40 Pine-street, or the *inventor*, Waterford.

MORTICING MACHINE.—The above cut preresents a Morticing Machine, exhibited at the Fair of the AMERICAN INSTITUTE, in October 1835, by Mr. George Page, of New-Hampshire, to which was awarded a *silver medal*. At the recen exhibition, a diploma was awarded.

DESCRIPTION.

C, C, B, A, the *frame*, consisting of two cross pieces or sills, with an upwright post from their centre, and a piece projecting upward in front at an angle.

d, *d*, The slide, with a socket in the lower end, into which the chisel is inserted. This slide is of iron, connected with the lever *h*, and sustained in its place by two boxes, passing through the upwright, which are regulated by thumb-screws on the side of the post.

e, The CHISSEL, a small but very important part of the machine. It is made of cast steel, about six inches in length, and from *one-eighth* to an inch in diameter. The cut is perpendicular on *one* side, and beveling on the other, with *side cutters*, projecting backward about one-fourth of an inch, which serve not only to make the sides of the mortice as smooth as the ends, but also to clear the chips, as the chissel is withdrawn from the mortice.

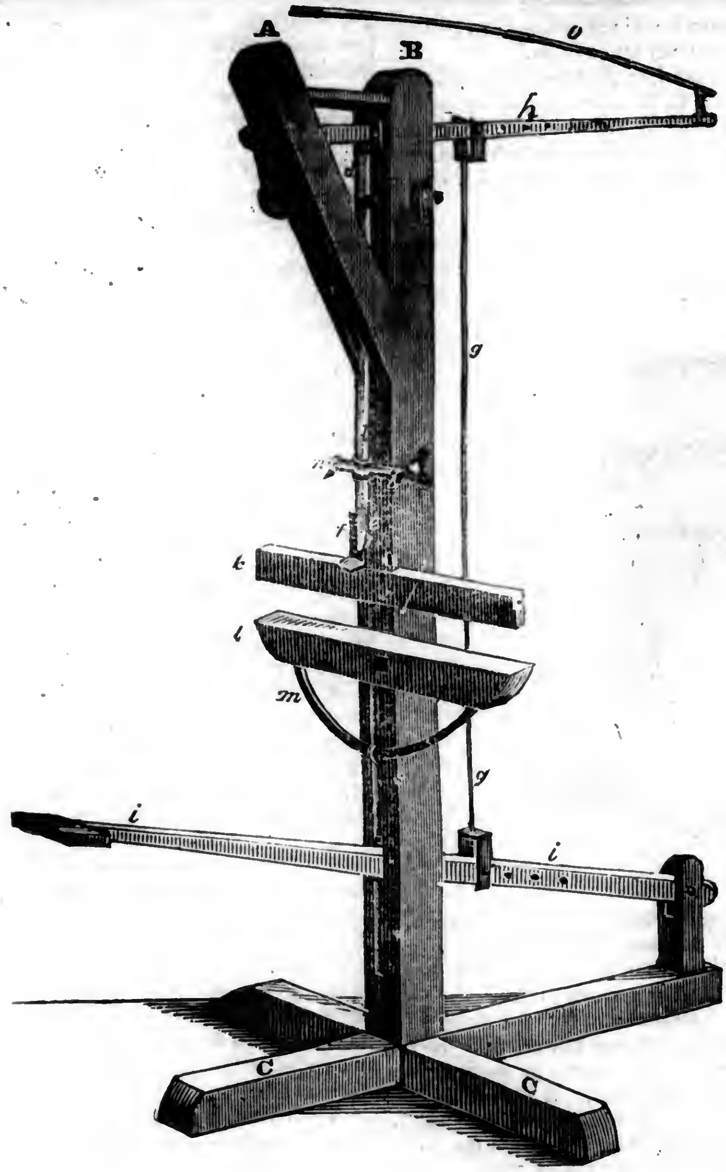
This chissel is either *single*, or *double*, cutting one or two mortices of equal width and depth at the same time. It has also a tool for making *dowells*, and another for cutting holes in Venician blinds, for the cord to pass through. The two latter are of much use, especially that for making dowells, or pins, of any size, from one-fourth to an inch in diameter, and 4 to 6 or 9 inches in length; and the other performs, at one pressure of the foot, an operation which in any other way requires five times the labor.

f, The stop, which is made fast to the upright by a bolt and thumb-screw, to prevent the timber from rising when the chissel is drawn up by the spring.

g, *g*, The connecting rod between the lever *h* and the treadle. This rod is movable to accommodate ahe depth of the mortice.

h, The *lever*, passing through the upright post and front brace, to which it is connected, in front, by two straps of iron. The lever, is about three feet in length, and at its extreme end connected with a spring-poll to raise the chisel from the mortice.

i, *i*, The treadle or foot-board, by which the machine is put in motion. This foot-board is also, like the lever, about three feet in length; passing through a long mortice in the lower part of the upwright post, and made fast *at the back end*, to a short upright standard, rising about 14 inches from



one of the cross sills. It is then connected by an iron rod in the rear of the upwright post, with the lever at the top, which rests upon the slide *d, d,* into which the chissel is inserted. The lever *h* acts upon a pivot in *front,* resting, at about nine inches from the pivot, upon the top of the slide *d, d,* which is moveable—and is connected by a rod with the treadle *i, i,* which acts upon a pivot at its extreme *back* end. By placing one foot upon the foot board, and pressing it down, the back end of the lever *h* also descends, and causes the chissel to perform its office upon the timber, which is laid upon the rest *l.* It will be readily perceived that a powerful leverage is obtained by this arrangement, and that a rapid motion is easily produced with the foot, by which the chissel is driven into the timber, and drawn out again by the aid of the spring pole.

The timber to be mortice is held in ist place on the rest *l,* until it receives a thrust from the chissel, when it is moved forward one eighth of an inch, by hand, or otherwise, as the chissel rises, and falls again by the aid of the foot. When the mortice is headed down at one end, to its proper depth, the chissel is turned the half of a revolution, by the aid of a spring and movable box *n.* and again confined, by a spring, in a proper position, and the timber is caused to retrace its course, and the mortice is completed, to a uniform depth, and headed down at the other end; and, on turning it over, the chips will either drop out, or may be easily picked out, as the chissel is so constructed, with side cutters, as to cut at *both sides,* as well as at the end; and therefore the mortice is not only perfectly true, or uniform in its sides, but also smooth, or free from splinters, arising from cross grain, as is frequently the case in the ordinary mode of morticing.

k, A back board or fence, which serves to keep the timber parallel.

l, The *rest* or *bench,* on which the timber to be morticed is laid. It may be *raised* or *lowered,* or placed at any desired angle to suit the nature and size of the work.

m, The half-circle, by which the position of the rest is regulated.

n, The box and thumb-spring, by which the position of the chissel is regulated.

o, The spring-pole, (shown in part,) which acts upon the lever *h,* and of course the slide and chissel which are connected with it.

It will be readily perceived that, by pressing the foot-board down to C, the chissel *e* will be brought down in a perpendicular line near to the top of the rest *l;* and it may be repeated an hundred times a minute, and thereby cut a mortice three inches or more in depth, and six to twelve inches in length, according to the wood, in a minute.—[Ed. M. M.]

B. SHERWOOD'S PATENT PORTABLE REVOLVING SAFE WITHIN A SAFE.

Having tested my FIRE PROOF REVOLVING SAFE WITHIN A SAFE, in the presence of many witnesses at the Fair of the Mechanics' Institute at Castle Garden, on the ninth day of September, 1836, I think it necessary to give an explanation of the test and its effect:

I built a cupola four feet six inches diameter at the bottom, and three feet six inches at the top, and six feet high; and placed the Safe in the centre, elevating it twelve to fourteen inches from the bottom, leaving a space of twelve to fifteen inches on every side, and underneath, which I filled with charcoal, and placed a large bellows at each side carrying their blasts underneath the Safe; set fire at half past one o'clock and began to blow. At half past two o'clock put into the cupola a quantity of iron, which soon melted down and lodged in the bottom. I kept up the blast until six o'clock, then pulled the cupola to pieces, drew out and opened the Safe, and found it to be safe indeed, for the books were not injured in the least, and although the heat was sufficient to melt the mortar and bricks of which the wall was composed, and the iron between the wall and the Safe, the iron of which the outside of the Safe is made was not injured.

The reason why the iron of the Safe was not injured, is—the composition put in as a non-conductor prevents the fire from affecting it, insomuch that the coals will be black about the Safe for two or three inches, when there is heat enough to melt iron at a distance of eight inches from it. It is evident that the heat endured by my Safe, was far greater than it would have been exposed to had it been in the hottest part of the great fire of December, 1835. For if it had been there, it would have fallen and laid on and amongst the rubbish, and the part that laid down would have been exposed to but very little heat, and it being round, the heat would have passed off without the least injury. It will be remembered, that where the heat is sufficient to melt iron, it must be of short duration, unless supplied with fuel; for, any thing combustible is soon destroyed where there is heat enough to melt iron. It is true, that the fire of December, 1835, continued some days, but not with sufficient heat to melt iron; where the heat was the most intense, the fire was out first. Those iron chests which were destroyed at the great fire could not have bden exposed to heat enough to melt iron; for it will be remembered that there were hundreds of their skeletons to be seen about the ruins, which consisted of thin sheet iron, and nails with large heads, the wood being entirely destroyed; and it is evident, that sheet iron as thin as they are made of, could endure the heat of a furnace but very few minutes.

The following is the copy of a certificate voluntarily got up and handed to me:

"This is to certify, that on the 9th day of September, 1835, at the Fair of the Mechanics' Institute at Castle Garden, Mr. Benjamin Sherwood, made trial of his Double Safe. A cupola was built outside the Fort, and two bellows applied. The books were deposited in the presence of the Managers and others, and it was then put into the cupola furnace with a quantity of cast iron: at 4 o'clock the heat was so that the cast iron melted down. The blast was continued until 6 o'clock, when the furnace was broken to pieces and the Safe taken out and opened. The books were perfectly uninjured and scarcely warm, though the outside of the Safe had endured a heat sufficient to melt cast iron, for more than two hours.

Samuel Carter, 36 Vesey-street.
Owen G. Warren,
W. J. Mullen, 175 Broadway, up stairs.
Henry Durell, 216 William-street.
J. Walter Weaver,
Richard Bragau, 41 Wooster-street.

The Committee awarded the above Safe the Silver Medal of the Institute, which is its highest honor.

The Safe is portable, and mounted on castors; and may be had at No. 65½ Wall-street, where the one referred to above may be seen, together with the iron melted round it, and parts of the wall with which it was enclosed, and other evidences sufficient to satisfy the most sceptical.

Benjamin Sherwood, Patentee.
New-York, Oct. 1st. 1836

(From the Macon Messenger.)

GEORGIA RAILROAD CONVENTION.

Macon, Monday, Nov. 7, 1836.

At 12 o'clock the Convention assembled at the Methodist church. On motion, H. G. Lamar was appointed chairman, and Asbury Hull, of Clark, appointed Secretary.

The Rev. Mr. Wilson addressed the throne of Grace.

The Delegates present produced their credentials; and the secretaries recorded their names: From the county of

Baldwin—J. A. Cuthbert, W. Rutherford, M. J. Kenan.
Bibb—I. G. Seymour, W. Poe, John Lamar.
Campbell—E. B. Thompson, W. Bomar, Wm. Cantrel.
Cass—W. Hardin, T. Hamilton.
Chatham—J. M. Wayne, S. B. Parkman, J. M. Berrien, Wm. Searborough.
Cherokee—S. Thompson, M. J. Camden.
Clark—A. S. Clayton, E. Payne, J. A. Cobb, A. Hull.
Cobb—J. R. Brooks, J. B. Green.
Crawford—H. Crowell, J. A. Miller, R. H. Slappey.
DeKalb—R. Cone, W. Ezzard, A. McLarty, E. Bird.
Fayette—J. D. Stell, J. Lambirth, T. C. Coleman.
Floyd—J. H. Lumpkin.
Glynn—T. Butler King, George Dupree.
Greene—F. H. Cone.
Gwinnett—John S. Wilson, A. R. Smith, E. Winn, J. Mills.
Habersham—R. W. Habersham, jr., John Brannon.
Hancock—J. B. Gonder, J. B. Lewis, R. P. Sarsnett.
Henry—T. D. Johnson, B. Petit, J. Johnson, J. S. Calloway.
Houston—D. C. Campbell, J. A. Everett, E. E. Crocker, Geo. Patten.
Lumpkin—A. J. Hansell, E. W. Randell, M. H. Gathright.
McIntosh—T. Spalding.
Monroe—A. Speer, O. Rodgers, J. Thweatt, A. Redding, W. H. Prichard.
Morgan—R. H. Randolph, C. Campbell.
Muscogee—J. W. Campbell, B. Hepburn, W. S. Chipley.
Newton—J. N. Williamson, J. W. Graves, A. J. Luckie, John G. Floyd.
Pike—J. Adams. J. Whatley, J. Eppinger.
Pulaski—S. B. Taylor, A. Rosseter, J. Rawls.
Putnam—P. S. Holt, H. T. Shaw.
Raban—Samuel Beck, H. H. Armstrong, B. Dover, Sitton.
Richmond—J. P. King, D. St. Johns, T. Glascock, W. W. Holt.
Sumter—T. C. Sullivan,
Tolbot—A. W. Sneed, B. Hill.
Taliaferro—T. Chaffin, T. Foster.
Twiggs—H. Bunn, J. E. Dupree, G. M. Welch.
Upson—J. Beall, W. A. Cobb, S. S. Crute.
Walker—W. Jones, R. M. Aycock.
Washington—M. Brown, Q. Screene, Wm. Fiske, J. W. A. Dawson.
Wayne, T. B. King.
Monroe R. R. Co—L. L. Griffin, A. H. Chappell, S. T. Bailey, H. G. Lamar, J. A. Nisbet, T. G. Holt.
Georgia R. R. Co.—O. H. Prince.

Some debate took place on the question of admitting Delegates from the several incorporated Railroad Companies in this State to seats in the Convention:—the question was finally settled by withdrawing the objections.

Ossian Gregory, and C. A. Higgings, Esqrs. were appointed Secretaries to the Convention.

On motion of T. Butler King, the Convention proceeded to the election of President by nomination, James M. Wayne, of Chatham, was thereupon nominated by Mr. Hull of Clark, for President of the Convention; which nomination was unanimously confirmed.

On being conducted to the chair, the President elect addressed the Convention in an appropriate speech, in which the origin and object of the Convention were briefly unfolded.

Mr. Clayton, from a committee appointed at the Knoxville, Ten., Convention in July last, made a report accompanied by the following resolution, which was agreed to:

Resolved, That a committee of 40, consisting of one member from each county, and one from each of the Railroad companies represented in this body be appointed, to which shall be referred the documents already presented to this meeting, and such resolutions as may hereafter be adopted by the Convention.

The following gentlemen were appointed by the Chair: viz. Messrs.

Clayton, of Clark,
Poe, of Bibb,
Cuthbert, of Baldwin,
Hardin, of Cass,
Parkman, of Chatham,
Thompson, of Cherokee,
Crowell, of Crawford,
Thompson, of Campbell,
Brooks, of Cobb,
Cane, of DeKalb,
Stell, of Fayette,
Lumpkin, of Floyd,
Wilson, of Gwinnett,
King, of Glynn,
Cone, of Greene,
Brannon, of Habersham,
Gonder, of Hancuck,
Campbell, of Houston,
T. D. Johnsou, of Henry,
Hansell, of Lumpkin,
Spalding of McIntosh,
Speer, of Monroe,
Randolph, of Morgan,
Campbell, of Muscogee,
Williamson, of Newton,
Holt, of Putnam,
Eppinger, of Pike,
Taylor, of Pulaski,
King, of Richmond,
Beck, of Rabun,
Sullivan, of Sumter,
Dupree, of Twiggs,
Sneed, of Talbot,
Foster, of Taliaferro,
Cobb, of Upson,
Brown, of Washington,
King, of Wayne,
Aycock, of Walker,
Chappell, of the Monroe R. R. Co.
Prince, of the Georgia, R. R. Co.

The Convention then adjourned tomorrow morning 10 o'clock.

Tuesday, Nov. 8, 1836.

The Convention met pursuant to adjournment. After prayer by Mr. Speer, the journal of yesterday was read.

The following gentlemen appeared and took their seats as members of the Convention.

Milton H. Farther, of Lumpkin, Jno. W. H. Dawson, of Washington, W. G. Chipley, of Muscogee, W. W. Pritchard, of Monroe, F. H. Cone, of Greene, W. W. Holt and Thomas Glascock, of Richmond, W. Rossater and Jno. Rawles, of Pulaski.

F. H. Cone, Esq., of Greene was added to the committee of 39.

Considerable debate took place on the question of referring the Charters of the several Railroad Companies to the Convention, to inquire what amendments, if any were necessary, to induce the State to embark in a general system of Internal Improvements—in which Messrs. Clayton, Griffin, Spalding, Bailey, Poe, H. G. Lamar, Cone, Prince, &c. &c., took part. The motion was finally laid on the table.

The following resolution offered by Mr. Chappell was adopted:

Resolved, That the Committee of 40 be instructed to inquire and report, what means by legislation or otherwise, are best cacu-

lated to bring about a harmonious and efficient co-operation of the various sections and interests of the State in constructing a system of Railroads, connectin8 the commercial cities of Georgia with the Tennessee river.

On motion of Mr. Cone.

Resolved That the Committee of 40 be instructed to inquire and report what system of Internal Improvement by Railroad and Canals and the navigable waters of the State will best subserve the great interests of the State.

On motion of Mr. Brown of Washington,

Resolved, That a committee of 7 be appointed by the Chair, to report rules for the government of this Convention in its deliberations. Whereupon the Chair appointed Messrs. Brown, Berrien, Glascock, King, Payne, H. G. Lamar and Bailey, that committee.

Adjourned till to-morrow ten o'clock.

WEDNESDAY, Nov. 9.

The Convention met pursuant to adjournment.

Prayer by Mr. J. S. Calloway.

Mr. Clayton from the committee of 40 made a report to the Convention as given below.

Messrs. Clayton, Spalding, Berrien, Glascock, and others addressed the Convention, on the subject of Internal Improvement. Mr. Sneed of Talbot moved that the report be amended by striking out that part of the resolution which recommends the main trunk to be constructed at the expense of the State—which motion was lost.

The committee of the Macon Railroad Convention to whom has been assigned the duty of inquiring and reporting what means are best calculated to bring about a harmonious and efficient co-operation of the various sections and interests of the State, in constructing a system of Railroads connecting the commercial cities of Georgia with the Tennessee river, have, in their consideration of the subject, been deeply conscious of its exceeding magnitude and of its vital connexion with the permanent grandeur and prosperity of the State. When a commercial intercourse shall once be opened by means of a judiciously devised system of Railroads between the several leading places of trade in Georgia and the navigable waters of the Tennessee river, it requires not the gift of prophecy to enable us to forsee that a powerful impulse and vast expansion will be immediately imparted to all our resources of greatness and social improvement. The whole valley of the Mississippi and of the Ohio, comprising regions equal in extent to two thirds of our entire country, and of unsurpassed fertility in productions different from those most congenial to our own soil and climates would be thrown open to an easy, cheap and rapid trade with us. Our commerce in the direction of the West would receive no barrier short of the Rocky Mountains—in that of the North it would find an easy access to the margins of the Great Lakes—to the east of the Mississippi and above the mouth of the Ohio, the Allegany Mountains would be its only boundary—whilst below the mouth of the Ohio, the navigation of the Mississippi and its tributaries would invite and favor its transit through extensive regions of kindred character and productions with our own.

For all this vast, various and fertile expanse of country, nature has provided no avenue of commerce with the rest of the world save that of the Mississippi river. An axenue, it is true, fully comporting, in point of physical grandeur, with the magnificent evtent of territory which it was destined to accommodate, and adequate to the wants of that territory whilst it was yet but slightly reclaimed from a state of wilderness; but wholly insufficient for the necessities of the present day. When the forests have given place to cultivated fields and to the thick abodes of high civilization and enterprising industry—so soon as society and population in the valley of the Ohio and upper Mississippi approximated to this stage in their onward progress, the disadvantages of a pent position barred by mountains from commercial access to the Atlantic States and seaports, began to press with grievous weight on the Western people.

The Atlantic States and cities were, in their turn, quick to perceive and appreciate the rich benefits to themselves, that would necessarily accrue fromopening channels of commerce through which they might supply the augmenting wants, and receive in return the overflowing productions of the West. It was this view of the subject, coupled with a patriotic solicitude to consolidate the bond of our political union by the ties of commercial interest, that prompted Washington, in the infancy of our Republic, to recover, and seduously to cherish and urge the idea of conneting, by canals, the Ohio river with the great Atlantic streams of Virginia. Such an idea, deliberately entertained and earnestly patronised by the Father of his country, could not fail to sink deep in the public mind. It terminated at length, and at this time it is seen in all the great Atlantic States, from New-York to Georgia, producing its benign fruits in works of commercial connection with the West, either already completed and in operation, or in a process of successful execution, or engaging an anxious public attention preparatory to the commencement of active labors.

The great State of New-York stands first in point of time, and foremost in grandeur and success of her exertions to this end. She was stimulated to the work, not less by the peculiar advantages of her geographical position and features, than by the necessities of her interior population, and her prescience of the mighty benefits her commerce would derive from making the valley of the Ohio assemble to her great emporium. The subsidence of the Alleghany range of mountains, into that vast extent of plain country which spreads out from the head of navigation on the Hudson river to the borders of Lake Erie, invited and faciliated the construction of her Grand Canal. From the western termination of the canal her commerce was carried, by the navigation of the Lake, to the shores of the State of Ohio. The people of Ohio, taking up the work in their own boarders, soon executed a chain of canals, connecting the Ohio river with Lake Erie. So that by the joint result of the Internal Improvement's of New-York and Ohio, one great outlet, embarrassed however by much circuity, and numerous transshipments, has been opened from the great West to the Atlantic coast.

Pennsylvania has vied actually with New-York in works of internal improvement, for attracting the commodities and commerce of the West to her borders: and her communications are now complete through a succession of canals and railroads. Virginia, Maryland and South Carolina, as well as Pennsylvania, have all distinctly entered the lists as competitors for the same Western trade, upon which New-York has grown so great: but all these States lack the felicity of position enjoyed by New-York. *The monntains tower up across their path to the West.* It is not until we reach Georgia, that we meet with any thing analagous or comparable to the geographical facilities possessed by New-York, for constructing artificial channels of commerce with the West. The dispension and subsidence of the mountains in the North-West angle of Georgia, opens a way through our territory for a connection of the Atlantic with the Mississippi waters, strikingly analagous but greatly superior for all purposes of extensive trade with the West to that which New-York owes to the non-appearance of the same mountain chain across the route of her great canal. A canal of more than three hundred miles in length connects the steam boat and sloop navigation of the Hudson, *not with the steamboat navigation of the Ohio and all the Western rivers*, but only with that of Lake Erie, and from the Lanhee through several other channels, and after divers transshipments at length with the Ohio, whilst a single track of railroad of from one hundred and ten to one hundred and thirty miles in length, branching off into three prongs, ranging from one hundred to one hundred and fifty or sixty miles in length would connect our three main navigable streams with a point on the Tennessee from which we have an assurance of continuous steamboat navigation throughout the whole length of the Ohio and Mississippi, and all their tributaries.

In point of geographical position and circumstances, then the advantages of Georgia over New-York for forming artificial channel for commerce to the West seemed to be neither small or questionable whilst her advantages in the same regard over Pennsylvania, Virginia, Maryland and South Carolina, are great and decisive to the full extent of the difference of distance in her favor, and to the extent also of the difference between the facilities and plains, and the obstacles of mountains to the construction of Railroads. Assuredly not one of the Atlantic States to the east of Georgia would have dreamed of the gigantic enterprize of surmounting and perforating mountains at enormous expense with lines of railroad leading to the west, and nature

vouchsafed to them so direct and easy a pathway as that which she has thrown open to Georgia.

Will the people and government of Georgia, slight so benign and magnificent an overturn of nature in their favor? Will they refuse to lend their own concurrence and co-operation to effect a complete fulfilment of the grand destiny which a partial Providence has put so clearly and easily within their achievment? Are they content that the State shall forever revolve as a secondary orb, although manifestly entitled by her position and capabilities to assert her claims to the highest and most brilliant sphere? Nay more: are they willing that comparative poverty, discomfort and desolation shall have perpetual reign over the extensive domains of Georgia which might be speedily and permanently converted into seats of wealth, high social improvement, and of a dense and flourishing population by the simple process of excluding a system of internal improvements which all approve and desire, to which the resorces are infinitely more than adequate, and which over and above its ever flowing advantages in other regards, would in the very next moment after its completion more than repay to the people the whole cost of construction by the single effect of the augmentation which it would occasion in the value of lands.

The committee have propounded these questions which nothing but the future history of Georgia can positively answer, not in the dispondency of doubt but in the fervor of oonfidence. Every consideration of patriotism and enlightened self-love, all the views of sound policy and noble ambition by which a great and sagacious people can be expected to be governed, must fail in one single case, of their usual and natural results, if the exeeution of the great work referred to the committee, be not in a very few years placed beyond doubt or contingency.

This confidence on the part of the committee, will not be considered as unwarrantably entertained, when a closer view is taken of the character and extent of the proposed work, the vastness of its utility and its almost equal diffusion of benefits to all the various sections and interests of the State.

Let it be remembered, then that the Big Tennessee river to which it is proposed to carry our contemplated system of railroads is navigable by steamboats throughout its whole length to its junction with the Ohio, with the exception of the obstructions at the Muscle Shoals. Around these shoals a railroad is already built and in use, and the construction of a steamboat canal is also far advanced, which is expected to be soon made passable by steamboats, and which, when finished, will furnish a constant steamboat navigation at all seasons of the year.

Mop's Landing or some neighboring point on the Tennessee river, just above the commencement of the passage of the river, through the Cumberland Mountain, is thought to be the most eligible place for the proposed railroad to strike the Tennessee river. The Tennessee from this point would be our channel of trade with the West and Southwest, seconded and aided however by railroads by which it is contemplated in that quarter of the country, to connect the Tennessee river with Memphis, Nashville and other important towns.

From Kop's Landing, the road coming in this direction would proceed only five miles before entering the territory of Georgia at or near Rossville, a place just within our boundary. It is a matter about which no doubt is entertained by those well acquainted with the localities of the country, that an excellent route for the road requiring not a single inclined plane or stationary engine can be obtained from Kob's Landing to some point on the Chattahoochy in DeKalb county. The distance would probably be about from one hundred and ten to one hundred and thirty miles. At this point or at some neighboring point—the road might be made to diverge into three branches, the most easterly proceeding to meet the railroad from Augusta to Athens; the next to meet the Monroe railroad from Forsyth to Macon—the most westerly pursuing its way down the Chattahoochy to Columbus. The three branches would thus be respectfully united to the three leading Commercial towns in the interior of the State, Augusta, Macon and Columbus, and to the navigation of the several rivers on which they are respectively situated.

These branches like the common trunks beyond the Chattahoochy, would pass over a country so favorable as not to require an inclined plane or stationary power.

It will at once be seen by an inspection of the map of the State that this system of Railroads would diffuse over all parts of the State, almost a precise equality of advantages. The main trunk would be actually common in its use, and equal in its utility to all parts of the State; and the several different sections of the State would certainly receive equal, or nearly equal benefits, from their respective branches.

There is a space of five miles from Rossville, on the boundary between Georgia and Tennessee and Hoss' Landing, on the bank of the Tennessee river, which being within the territory of Tennessee, cannot, of course, be covered by a Railroad constructed by Georgia. To supply this chasm, and make the line complete to the Tennessee river, there can be no difficulty in effecting a suitable arrangement with the Hiwassee Railroad company chartered by the last Legislature of Tennessee for the very purpose of carrying to any point that may be selected on the Tennessee river, any railroad coming from Georgia to the Tennessee line. The stock under this charter was taken last summer: the company is organized and now it is understood awaiting our movements and ready to co-operate with us.

Another striking recommendation of the scheme of railroad connection with the Tennessee river, which the committee have sketched, is the facility with which it may at any future day, be united by a branch with the Louisville, Cincinnati and Charleston Railroad, at Knoxville. A branch of only an hundred and twenty or thirty miles in length would be necessary for this purpose, and the Legislature of Tennessee in enabling the charter of the Cincinnati and Charleston Railroad, reserved to itself the right of authorizing such a branch.

In the event of this connection with the Cincinnati and Charleston Road, we should have two openings to the trade of the West—one through the channel of the Tennessee river, into the Ohio and Mississippi—the other through that of Cincinnati and Charleston road. And should this connection with the Cincinnati and Charleston road never take place, we shall still have access to the trade of all East Tennessee and a part of North Carolina and Western Virginia, by means of the navigation of the Tennessee river and its tributaries, above Ross' Landing.

The road when completed, with the three branches, leading to Augusta, Macon and Columbus will be fed and sustained by the transportation of all Western supplies introduced for the internal consumption of all Georgia, and Florida—the Southern side of South Carolina, and the Eastern side of Alabama, also by the transportation of all Western commodities, searching a Foreign market through the seaports of Georgia. To which must be added the vast amount of transportation, arising out of the internal trade of the State—the productions of our soil, and the foreign merchandize by our own people. The revenue of the road would be still further swelled by the conveying of all foreign goods, obtained from or through Georgia, for the Western markets—to which must be likewise added, the important item of the stream of passengers that would be continually flowing along the lines of the road.

The commercial towns of Georgia would also become, to a very large extent, the medium through which the foreign trade of the West would pass: and thus be enabled to take their stand as competitors with New-Orleans, New-York, Philadelphia and Baltimore, for the general commerce of the West.

With these great and numerous advantages—almost equally diffused through every part of the State—profiting alike our agriculture and our commerce—with the certainty, too, that the amount of travel and transportation would be sufficient to render the work a safe investment of capital, the committee see every ground for believing that when the enterprise shall be thoroughly canvassed and understood, it will unite the suffrages and be supported by the general co-operation of the people of the whole State.

The mode in which the public energies would most advantageously be directed to the accomplishment of the work, has occupied the anxious attention of the committee. And their opinion on the best reflection they have been able to bestow, is that weighty reasons concur in making it expedient that the single trunk of railroad from the Tennessee river to the Chattahoochy, which would be common in its use to all the three branches, and equal in its benefits to all parts of the State, ought to be under-

taken and constructed entirely by the State, at the public expense, and emphatically as a State work. The branch may be advantageously constructed by Joint Stock Companies, particularly interested in the sections of the States through which they respectively pass, aided by the State, subscribing for a portion of the Stock.

The committee in accordance with these views submit the following resolutions:

Resolved, That it be recommended to the Legislature to commence and construct a system of Railroad improvement, by constructing a Railroad from a point on the Tennesse line, at or near Rossville, to some suitable point at or near the Chattahoochee river, running through the Cherokee counties on the most practicable route between said points hereafter to be ascertained by legislative provisions.

2d. To authorize any companies that may have charters, and to create others, where they do not exist, to branch from any point of said main trunk to the towns of Columbus, Forsyth, Athens, and to such other places as the Legislature may designate, the State investing one-fourth of the capital necessary for each branch.

From the Williamsport Free Press, Vov. 17.

NORTHUMBERLAND AND ERIE RAILROAD CONVENTION.

Agreeably to the commendation of the meeting at Erie, delegates were appointed from several counties to convene in this Borough on the 16th inst., to consider and adopt such measures as would tend to the early connection of Philadelphia and Erie by Railroad, viz: from the West Branch of the Susquehanna river to intercept the Railroad from Philadlphia at Northumberland or Sunbury.

Having ascertained that the Court House would be too inconvenient for the Convention to assemble in, application was made by Wm. P. Farrand, Esq., and other of our citizens for the use of the German Church, which was willingly and cheerfully granted by the Trustees.

At 11 o'clock the Delegates assembled, and were called to order by Mr. Richards of the city; when General J. B. Anthony was called to the Chair, and Col. J. Burnside of Centre, and W. H. Watts, Esq., of Erie, appointed Secretaries. The counties being called over, two hundred and four Delegates from sixteen counties presented their credentials and took their seats.

Hon. E. Lewis, of Lycoming, moved that a committee of one from each delegation be appointed to select officers for the permanent organization of the convention—which, after being amended on motion of Gen. Cameron of Dauphin, that each Delegation should make choice of their representative, was agreed to.

On motion of Mr. Ayres of Dauphin, Editors of papers in the county were admitted to seats in the convention to take minutes of its proceedings.

Mr. Reed of Philadelphia, moved, that when this convention adjourns, it adjourn to meet at 2 o'clock, P. M. Agreed to.

On motion, adjourned.

Two o'clock, P. M.

Convention met agreeably to adjournment.

Mr. Bellas, from the committee to report Officers, made the following report, which was unanimously adopted by the Convention.

President.

NICHOLAS BIDDLE, of Philadelphia.

Vice Presidents.

WM. F. PACKER, of Lycoming,
SIMON CAMERON, of Dauphin,
WM. DONALDSON, of Columbia,
HUGH BELLAS, of Northumberland,
JOHN DICK, of Crawford,
RUFUS S. REED, of Erie,
S. SARTWELL, of M'Kean,
H. HALDEMAN, of Lancaster,
R. HAYES, of Union,
A. B. REED, of Clearfield.

Secretaries.

JAS. BURNSIDE, of Centre,
A. V. PARSONS, of Lycoming,
THOS. STRUTHERS, of Warren.
WM. WILLARD, of Tioga.

The Hon. Ellis Lewis, and H. Bellas, Esq., conducted the President to the Chair, when he returned thanks to the convention in the following very neat address:

I pray you gentlemen, to accept my acknowledgments for the mark of your confidence—alike gratifying and unexpected. It is now more than twenty years, when at the close of the last war, being anxious to devote all the resources of Pennsylvania to its improvements, I introduced in the Senate of our State, a bill to examine and survey all the communications between the Eastern and Western section, and particularly this very country—the improvement of which, is the object of this convention.

Since that period other pursuits have made me less familiar with the details of this project, but they have abated nothing of the zeal which I have always felt for its success, and I, therefore, came willingly to this convention, to offer to the cause any poor service in my power. But, I came to listen and to learn—prepared to take only an individual's share in the deliberations of a body, where there are so many gentlemen who were more natural objects of your preference, and more worthy of it than one so little known to its members. You have decided otherwise, and I cheerfully accept the appointment under the conviction which has regulated my life, to decline no duty by which I may be deemed competent to serve the country. I assume it with less reluctance because the composition of this assembly, as well as the object of it, will render easy the task of presiding over its deliberations. The great purpose which calls us together, will ensure a unity of action and an earnest and harmonious co-operation of us all to accomplish it, and as the members themselves are gentlemen, who can differ without losing their natural respect, and who know how to infuse into the collisions of opinions so much urbanity, the body will move by the instinct of its own good feeling, and there can be no difficulty in preserving order where there is no disposition to disturb it.

Mr. Reed, of Philadelphia, moved that a committee of one from the city and each county be appointed, to report proceedings for the action of the convention. Agreed to.

Whereupon the Chair appointed

Messrs. Reed of Philadelphia, Roberts, Sharp, Sallade, Paxton, Caldwell, Donnel, Grafius, Armstrong, Walker, Clark of Potter, Farrelly, Warner, Clark of M'Kean, Saynisch,—who retired to perform that duty.

A letter from Engineer Chas. D. Hass, to the Postmaster at Lewisburg, was presented to the Convention by G. F. Miller, of Union; which, on motion, was read.

Mr. Packer, of Lycoming, moved that in case of a division being called for, in the convention, no city or county should be entitled to more than one vote.

Gen. Frick, of Northumberland, moved to amend, so as to give each county and city represented the same number of votes allowed them in the Legislature—each county represented, however, to be entitled to one vote.

After some discussion,

Mr. Cummings, of Lycoming, moved an indefinite postponement of the question.—Not agreed to.

After considerable debate the amendment was adopted, and the resolution as amended passed.

On motion, the convention adjourned to meet at 7 o'clock, P. M.

Seven o'clock, P. M.

In pursuance of adjournment, the convention met. The minutes of the afternoon session having been read,

Mr. Reed, of Philadelphia, from the committee appointed to draft resolutions expressive of the sense of the convention, reported

That he had been instructed to report the following for the consideration of the convention, which had been adopted unanimously by the committee.

1. Resolved, That this Convention, deeply impressed with a sense of the importance of an immediate connexion by Railway between the waters of Erie and the city of Philadelphia, and relying securely on the liberality and enterprize of their fellow citizens throughout the Commonwealth to aid them in attaining so desirable a result, recommend an immediate application to the Legislature to incorporate a company with adequate capital to construct a Railway from Erie, by the way of Williamsport, to Sunbury, in Northumberland country, thus completing a communication between the waters of the great western lakes and the Susquehanna, and by avenues, now contemplated or in progress, with the metropolis of the State.

2. Resolved, That so strong is our confidence in the success and ultimate value of the Railroad communication between Lake Erie and the Susquehanna, and such our anxiety to facilitate its early completion, that we consider ourselves fully authorized to solicit the aid of the State, either in the form of subscription or otherwise, and that the Legislature be memorialized to that effect.

3. Resolved, That this convention also earnestly recommend to the attention of the Legislature the subject of the intersection of the Main line of Railway from the Lakes to the Suquehanna, by a Railroad from Catawissa, at some point between Williamsport and Sunbury, to be determined by the company incorporated and now engaged in making a Railway from the Susquehanna to the

Little Schuylkill, and also recommend a connexion by Railway from Sunbury to Harrisburg, believing such projects to be calculated to promote the interests of the State as well as of those of its citizens who are immediately affected by them.

4. Resolved. That this convention consider it due to themselves and to the constituents who have deputed them, to promote by concert and recommendation the further extension of the public works of the commonwealth, to bear ready and decided testimony in behalf of the system of Internal Improvement by Railroads and Canals, which after struggling through years of doubt and difficulty, now approaches the maturity which will shed undying honor on the public men with whom it originated as well as those by whom it has been resolutely sustained.

5. Resolved, That as friends of Internal Improvement, we cannot consider that system as in any sense completed while any portion of the first, great enterprize remains to be done, and that this convention therefore earnestly recommend the further extension of the canal and slack water navigation on the west branch of the Susquehanna, and if on full and accurate examination it shall be found practicable, as we confidently believe it will be, the connexion by canal of the head waters of the Susquehanna with those of the Allegheny and Lake Erie; and that this work should be done under the authority of the State whose bounty her citizens in every part have a right to share.

6. Resolved, That the public gratitude especially due to the individuals with whom the proposition of this convention had its origin; they have been the instruments of convening on this auspicious occasion, citizens from the most remote extremities of the commonwealth, who have brought hither the best and purest wishes for her welfare, and a resolute determination by all honorable and patriotic means to promote it; who have counselled together with a single view to the attainment of the great object of their meeting and whose deliberations will, they fervently trust, be crowned with complete and ultimate success.

After the resolutions were read,

Mr. Ayres, of Dauphin, moved that a second reading be dispensed with, and that they be adopted collectively, but at the request of Mr. Merril, of Union, the motion was withdrawn. The first resolution being then read.

Mr. Merril moved to strike out "Williamsport," and insert "the West Branch of the Susquehanna," and addressed the convention for some time in favor of his motion.

Mr. Ayres opposed the motion.

Mr. Reed of Philadelphia followed, also in opposition to the amendment, and sustained the resolution as reported in a very able and felicitous manner.

Mr. Caldwell, of Union, advocated the amendment.

Mr. Armstrong, of Lycoming, addressed the convention in opposition to the amendment, and in favor of the original resolution.

Mr. Merril again addressed the convention in support of his amendment, and was answered by Mr. Parsons of Lycoming, after which the question was taken and the amendment was lost.

The original resolution was then adopted almost unanimously.

The second resolution was read and adopted without discussion.

The third resolution being read,

Mr. Comly of Columbia, moved to amend by striking out "some point between Williamsport and" and inserting "Northumberland or" in lieu thereof.

Col. Paxton of Columbia, opposed the amendment and it was agreed to.

Gen. Cameron of Dauphin, moved to amend by inserting after Sunbury "by the way of Millerstown and Halifax."

Not agreed to.

The resolution was then adopted as reported unanimously.

The fourth, fifth, and sixth resolutions were severally read, and adopted unanimously.

Mr. Ayres moved that the committee who had been appointed to report resolutions be appointed a committee to memorialize the Legislature in accordance with the second resolution.

Mr. Reed of Philadelphia, suggested that it would be better to pass a resolution recommending to each delegation to sign a memorial and get their constituents to sign it and lay it before the Legislature, and that the proceedings of this convention be signed by the officers and members of the convention, and copies to be sent to each member of the Legislature and the Executive of the State.

The motion was so amended and adopted.

Mr. Trego from the city, offered a resolution expressing the thanks of the convention, the distant members particularly, for the kindness shown them by the citizens of the Borough of Williamsport, and to the Trustees of the German Church, and to the County Commissioners for their kindness in allowing the use of the Church and Court House.

On motion of Mr. Watts of Erie.

The thanks of the convention was voted to the officers for the able manner in which they fulfilled their duties.

Mr. Biddle as one of the officers, acknowledged the compliment, and expressed his pleasure at the order, unanimity and good feeling preserved and expressed by the members of the convention.

On motion, Ordered, that the proceedings be published.

Mr. Armstrong, in behalf of the Lycoming Delegation, claimed the right of defraying the incidental expenses of the convention.

Objections were made to this arrangement by the other Delegations; but the Lycoming Delegation would not concede the point.—Mr. Burnside in behalf of the other Delegations, expressed their thanks.

On motion, the Convention adjourned SINE DIE.

From the New-Orleans Standard.

INTERNAL IMPROVEMENTS OF LOUISIANA.

Believing that it would be beneficial to the interest of Louisiana to ascertain what internal improvements in canals and roads have been completed or are in progress, in order to ascertain what may be projected, we have obtained an account of them as prepared by Dr. E. H. BARTON, for another useful purpose: from which we make the following remarks, with additional observations of our own.

1. CANALS.—The Carondelet canal company was incorporated shortly after Louisiana had been ceded to the United States, with a capital of $200,000 and a perpetual charter—to connect lake Ponchartrain with the Mississippi river which has been done: the canal made, being only 2 miles in length; and three-fourths of the anticipated gain being destroyed by absolute neglect.

2. The Barrataria and Lafourche canal connects the Mississippi river—6 miles above New-Orleans—with the Barrataria bay via the bayou Lafourche, being about 22 miles long, at a cost of $100,000.—Steamboats with stern machinery now ply on it; but the operations languish from want of funds of proper management. A delightful hotel and bathing place might exist at the bay, were the canal efficiently completed.

3. The Orleans canal of the Canal and banking company, runs from the centre of the second municipality to lake Pontchartrain, about 6½ miles long and 60 feet broad. It has cost very nearly $1,000,000 and is still inadequate for the purposes designed.

4. The Plaquemine canal is old and almost useless, as its bed is higher than that of the Mississippi, and consequently dry at low water. It was a local speculation; and heavily taxed the resources of the State to please log-rolling members from that district.

5. The canal Verret is intended to connect the Barrataria canal with the rivers Atchafalaya and Teche: but when or whether it will be finished is a problem in the womb of time.

RAILROADS.—1. The Pontchartrain railroad was the second completed in the United States; and is second to none in construction and management. It is 4½ miles long, and cost about $200,000. It yields an income of 8 per cent. which has however, been sunk in making improvements on the harbor etc.—now valued at $500,000.—The company has been authorized and required to construct another railroad to lake Borgne; and had received banking privileges on a capital of a million and a half: but the bank was refused and nothing additional has yet been done.

2. The Carrolton Railroad, with its branches, is about 11 miles in length; and cost nearly $300,000. A bank was attached to it, in order to extend the road to Bayou Sara, which would bring that town within 90 miles or 5 hours distance instead of 150 miles and 12 hours; but the company suffered taxation by the State rather than vainly contend with the inveterate ignorance and prejudice of the planters thro' whose lands the route would pass. It now yields a considerable revenue to the bank.

3. The New-Orleans and Nashville railroad, according to the surveyed route, would be about 564 miles; and would cost ten millions. Twenty miles of it are under contract; and may soon be completed, as the rails etc. are imported already. Owing to the parsimony and perverseness of the State Legislature, and some prejudices raised against the company here and in Mississippi, the works have not progressed as anticipated; but these obstructions will

shortly be obviated, and in another twelve months, the whole line in Louisiana may be completed.

4. The Atchafalaya railroad is intended to connect Opelousas with the Mississippi; and afterwards to extend to the Sabine—the 1st line being 30 miles, and the whole 150. It will have a branch to Cheneyville, and thence to Alexandria on the Red River.—The cost will be $500,000.

5. The Red River railroad is an adjunct of the latter for the purpose stated, for which a company has been incorporated with a capital of $500,000. The route has been surveyed, and the line is under contract.

6. The Baton Rouge and Clinton railroad is to be 20 miles long, and to cost $250,000. It will connect both towns, and is now under contract.

7. The St. Francisville and Woodville railroad is to be 27 miles long; and to cost $500,000. It extends into the State of Mississippi and may be prolonged to Natchez.

8. The Port Hudson, Jackson and Clinton railroad is to be 28 miles long, and cost $400,000. A bank has been attached to it; and the road is under contract.

9. The Orleans street railroad is 1½ miles long, and cost already $12,000; but owing to the supineness or culpability of the 1st municipality council, it is useless to the public, and a dead loss to the owner. It was intended as a route to the grave-yard.

Companies have been incorporated to construct other railroads. One from Springfield to Liberty, 30 miles long, to cost $200,000; another at Livingston into Mississippi 16 miles, to cost $150,000; a third from Lake Providence to Alexandria, 100 miles long, to cost $800,000; a fourth in the parish of Iberville about 8 miles long, to cost $50,000.

A company has been established, but not yet incorporated, to construct a railroad from the lower part of the city of the English Turn; and one was incorporated last year, but not yet established, to construct a railroad on the opposite side of the river in a parallel direction. But the former only will be successful.

Companies have been chartered for other objects of what may also be termed internal improvements, such as constructing water-works for New-Orleans, furnishing gas lights, etc. The water-works belonging to the city have a mile of pipes, and cost $110,000; and are intended exclusively to supply a stream of water in the street gutters: the water-works belonging to the bank have already cost about $480,000; and by next summer nearly 20 miles, of mainpipes will have been laid—they are to supply public streets and private houses. The gas works has not progressed as expected, owing to the obstinance of the old council, and its immediate successor, as they are likely to yield a handsome revenue to the bank, when in full operation.

It may not be amiss to state also the Draining company; chartered to dig the swamp rearward of New-Orleans. Two steam engines have already been constructed, and long since have been in operation, but that an experiment was tried on a worse than useless wheel, and that its substitute will be very little better. It is necessary to raise the water at least 7 feet; but a level wheel elevating only 3 or 4 was tried and of course failed; and a water screen is now attempted which will equally fail, as it can elevate only 6 feet. The only safety for success and economy consists in using forcing pumps: machinery on any other basis will be a loss and a failure. The expenses of the company have already amounted to nearly $70,000; and the probable cost of contemplated operations, is $640,000.

Nor may it be unnecessary to remark that several improvements in remaining obstructions from navigable rivers and closing up bayous, have been effected at the expense of the State, for the sake and influence of members from certain districts.—The raft has been removed from nearly 200 miles of the Atchafalaya river: for which Congress should indemnify the State, as the route is chiefly if not wholly through public lands unsold and unsurveyed.

From this statement it will be perceived that when all the canals and railroads in progress or projected in the State of Louisiana are completed, the length of the canals will be 60 miles, and the cost $1,450,000; and the length of the railroads will be very nearly 900 miles, at an expense of $15,438,000.

N. B. There are private railroads and canal of considerable length, on the estates of many planters.

From the Mauch Chunk Courier.

LEHIGH NAVIGATION.

It is with much pleasure we announce to the public the completion of one of the Lehigh Coal and Navigation Company's high dams and high lift Locks which, on practical trial, meets the most sanguine hopes of its friends.

The Lock is 20 feet wide, 100 feet long, and 23 feet lift. It fills in 2 minutes and empties in the same time, or rather less time. When the Lock is ready for reception, a boat can pass up or down in 3 minutes, which is as short a time as is employed in passing an ordinary Lock of 5 feet lift.

From the manner of filling the Lock, the boat ascends more safely and with much less jarring about than in the common Lock.

The introduction of this species of Lock forms an important epoch in Navigation for Pennsylvania, which abounds in large rivers where the supply of water is ample, as it reduces the interruption in Navigation arising from lockage, to about one-third of the time employed on the old system. On the Lehigh River it is especially adapted, as from Mauch Chunk to Wright's Creek, there is required but 29 locks, whereas on the old plan it would have required 75, of 8 feet lift. Allowing the average of 5 minutes to pass a lock, it will now take but 145 minutes from Mauch Chunk to Wright's Creek, but on the old plan 375, making a difference in favor of the present plan, of about 4 hours every passage up or down, or two-thirds of a day to each trip a boat would make during the season. Allowing each boat and crew to be worth $4,00 a day, the boat would save each trip $2,66, and allowing her to make but 16 trips a season, each boat would save in passing these locks, $42,50 a year.

The Lehigh Company now have 200 boats employed in the Coal trake alone, and their business increasing in the ratio of 50 per cent. a year, but supposing the Wyoming Valley should only send in the aggregate as much Coal as is now sold by the Lehigh Company, those 200 boats would save to the Valley, by the new plan of high lifts, more than eight thousand dollars per annum.

Much credit is due to E. A. Douglas, Esq., Engineer of the Company, by whose skill and sound judgment these Locks were laid out, and under whose direction the one now in use has been completed. Mr. Douglas, as well as the Company, may now safely challenge any skeptic in the plan of high dams and high lift locks, to prove that they are less secure in point of strength, or less durable than those of the ordinary height and lift of 8 feet. All who have witnessed the operations of the Lock at White's Haven, acknowledge its superiority in every point of view.

Items.

Jamaica Portion Long-Island Railroad.—We understand that it appears, by an estimate, that since this road went into operation in May last, 70,000 passengers have been conveyed upon it. The receipts for passengers and freight have been upwards of $24,000.—*Star.*

During the construction of this road, it was confidently predicted, that in less than a year, the grass would grow over the track.

The Louisville, Cincinnati and Charleston Railroad Company is formed.—The subscriptions to this Road, as returned to the central Commission at Knoxville, on Monday, the 7th inst., were for the following amounts:

Stock taken in South Carolina,	$3,023,450
We know of four places in the State where Stock were taken, that did not send their returns in time,	101,300
Amount taken by Col. Wade Hampton, on re-opening the Books at Knoxville,	220,050
Whole amount taken by citizens of South Carolina,	3,344,800
Stock taken in North Carolina,	102,600
" " " Tennessee,	353,600
" " " Kentucky,	186,800
" " " Cincinnati,	12,200
Amount required to secure the Charter,	$4,000,000

The Greenwich Railway Company have commenced lighting their line with gas. Its appearance from the Old Kent road is very brilliant, and, when completed to London bridge, will certainly be one of the

most splendid displays of gas in Europe.—[Herald.]

GEORGIA RAILROAD.—The Augusta Constitutionalist of the 11th inst., says: It will be gratifying to the friends, as also those interested in the extension of this Railroad towards the west, to learn, that it has been ascertained, from a recent instrumental examination of the country between Greensboro' and Madison, that the ground is much more favorable for that purpose than originally anticipated. No inclination exceeding thirty-five feet per mile will be necessary, and the expense of graduation will not be materially greater than the average cost of the Union Railroad. For the above information, we are indebted to the Chief Engineer of the Road, J. Edgar Thompson, Esq.

THE RAILROAD.—On Tuesday afternoon, the new locomotive engine, "*Susquehanna*," manufactured by Mr. W. G. Whistler, of Lowell, was tried on the Wilmington and Susquehanna Railroad, and her performance was equal to the most sanguine expectations. She started from the depot in Wilmington with her tender, and this being the first essay with an engine on this road, proceeded at a moderate pace to White Clay Creek bridge, a distance of six miles. Here a large burden car was attached filled with passengers, and the solidity of the superstructure having been satisfactorily established, she returned with rapid speed to Wilmington. She was about 14 minutes on the road, some part of which was travelled at the rate of 35 or 40 miles an hour.

The Susquehanna is provided with a "*steam whistle*," an instrument whose piercing, shrill sound may be heard at a distance of at least a mile, and give awful notice of its approach to any point, where such notice may be useful. The rails are laying over White Clay Creek bridge, and when the draw which is now preparing is attached to the bridge, the travel from this place to Elkton by the Railroad, will be open. This will be by the 1st of December.—[Delaware Journal.]

ANOTHER LOCOMOTIVE ENGINE FOR RUSSIA.—On Thursday, the 15th of September, a large and powerful locomotive-engine, built by Mr. Timothy Hackworth, of New-Shildon, for the Emperor of Russia, was shipped on board the *Barbara*, at Middlesbro'. This engine is constructed on an improved principle, and finished in the best manner. She has been tried on the premises, and propelled at the rate of 72 miles per hour. It is said that this machine, and the similar one built at Newcastle, will, on their arrival at St. Petersburgh, have cost the Emperor upwards of 2,000*l.* each. Who, a few years ago, would have dreamed of the exportation of machinery from the river Tees. This engine is for travelling on the railroad from St. Petersburgh to Pawlowsky, where stands one of the country palaces of his Imperial Majesty.—[From a Correspondent.]

DETROIT AND ST JOSEPH RAILROAD.—We are happy to learn that part of the iron for this great work, for the first 27 miles, we believe, has arrived at Buffalo, and been shipped there for this port.

The season has been a very unfavorable one for clearing and grading on the part of the route put under contract; considerable progress has been made, however; and we believe no obstacle now exists to the speedy completion of the road as far as Ann Arbor or Dexter.—[Detroit J. & C.]

MANCHESTER AND LEEDS RAILWAY.—The first general meeting of the proprietors in this undertaking was held on Thursday, at Manchester. It was stated in the report that the annual export of cotton twist and manufactured goods, for the north of Europe—the whole of which must pass by this railway—was proved by one witness, before the House of Commons, to amount to 80 millions of pounds; while another stated that the trade in twist, with Russia alone, was in value upwards of £1,500,000 annually. In estimating the advantages resulting from passengers, it was calculated that the average along the whole line by coach was now 116,399 per year; the average fares being 15s. inside, and 8s. to 10s. outside; and the average time occupied six hours and a half. By waggon there are carried, along various distances, 109,486 tons, equivalent to 44,274 along the whole line; the present charge is 30s. per ton; and the time occupied from two to three days. The goods carried by canal are equivalent to 189,020 tons of merchandise, and 60,452 of minerals; making a total of 249,472 tons along the whole of the line. The average freight is £1 6s. 8d. per ton, and the time occupied is three days. Now, estimating the number of passengers at double, the goods carried by land at their present amount, and the goods carried by land at their present amount, and the goods carried by water at one-third, the expected income would be £228,963 6s. 8d., for passengers and goods; of which it is calculated that passengers, at 2d. per mile, would produce £115,256 5s. 4d.; and goods, at 4d. per ton, per mile, for merchandise, and 2d. for minerals, would realise £113,707 1s. 4d. The estimate of the work was £984,482; to which, adding contingent expenses, at nearly 12 per cent., there would remain £200,000 for the purchase of land.—(Cheers.) The report of the Finance Committee was next read, by which it appeared that the amount of paid up capital was £64,755, and supposing all liabilities to be discharged, there would remain for disposal, in the banker's hands, the sum of £31,975 8s.—[Ledger.]

A party of Englishmen lately undertook on a wager, to make the tour of France by WATER. They took the Languedoc canal from Bordeaux to the Mediterranean and continued their course up the Rhone, till at Mullbans they discovered that the canal was too shallow to admit the yacht. Under this embarrassment they adopted an expedient which even Yankee ingenuity could not have surpassed. The yacht was embarked in one of the canal boats, and the adventurers without ever quitting their quarters on board of her, were comfortably transported to the Rhine, where they will proceed on their voyage.—[Boston Transcript.]

CANAL TOLLS. The tolls collected on the New-York canals for the month of October, amonnt to the sum of $262,684,27:

This is an increase over the tolls of October 1835, $3,252 86. The tolls received from the 1st to the 14th of November, amount to about $120,000. If the weather continues favorable until the first of December, the receipts for toll for October and November will not fall much, if any short of half a million of dollars for the two months.

The whole amount received for tolls from the opening of navigatinn on the 15th of April to the 14th of November (seven months) is about $1,550,000—being an average of a little more than $221,000 for each month.

The gold mines in Virginia continue to attract attention. The Vaucluse mine adjoining the rich Greenwood mine, has been brought into market for $51,000, or $30 per share. More than 700 shares have already been taken. As much as $30,000 have been obtained from the Vaucluse mine by simple washing.

The Governor of Tennessee has subscribed in behalf of the State for one third part of the capital stock of the Lebanon and Nashville Turnpike, and has appointed Col. A. G. Findley, John Hearn, Esq. and Col. Alfred M'Lean, of Wilson county, Directors on the part of the State for the same.

MANUMOTIVE-CARRIAGE.—A mechanic a white-smith by trade, named Nicholson of the town of Enniscorthy, has invented a new carriage, on most simple principles.—It is very ingeniously consrtucted, having three wheels, one in front, and two behind—the latter about three feet in diameter, the former one and a half. It is propelled by an iron handle, which the guide moves to and fro with the right hand, and not tiresome, being quite a gentle motion; on the left there is a small lever, to be touched by the finger when any obstruction appears on the road, which raises the first wheel over such impediments, and prevents the guide from receiving any shock or interruption. Then over the small wheel there is a handle, or tiller-stick, to be touched when the driver wishes to turn the gig, and which is done instantaneously; there is another spring for the foot, which retards the progress of the machine. The maker is quite confident of its ultimate success, and says he can improve on the general principle, the present model being too small to contain more than one person; and we suppose the driver or guide would work it for eight or ten miles without tiring. It has taken the artist some years in its completion, and we wish him every success and encouragement to which his genius and industry justly entitle him.—[Dublin Paper.]

MAGNETIC BALANCE.—Could not small philosophical scales be more nicely suspended by magnetism than by the present method; with the precaution, to use no metal in their construction acted on by magnetism, except the centres, the edges of which must be reversed?—[Tyro-Mechanicus.]

J. Hoyle, of Holmfirth, gardener, devoted to the Church Missionary Society last year the fruit of a gooseberry tree, which sold at the rate of one penny for each berry, for £2 7s. 8d. He made a similar gift this year, and the produce of the same tree has been sold at the same rate for the sum of £4.—[Stockport Advertiser.]

The bore for the Artesian well at the Abbattoir de Grenelle has now reached 1100 feet without finding water. M. Mulot has engaged with the city of Paris to go to 1200 feet, and it is said that if he then should find no water, he is ready to enter into a new contract, to bore to the depth of 2,000 feet.

Lord Henniker stated, at the last East Suffolk Agricultural Dinner, that he had received a letter from Lincolnshire, informing him that in that neighborhood they had already a steam plough, which would harrow 30 acres and plough eight acres per day.—[Globe.]

We learn from Athens that there has been lately discovered there an ancient tomb, ornamented with very fine sculpture, having at each corner a lion in demi relief of great beauty. On being opened, the bones it contained crumbled into dust, and there are not the least traces left of any inscription, although no doubt is entertained that it originally bore one. The learned believe it to have enclosed the body of some celebrated Athenian Generol.

It was mentioned in 1834 that in a body found on opening the ancient British Tumulus, near Maiden Castle, there was a mass of seeds discovered in the viscera; they have been set by Professor Lindley, who has reared several plants of common raspberry, now bearing fine fruit. This proves that this plant was known at a very early period in England.—[Dorset Chron.]

The following curious experiment has been tried with success on a mountain called Teufelsberg, near the village of Philippsthal, within the Prussian States. It became desirable to get rid of a large rock, and in order to avoid the immense expense of the ordinary means, it was resolved to try the effect of atmospheric electricity. To this end a deep hole was made in the rock and from it was raised a bar of iron 28 feet high. At the first thunder storm which ensued, the lightning was attracted by the iron bar and conducted into the rock, which it shattered to pieces, and was afterwards easily carried away.

Power-looms in Glasgow have increased greatly of late years; some idea may be obtained of the extent of their use when it is known that, in 1835, four houses employed 3,040 looms. These looms on an average weave 14 yards each, per day. Allowing each loom to work 300 days in a year, these four companies would throw off 10,-101,000 yards of cloth, which, at the average price of 4½ d. per yard, is £189,393, 15s. per annum. The power and hand-looms belonging to Glasgow in 1831 amounted to 47,127; viz., steam-looms 15,127; hand-looms in the city and suburbs 18,537; in other towns for Glasgow manufactures, 13,463. Since that period power-looms have greatly increased.—[Ledger.]

A little mine has lately been set on foo at Newlyn, near Petnzance, called Wheal Newlyn; and not being able to open their a..t on the course of the lode, in consequence of a fish cellar over it, the miners were obliged to drive in another direction to come on the lode, when they found a cavity in the earth, about 18 feet in length, with water about a foot deep, in which was discovered a quantity of fish of the conger-eel species, although there appears to be no inlet or outlet for the water. It is supposed that a mine was worked on the spot about 150 years since; but how the fish got there is quite unaccountable, as it is upwards of 70 feet from high-water mark. Some of the fish were eight or nine inches long, and it is supposed that there are many large ones in the same place.—[Falmouth Packet.]

The *Revue de Paris* states that "M. Vorace Hernet, who some days since returned to Paris, will make but a short stay in the capital, and that he has been largely remunerated by the Emperor of Russia for his preference of that country to France. A Lieut. General is said to have been attached to M. H. Vernet's person during his stay in Russia, and it is added that as he wished to visit Moscow, the Emperor lent him his own relays, by which he was enabled to perform the journey between that city and St. Petersburg, in the incredibly short space of 36 hours. The artist has also been honored with numerous proofs of his Imperial Majesty's munificence, and, amongst others, with the gift of a suit of oriental armour enriched with precious stones. The armour in question was originally in the Museum, but M. Vernet having one day regarded it with admiration, the Czar, by whom he was accompanied, immediately ordered it to be conveyed to his protege's residence. Paintings to the value of 300,000 rubles were also ordered to be executed by the favored artist. M. H. Vernet is not the only French painter who has met with hospitality and patronage in Russia; M. Tanneur, a marine painter, having likewise reaped a plentiful harvest of presents in that country, and having obtained an order, to the value of 150,000 roubles, to paint the Russian ports."

We learn from Angers that, on repairing the walls of a gallery which leads from the Conciergerie to the apartments of the Prefect, a discovery has been made which may tend to elucidate the history of the ancient Benedictines of that town. On clearing the wall, some fragments of ancient gothic sculpture were disclosed, and, curiosity leading on to further searches, a magnificent range of arcades, of the moresque style, were apparent. They are composed, as far as it is yet possible to judge, of six arches, resembling mortuary chapels. Each of these recesses is sustained on one side by 12 columns, placed in two parallel lines, and on the other by a plain pilaster, surmounted by an elegant freize. The capitals of the columns are of different designs, and several of them rival the Corinthian in richness, and in delicacy of workmanship. These six arcades are followed by four others upon a larger scale, and also supported by columns. They are extremely rich in symbolical sculpture. That of the middle, which is the largest, is filled with griffins, fishes, reptiles, and human figures, more or less artfully grotesque.—Some erudite persons affirm that the signs of the zodiac are meant to be represented.—The arch adjoining, represents the heavenly abodes. Several groups of archangels, angels, and cherubim, are worthy of being studied. The third division is dedicated to warriors, whose arms and costume seem to be of the tenth century. The last appears to have been devoted to the useful arts, and represents numerous workmen engaged in their respective labors. Measures are being taken to preserve these truly interesting remains of the early ages.

A letter of the 14th inst., from Blois, gives the following account of the Scientific Congress now assembled there:—

"The first meeting was held on the 11th. About 200 members are expected to be assembled; but the whole had not arrived. The President of the Congress is M. de la Place, of Orleans. The Vice-Presidents are M. Bergevin of Blois, and M. Gaillard of Rouen. It is divided into the following sections—*First. Physical and Natural Sciences.* President, Dr. Roberton, member of the Geological Society, and the Society of Natural Sciences of France, and of several Academical Societies. Vice-Presidents—M. Montlivaut, Vice-President of the Academical Society of Tours, and the Abbe Lefron, Botanist. Secretaries—the Count de Vibraye, of the Geological Society of France, M. de Villiers, Conservator of The Cabinet of Natural History at Chartres, and M. Renon, Chemist. *Second Section. Agriculture, Industry, and Commerce.* President, M. Lair, President of the Central Society of Agriculture at Caen; Vice-President, M. de la Giraudiere, President of the Royal Society of Agriculture at Blois; the Prince de Chimay, Founder of the Prytaneum at Menars; Secretaries, M. Riffault, of the Agricultural Society of Blois, and M. de la Tremblaye, of The Royal Society of the Indre et Loire. *Third Section. The Medical Sciences.* President, Dr. Desparanches, of the Royal Society of Medicine; Vice-President, Dr. Archambault, President of the Medical Society of Tours; Secretaries, Dr. Desbrosses, of the Academical Society of Blois, and Dr. Heme, President of the Medical Society of Tours. *Fourth Section. History and Archaiology.* President, M. de Caumont, Correspondent of the Institute, and Secretary to the Antiquarian Society of Normandy; Vice-Presidents, M. de Fontenelle, Secretary to the Academical Society of Poltiers; Secretaries, M. Duplessis, Secretary to the Academical Society of Blois, and M. de Sauley, of the Royal Academy of Metz. *Fifth Section. Literature, the Fine Arts, and Philology.* President, Mr. I. Spencer Smith, of the Royal Society of London; Vice-president, M. Chatelain, a man of letters of Paris; Secretaries, M. De Recy, of the Academical Society of Blois; M. Doublet de Bois-Thibault, of The Academical Society of Chartres. *Sixth Section. Moral, Economical, and Legislalive Sciences.* President, M. Jullien, of Paris; Vice-President, Dr. Simon; Secretaries, M. Alphonse Laurent, President of the Tribunal of Commerce at Blois, and M. Charles Dain, Member of the Ecole Societaire.

Friday the neighborhood of Thames-bank, Chelsea, was the scene of considerable bustle and excitement, in consequence of the completion of the buildings belonging to the United Kingdom Beet Root Sugar Association. Early in the morning the premises were decorated with numerous flags, and at twelve o'clock the ceremony of laying the

stone of an immense shaft took place. The premises, covering an extent of 50,000 square feet, were completed in the extraordinary short period of six weeks. The whole of the engineers, carpenters, etc., to the number of 300, were regalled with plenty of old English fare. It is expected that this association will be the means of furnishing employment to many thousand laborers throughout the kingdom.—[Post]

A circumstance has occurred within these few days, which is calculated to give a new stimulus to the exertions making in this country for the improvement of the communications with India. We allude to the arrival of the petitions to the House of Commons from Calcutta and Madras, in favor of the route through Egypt. That from Calcutta has nearly 3500 signatures; and that from Madras as many in proportion to the population, all the signatures being those of the most wealthy and eminent native and English residents. These petitions were prepared and signed as far back as March last, and the calculation of the parties was, that they would reach England before the prorogation of Parliament. Captain Grindlay, who is well known for his intimate acquaintance with Indian affairs, has been appointed agent in this business for both the Presidencies. We should say, if the mere subscription of £65,000, which is the sum asked from the government and the East India Company together, were likely to be an absolute loss, the experiment ought to be made. That it will be attended with any loss at all is, however by no means probable.—[Times.

The Lead Trade.—There are annually transported from the upper Mississippi Lead mines to New-York, about 14,000,000 pounds of lead; and the opening of new mines at Dubuque and Mineral Point, in Wisconsin Territory, will this year probably swell it to 20,000,000 pounds. The freighting is now done on the Mississippi, by the way of New Orleans to New-York. The lead sells at 6 cents per pound in that city. A petition is to be presented to the Territorial legislature of Wisconsin, next month, for authorizing a company to build a railroad from Milwaukee to some eligible point on the Mississippi, and to terminate to Cassville. The length will be about 140 miles. On this railroad, it is calculated the immense freighting from the mining district will be done and taken through our lakes and the Erie canal to New-York, which can be done in one quarter of the time it now takes by the New-Orleans route. We hope no time will be lost in putting so important a work in operation; and we can safely conclude that no other route can compete with it for the lead trade of the upper country.

J. C. Schæfer published a Book in Germany so long since as 1765, describing his intentions for making paper from every kind of stuffs and the bark of trees. He has given various processes for making paper without rags, with specimens; among these are samples made from the cotton flowers of the poplar tree, wasps' nests, wood-shavings, moss, beech, willow, aspen, mulberry-tree, clematis and pine tree; from hemp, and hop stalks, the barks of the vine; the leaves of aloes and the lily of the valley; from barley straw, cabbage stalks, the stems of thistles, burdock, maize and broom, and even from Bavarian turf.

Mr. Webster's Lecture.—The Boston Lyceum on Tuesday evening commenced its fall campaign, with an audience of 2500 persons, and an introductory Address by the Hon. Daniel Webster. The performance was a masterly essay on the progress of Popular knowledge, philosophical, profound, and every way worthy of the orator; Mr. Webster adverted to the importance of wealth in carrying on large manufacturing establishments—and the necessity for partnerships of individuals for this purpose, under the restraints and protection of the laws, The tendency of these incorporated companies, is not merely to amass property—*but to diffuse it.* And the present unexampled prosperity and happiness of New-England may be attributed in a great measure to the diligent employment of our citizens. He has also exposed in the most triumphant manner the popular fallacy, that capital is an enemy to labor—and showed that while aggregated wealth has for years been steadily employed in the application of science to art, the price of labor has been constantly increasing, and now is higher in this country, than has ever before been known—thus contradicting the favorite dogmas of the writers on political economy. Labor with us is free—and is constantly accumulating for all, owing to the enterprise of our citizens, and the skill with which capital is employed. In Europe, the laborer is *always* a laborer—but not so in New-England. Here, capital and labor are less distinctly divided. There is no class which owns all the capital, and another which performs all the labor. *Industrious and sober young men, who are laborers to day, may reasonably expect to become capitalists to-morrow.*

Distressing Steamboat Accident.—We learn from the Cincinnati Whig of the 18th inst., that a most distressing accident occurred on board of the steamboat Flora, Capt. R. D Chapman, on the 17th, while on her way from Louisville to Cincinnati. The boat had approached to within thirty miles of the latter place, when the pipes which connect the two boilers together, commonly called the "connecting pipes," suddenly broke, or separated, causing the death of one man, and the scalding and mutilation of thirteen others, all cabin passengers but one.

As soon as the noise, which the accident occasioned, was heard by the persons in the cabin, most of them unfortunately ran to the door, which on being opened, enabled the scalding steam to rush in and perform its work of destruction. The following is a list of the sufferers:—

Killed—Benj. Myrick, of Charlestown, Mass.

Very badly scalded—recovery doubtful—Samuel Donnally, of Washington, Penn.; E. McLaughlin, Columbiana county, O.; Hon. G. L. Kinnard, member of Congress, from Indiana; George Fisher, residence not known, but got on board at Louisville.

Badly scalded—but will probably recover—L. Allen, from the Eastward, residence not known; Isaac Shepherd, residence not known; Thomas Turner, Steubenville, Ohio; Moses Brown, colored cabin boy.

Slighly scalded—Mr. Clancy, Pittsburgh, Pa.; C. L. Thomas, residence not known; Rev. Luther Hasey, Pittsburgh; Mr. Thomas Turner's brother, a lad about 10 years of age; Mr. Philips, of Pittsburgh, was slightly hurt in attempting to jump through the window.

The boat was towed to Cincinnati the day after the accident, by another steamboat, and several of the wounded persons taken to the hospital.

The Cincinnati Gazette states that "the accident is imputed to the gross negligence of the engineer."

The Fire Brigade.—An experiment was tried last week with the new covering of the body which has cost the London Fire Engine Establishment 5,000 francs, and which is so constructed as to prevent the thick smoke which generally precedes a conflagration from injuring the wearer, and also enables him to rescue any persons who might be nearly suffocated by the smoke. The invention, which is by a Colonel Paulin commandant of the fire brigade at Paris, is composed of particularly strong pieces of leather, and forms a shirt and it is covered over with composition, It has also sewn to the neck a kind of bag, into which the head of the bearer is to pass, and is to be drawn over the helmet and coat of the firemen. The sleeves are firmly tied round the wrist, so as to exclude the smoke and external air. The ends of the garment, which do not reach below the abdomen, are secured around the body to an air-proof closeness with a strong leathern belt; on the forehead of the cap is fixed an oval piece of strong plate glass, of such dimensions that the eyes can range through it without the slightest obstruction. Beneath the glass and opposite the mouth is a tube, on which the bearer, in case of an alarm, or according to a pre-arranged signal, can sound a call as loud as a boatswain's whistle. On the back of the shirt, about half way down, is an orifice, to which is to be fastened a tube communicating with a fire-engine, and through this, by an apparatus to be added to the engine, air is pumped for the suste-ance of the wearer at regular intervals, which will be discharged through another tube provided with a valve for that purpose, and fastened to the frontal extremity of the covering. On the breast of the person is fixed a large reflecting lamp, by which he will be enabled to distinguish any person who may have fallen. On one side of the belt, which goes round the body, is stuck a large axe, and to the back of it is affixed a strong iron ring, to which is fastened a rope, by which, on a signal of approaching exhaustion, or even if he should have remained in the place too long, so as to create suspicion, he may be drawn out with ease. The fireman can take with him the branch of an engine hose, and can discharge water on the fire. The experiment was crowned with success. One of the firemen equipped himself in his shirt, and entered a cellar in which a quantity of straw was placed and set light, and he remained amongst the black volumes of smoke for nearly an hour. He felt no oppression or inconvenience by it, and it is the intention of the establishment to supply all the engines belonging to them with Colonel Paulin's shirt and appendages, which will most likely save both life and property in the course of time.—[Standard.]

On Wednesday, died at his house in Greenwich, John Pond, Esq., Fellow of the Royal Society, a corresponding member of the French Institute, and an honorary member of most of the astronomical societies in Europe. During 25 years Mr. Pond filled the office of astronomer Royal, from which a hopeless state of ill-health obliged him last autumn to retire. As a practical astronomer, Mr. Pond had no superior few, if any, equals. His perception of the capabilities of instruments generally, and of the mode of so using them as to render all their strong points available and their weak ones unprejudicial, formed a very striking feature in his professional character. The numerous bulky folio volumes of his observations, so highly appreciated by scientific men in every part of the globe, are alone sufficient to show the extent and utility of the work performed at Greenwich during the time that the establishment was under his direction. The accuracy of a portion of these observations is to be attributed to improvements in the mural circle, suggested by Mr. Pond, which converted it into the most perfect instrument used in the Observatory; but the correctness of the chief part must be ascribed to a mode of observing of which he was the sole inventor. This consisted in the union of the two circles, and the observing with one by direct vision, with the other simultaneously by reflection, thus correcting those errors which are incidental to observations made by a single instrument. A result, and perhaps the most important, of the application of the mural circle, has been the formation of a catalogue of the fixed stars more perfect than any before or since produced. Here it may also be stated that the vast superiority of the Greenwich transit observations made by Mr. Pond has been publicly recognised by several contemporary astronomers of the first rank. To his earnest and reiterated solicitations our national Observatory is indebted for many of the new instruments which have, confessedly, rendered it so pre-eminent and complete. His skill in the use of these was very remarkable; his talent for observing quite unique; and it is a question whether any of the most skilful of his countrymen are thoroughly, or at least practically, acquainted with his mode of operation; but Messrs. Arago and Biot, as well as M. Bessell, the great French and German astronomers, have borne witness to the decided merit and originality of his method. In order to study it, M. Arago not long since visited Greenwich, and was deeply impressed both by its novelty and efficacy.—[Chron.]

A German journal states that the excavations at Athens are being carried on with great perseverance. Among other discoveries there have been found in different broken fragments of an inscription, a species of account of the expenses of the sculptured ornaments of a temple which appears to have been the Erectheon. It bears the signature of the architect, whose name was Archilochus of Agryle, and has hitherto been buried in oblivion. The names of numerous sculptors are inserted with the prices of their works. Two modellers in wax were employed in making models of the rosettes and acanthus leaves in bronze. A contract was made with a painter named Dionysiodori, to paint n caustic 113 feet of the mouldings of the architrave, at the rate of a pentobolon a foot; 116 leaves of gold for gilding the bronze ornaments cost as many drachmas; the person who supplied this gold was a citizen of Melite, named Douis; the lead for fastening the figures cost 10 drachmas On demolishing a battery which masked the entrance to the Propylæa, the original ascending way or steps by which they were approached, was uncovered. The road was made in ridges, so that the horses might go up and down without slipping. The steps for those on foot were in part demolished when the battery was erected, but they may now be restored. While at work in re-establishing the columns of the Parthenon, a fragment of the frieze was found in a fine state of preservation. It represented three of the twelve seated Deities which adorned the middle of the frieze above the eastern entrance. Near this bas-relief was found a remarkably fine seat or throne of white marble, the back of which is ornamented with a winged figure covered with drapery, and which is probably one of the seats in which, according to Herodotus, the priestess of Minerva was accustomed to take her place. These two fine fragments were enclosed between the columns of the peristyle, and those of the pronaos. In other parts of this ancient city, fragments of statues and tombs of different eras have been found. Thus have been brought to light some sarcophagi in marble, on which are sculptured bacchanals and other figures, but which in barbarous times have evidently been broken open and made to receive other bodies than those for which they were originally intended. In one of these sarcophagi, twelve skeletons were found. Thus Athens may still hope to formmusd ɪpenlp s eumo of her own antiquities.

J. N. Reynolds, Esq., whose name has been so long and favorable known in connection with the project of exploring the South Sea, has published an address in the subjects, which, from the correspondence and documents by which it is accompanied, is said to cast much light on the advantages to be derived from a prosecution of the proposed expedition. The experience of this gentleman is such as to render him a very fit agent in the matter, and should, if through and exclusive devotion to the object of pursuit be of any avail, recommend him to the government. The following is a short but interesting extract from Mr. R's address:—

"In the course of these researches, many anecdotes came to my knowledge strongly illustrative of the enterprise and success of our mariners. One, I trust I may be permitted to mention in this place, since it shows our own national enterprise, and the liberality of Russia, in an inviable light; and exhibits one of those many acts of courtesy and kindly feeling which have been manifested by that great and powerful people.

"The two discovery ships sent out by the late Emperor Alexander, to circumnavigate the globe, were becalmed in a thick fog between the South Shetland Islands and Palmer's Land, though much nearer the latter; and when the mist cleared up, they were astonished at beholding a small vessel of about fifty tons burden, between the two ships, which immediately ran up the American flag. The Russian commander displayed his own colors, and despatched a boat to the stranger vessel; with an invitation to the master to come on board, which was accepted, and in a few moments he stood on the Russian's deck.

"What Islands are those in sight," inquired the commodore. "The South Shetlands," replied the captain—"and if you wish to visit any of them in particular, it will afford me pleasure to be your pilot." "I thank you," said the Russian commander, "but previous to being enveloped in the mist, we had a glimpse of them and were felicitating ourselves on having made a new discovery—when lo! the fog lifts and shows an American vessel alongside, whose master offers to pilot me into port, where several of his own nation are at anchor? We must surrender the palm of enterprise to you Americans, and content ourselves with following in your train." "You flatter me," replied the captain; "but there is an immense extent of land still farther south; and when the fog is entirely dissipated you will have a full view of its mountains from the masthead."

"Indeed?" said the Russian, "then I am entirely anticipated in my object, and behold before me a pattern for the oldest nations in Europe; since I here find the American flag, a small fleet and pilot, instead of making new discoveries."

After treating Capt. Palmer in the most friendly manner, the commander of the expedition, Stanjykowitsh, was so much struck with the circumstance, that he named the coast Palmer's Land, and it bears the name at present on the recent charts."

The distinguished French astronomer and mathematician, Mr. J. N. Nicollet, now engaged in a tour of scientific observation through the different states and territories of the Union, has recently visited northern regions of the United States, and succeeded in penetrating further into the interior, with a view of making the discovery of the true source of the great "Father of Waters," than has ever been before accomplished. Mr. Nicollet left Fort Snelling, mouth of the St. Peters, about three months since, and at great expense and trouble transported his splendid set of astronomical and other instruments, through a country offering obstacles at every step, taking advantage of every opportunity to ascertain latitudes, longitudes, the magnetic variation and dips, the intensity of the force of gravity, geological and mineralogical examination, and indeed every other observation connected with the science, which might be considered useful, not only to himself and the various scientific and literary societies in Europe and United States, to which he belongs, but to the whole scientific world.

In this short space of time Mr. N. has made more than two thousand astronomical observations, besides noting many other important facts, calculated to enable him to carry out fully and satisfactorily the important objects of his expedition to the source of the Mississippi. His maps and charts have been examined by a correspondent of ours, whose knowledge of the greater portion of the country through which Mr. N. passed, is general and accurate, and pronounced to be most perfect. They fully establish the latitude and longitude of many of the most remarkable places in the north western region of the United States. By the important discoveries of Mr. Nicallet, we are put in possession of the valuable information, that the source of the Mississippi is *not* (as heretofore stated) in the La Beasch lake, which Mr. Schoolcraft denominated the "Itasca," but that *Rivers* are the true source, and not the lake in question.

It is laid down and established by Mr. Nicollet that the true source of the "Father of Waters" is to be found in five different rivers, an extension of the waters of which forms the La Beasch lake. Thus has the honor of this discovery, so long contended for by many travellers and wri-

ters, been reserved for Mr. Nicollet, and we sincerely hope he may succeed, (as we have no doubt he will,) in the establishment of his superior claims to the distinction.—[St. Louis Bulletin.

INTERESTING TO BLACKSMITHS.—Permit me to describe a machine which I have just seen, and which for utility and simplicity, is truly admirable. The article I allude to is a substitute for a smith's bellows, and is far more powerful than the kind in common use. It is constructed by way of fanners, and stands immediately behind the forge. The box of this implement is only eighteen inches in diameter, and the fans which fill the box are only five inches broad, aud are fastened upon a horizontal shaft of three quarters inch iron. On the end of the shaft is a pully two inches diameter, and right above which is a large pully twenty inches diameter, with a crank in the centre, which the man at the fire drives with one hand, while he guides the iron in the fire with the other. Around the large pully and down to the small one, is a leathern belt, by which this machine is driven, and with such ease that a child may drive it. The blast is so constant and so efficient that the driver prefers it for heavy work to the best bellows, which cost him 6*l*, while he has the blast bellows for about 20*s*; and he adds that for a few more shillings, he could have it driven by wind. Although bellows on the same plan has been used and driven by steam and by water at our large iron works, yet the merit of constructing one to work with the hand, belongs to Mr. William Bowie, blacksmith, Lower Bridge street, Stirling, where the machine may be seen in operation. What adds much to the value of this contrivance is, its being easily purchased, that it requires little room, and is in many respects superior to the kind in common use.—[Correspondent of the Stirling Journal.

A MACHINE ON A NEW PRINCIPLE, FOR RAISING COALS, WATER, &c.—The construction of this power is very simple, and its steady operation is quite assured. Its chief agent is a pair of wheels; or, if necessary, a series, moving with their diameters in the direction of the weight to be used—say the shaft of a mine. Taking the one pair of wheels, moving on the same fixed axis, we find that from the end of a radius or arm in each a chain descends, so as to hang on opposite sides of a square passage. To each chain are suspended, at different bu regular distances, quadrangular frames, to the upper sides of which stong projecting iron rims, moving on the principle of the hinge, are attached. The boxes, or receptacles, for the weight to be raised, have corresponding edges on each side.—When the wheel above is turned, and a single box below is placed in connexion with the lowest frame, it is caught by its rim, and with one revolution of the wheel is sent up as high as the frame on the opposite side to that on which it is borne; here it is again caught and sent up to the apparatus on the opposite side again; and so on by alternate transmissions, it is brought to the top of the shaft. The machine being kept constantly laden below, and its wheel constant ly turned above, it follows that at each revolution of the wheel a box is delivered; and thus, in an exceedingly snort space of time, a vast body of matter can be carried up through any depth of shaft. [The raising of water is performed by means of the same machinery, only buckets with valves in the bottom are used instead of boxes.] The machine could be most humanely employed, in great mines, in quickly sending the workmen up or down, to save them from their present tedious and tiresome expedients for that purpose.—[Mining Journal.

The *Societe Royal d'Horticulture* held its annual general meeting on Sunday, in the Orangery of the Louvre. Every lady as she entered was presented with a nosegay of the finest and rarest flowers. At 2 o'clock, Viscount Hericart de Thury took the chair, and opened the setting with a discourse on the cultivation of plants in genaral, on the art of gardening, and the delights it afforded. M. Soulange Bodin followed him with an elaborate report on the labors of the Society since the last public sitting, noticing the numerous improvements which had been made. Viscount Debonnaire, de Gif, the Vice President, read a report from the committee appointed to visit the gardens in the course of the year, awarding medals to M. Jamin, nursery-man, in the rue de Buffon, and M. Paillet, nursery-man, in the rue du Petit Banquier, for their successful cultivation of fruit trees; M. Alexis Lepere, of Montreuil, for his improvements in pruning and training peach trees; and M. Lasselin, a gardener, at Ville d'Avray, for having been 23 years successfully engaged in his occupation. M. Vibert, the cultivator of roses at Longjumeaux, and M. Dever, herborist of Paris, were mentioned with honor; but, as they are both members of the council of the society, could not receive medals. M. Poiteau, reporter of the Committee for examining the plants, flowers, impliments, and other articles exhibited, read its decision, awarding medals to M. Mathieu, of the rue de Buffon, for rearing the finest flowers so as to be in bloom at periods of the year most distant from the natural season; to M. Chauviere, of rue de la Roquette, for the richest collection and the best cultivated flowering shrubs; to M. Delayaye, a gardener, and M. l'Escalopier, for the finest collection of rare plants; to M. Dever, for his fine collection of plants; to Messrs. Jamin and Lepere, for their collection of fruit trees; and to M. Arnheiter, for his improvements in agricultural and horticultural implements. At intervals, the band of the 60th regiment, under the direction of M. Birette, performed pieces of music which were loudly applauded.

AN ENGINEER, regularly bred to the Profession in England, as well as to that of a Topographical Surveyor and Draughtsman, is desirous of obtaining employment in the United States. He has lately, for several years, been a salaried officer of one of the Principal Land Companies in the British Provinces, from the agents of which he can produce unexceptionable references.

On the subject of Railways he would feel particularly at home, having had much experience in their survey and formation while in England, and he confidently hopes that he would give satisfaction in all the other branches of the Profession.

Apply to the Office of this paper, 132 Nassau-st, or to Dr. Bartlett, at the office of the Albion, Cedar-street.

TO PLOUGHMEN.

THE Subscriber has upwards of three hundred acres of meadow land, in the sod, near the city of New York, that he wishes to have PLOUGHED, as early in the course of the next year as practicable. He wishes to CONTRACT for the whole, or any part. It must be ploughed four inches deep, the furrow must be turned completely over, so that the whole will lie flat—to plough a great part of this land advantageously and speedily, a double team of eight cattle is preferable to one pair of heavy oxen. Provender for men and cattle can be procured on the premises. Apply by letter, directed to Anthony Dey, 63 Cedar-street, corner Nassau-street, New-York, by mail or otherwise, stating terms etc.

rr4t—12n—48 A. DEY.

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	2½	by	½,	15 ft in length,	weighing		$4\frac{68}{100}$	per ft.
280 "	2	"	½,	"	"	"	$3\frac{50}{100}$	"
70 "	1½	"	⅜,	"	"	"	2½	"
80 "	1¼	"	¼,	"	"	"	$1\frac{25}{100}$	"
90 "	1	"	¼,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us.

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A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hardware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTOIN, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

THE NEW-JERSEY, HUDSON AND DELAWARE RAILROAD.

NOTICE is hereby given that under and by virtue of an act of the Legislature of the State of New-Jersey, entitled, "A further supplement to an act to incorporate the New-Jersey, Hudson and Delaware Railroad Company, passed the 8th day of March A. D., eighteen hundred and thirty-two," the books to receive subscriptions to the Capital Stock of said Company will be open at 10 o'clock, A. M., of each of the days following, viz:

On Tuesday, the 8th Nov. next, at Joseph Tilman's, Columbia, N. J.

Wednesday and Thursday, 9th and 10th Nov. next, at John J. Blair's, Gravelhill, N. J.

Friday, 11th Nov., at George Crockett's Marksboro, N. J.

Saturday, 12th Nov., at Peter B. Shafer's, Stillwater, N. J.

Monday, 14th Vov., at John S. Warbasse's, Newton, N. J.

Tuesday and Wednesday, 15th and 16th Nov., Abm. Brav's, Augusta, N. J.

Thursday, 17th Nov., at Stephen Ward's, Hamburg, N. J.

Friday and Saturday, 18th and 19th, Nov., at H. Vibbert's, Dechertown, N. J.

Tuesday and Wednesday, 13th and 14th Dec., at United States Hotel, Newburgh, New-York.

Thursday, 15th Dec., at no. 34 Wall-street, city of New-York.

And continue open at the last mentioned place until the whole stock shall have been subscribed for, or at the discretion of the Commissioners. But if the whole of the Stock shall be subscribed for at either of the above mentioned places, the books will be immediately closed.

The Capital Stock is $500,000 with liberty to increase to $800,000, divided into shares of $100 each.

The sum of $5 on each share is required to be paid on subscribing.

SAMUEL FOWLER,
JOHN BELL,
JOSEPH CHANDLER,
WILLIAM HYBERGER,
ENOS GOBLE,
DANIEL HAINES,
SAMUEL PRICE,
JOHN I. BLAIR,
JOSEPH E. EDSALL,
COMMISSIONERS

Dated Oct. 3rd, 1836 41—9t

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tililson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicabl eextent in the United States, Maryland excepted.

MOSES LONG.

General Agent of Col. S. H. Long

Rochester, May 22d, 1836. 19y-tf.

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS

Also, Flange Tires, turned complete

18 ROGERS, KETCHUM & GROSVENOR

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

ARCHIMEDES WORKS.

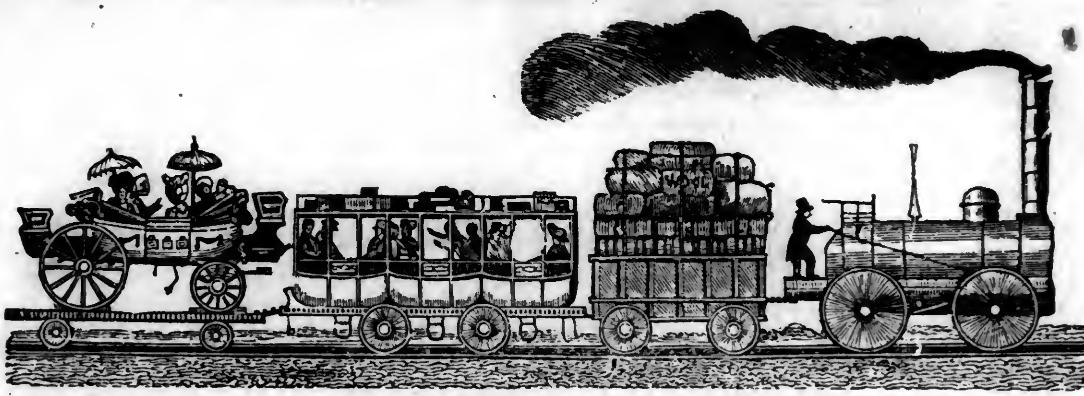
(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

4—ytf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, DECEMBER 17, 1836. [VOLUME V.—No 50

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, DECEMBER 17, 1836.

We have been referred to several gentlemen of high standing in the profession, as to the abilities and skill of the advertiser.

He has twice made the tour of the United States for professional information, and has been engaged upon the Ottawa and Ridean Canals, and upon other works in the British Provinces.

Particular attention is requested to the Circular of Mr. Norris commencing on page 797.

The lectures of the Mechanics' Institute commenced on the 8th of this month.

The lecturers are Drs. Wallace, Gale, Crandall, and Welden, Professors Torrey, Cummings, Mapes, Dunlap, Mason and Bush, Messrs. Bruce, Bartlett, Mills, and Chapin.

From the reputation of these gentlemen in their various departments, we are led to expect a course of excellent lectures.

The room chosen, is a good one, and in an eligible situation, the lecture room of the Lyceum of Natural History, in Broadway, near Prince-street.

The evenings selected are Mondays and Thursdays.

AMERICAN LOCOMOTIVES.

It gives us pleasure to find that the work shops of our own country are already rivalling, if not excelling, those of England in the article of locomotive engines. It has been but a few years since this manufacture was started in the United States; but in that short period the talent of our countrymen has been more favorably developed. We took occasion lateiy to publish a certificate from Wm. R. Lee, Esq., the superintendent o. the Boston and Providence Railroad, relative to the fine performance of an engine built by E. A G. Young, the superintendent of the New-Castle Manufacturing Company.—Another locomotive from the same shop has been within a few months placed upon the Boston Road, which by the annexed extract of a letter from Mr. Lee appears to be one of superior excellence, and which with a great capacity to make steam combines much economy in the consumption of fuel. The power to generate a snfficient supply of steam is a matter of high importance in these machines, and when that object is attained with a diminished supply of fuel it must give such an engine a great advantage ; enabling it to exert the same power at a much less expense. The decided approbation of a gentleman of Mr. Lee's knowledge and experience, and coming too, from a quarter where the best engines of either English or American make are in use, cannot fail to extend the reputation of Mr. Young as a builder, and to attach to the locomotives sent out by the New-Castle Company a just celebrity.

For the American Railroad Journal.

PROVIDENCE, Nov. 26, 1836, }
Office B. and P. R. R. Co. }

MR. E. A YOUNG,

DEAR SIR,—It gives me pleasure to assure you of my entire satisfaction with the performance of "Young No. 2," she answers our wishes fully. The capacity of your engines to make steam with *great* economy of fuel, is undoubted, and while I am not inclined to give a comparative view in this respect of engines from *different* shops. I do not hesitate to say that in my experience, your machines have a great advantage in the economy fuel."

Very respectfully,

W. RAYMOND LEE.

For the American Railroad Journal.

MR. D. K. MINOR.—Dear Sir,—being a subscriber to your valuable and interesting Journal, I am favored with the perusal of comments, (extracted from the Journal of the Franklin Institute,) on the production and manufacture of Salid, or Table Oil, in the United States, to be procured from the seeds of Poppy ; requesting information relative to what is already considered a very interesting part of French Husbandry, &c., being

and having been, a participator in the interest of this very important inquiry, and being a practical manufacturer of various kinds of Oils, I have made such investigations, as I will venture to pen down, in answer to the request set forth in the columns of the Journal of the Franklin Institute, and submit the same to you for publication, should it meet with such approbation as will entitle it to a place in the columns of your Journal. In December 1824, Mr. Daniel Markham, of Madison Co., N. Y. obtained Letters Patent, from the Government of the United States, for the discovery and art, of manufacturing Oil from the seed of Poppy, to be used for culinary, and many other important purposes. But ignorance and prejudice, being predominant in the minds of those who have been addressed on this subject, sickness and indigence on the part of the enterprizing projector, have ever held in check, the advancement of this important object in this country, for which reasons, it is believed, the patentee has just claims for a renewal of his patent, for seven years after the original has run out, to effect which, I believe, he is about to take preliminary measures. Myself and others, have from repeated trials, ascertained that 100 bushels of Poppy Seed can be procured from one acre of good land, after allowing amply for waste, &c. Doctor L. Bishop, of Oneida County, has raised the present season, at the rate of 147 bushels per acre, with taking very little pains in cultivation. This may seem to be, (in the minds of many,) an absurd exaggeration, but it is no less strange than true, and one bushel of this seed, will yseld from eight to twelve quprts of oil of the first order; possessing (when drawn cold and pure,) a transparency equal to the best spring water, and a flavor far more delicious than the Olive; it is extremely limpid, and never chills with frost. The present price of this Oil in the City of New-York, is 50 cents perpint, and is saught after, by the portrait painters, being the finest and best Oil for their business. When burnt in a lamp, it sends forth a brilliant flame, and emits but little smoke; its medicinal qualties are mild, harmless, though effective in many cases, as proved by practice—it seems to possess none of the narcotic quality of which the poppy is so abundantly supplied, but seems to be admirably calculated for the table, and I doubt not. but the time is near at hand, when the genteel portion of our community, may oil their palates from the production of their own soil, and no longer be under a compliment to France, Flanders, or any other foreign country, for a similar enjoyment. I think the most proper time is the fall of the year, for sowing the seed, and as late as the frost will permit—there has been by myself and others, various methods resorted to, for the cultivation of the Poppy; but I venture to say the best mode is yet verry far in the shade; but I hope that some of our agriculturists will take the trouble to appropriate a small piece of land, and a few hours time by way of experiment on this new piece of husbandry, (however trivial it may appear at first,) I doubt not they will be highly pleased and amply rewarded for their pains.

Sir, I am with much esteem,

very sincerely your humble servant.

E. S. S.

Paris, Oneida Co., N. Y. Oct. 1836.

REPORT ON THE SURVEY OF A ROUTE FOR A RAILROAD FROM WATERTOWN TO ROME.

BY WILLIAM DEWEY, ESQ. TO

Orville Hungerord,	Andrew Z. McCarty
William Smith,	John H. Wells,
G. C. Sherman,	Ambrose Curtiss,
H. H. Coffeen,	S. N. Dexter,
Edmund Kirby,	Linus Parker,
S. B. Roberts,	Caleb Carr,
Jesse Armstrong,	Avery Skinner,
Hiram Hubbell,	

Commissioners of the Watertown and Rome Railroad.

Gentlemen:—The examinations, undertaken for the purpose of ascertaining the cost of constructing a Railroad from Watertown, on the Black River, to Rome, on the Erie Canal, are now completed; and it affords me mach pleasure to present the very favorable results of my explorations.

As soon as practicable, after the survey was committed to my charge, I organized two parties of Engineers: one under the direction of Mr. Robert F. Livingston, and the other under that of Mr. James Roberts, Engineers of ability and experience, and to whose exertions I am greatly indebted for the opportunity of now presenting an accurate estimate of the probable cost of the Road.

As the object of the survey was to make such examinations as would enable the Commissioners to state, decidedly, to those disposed to make investments in the stock, that a good road could be constructed for a certain maximum sum, my proceedings, have been regulated by that consideration. Such preliminary explorations were made as indicated the most favorable direction for our purpose; and, in that direction, a regular survey was conducted, with sufficient precision to enable me to state, with confidence, the absolute cost of construction, if the road were located upon the line thus examined.

Our operations were commenced at a point, near the road leading from Watertown to Adams, in the vicinity of an old distillery; and about one mile and a half from Watertown. This point is elevated 056.025 feet, above the level of Lake Ontario, which has been made the plane of reference upon the accompanying profiles; and also 37.925 feet above the level of the pump on the public square at Watertown. The location of the one mile and a half between our starting point and Watertown, will depend upon what level it is deemed requisite to attain in the Village; and this level must be regulated by the point at which it is found most advisable to leave Watertown with the Cape Vincent Railroad, designed to constitute a continuation of this improvement, and form a means of access to Upper Canada.

Since it had been determined that our line of survey should proceed as directly as possible to Adams; and as we were aware that the level of that Village was about 115 feet above our point of departure, it was judged expedient, to ascend, at once, to the vicinity of what has been designated "the Ridge." We found the summit of the highest Ridge to be about 400 feet above Lake Ontario. Its formation offers a curious subject for Geological investigation. It is remarkably uniform, and is supposed to have constituted, in past ages, the shore of some great inland sea, whose surface lay far above those mighty forests, and fertile plains, that now form some of the richest portions of our State.

Frequently three or four successive ridges are plainly developed, varying in level from 15 to 20 feet, which it demands no extraordinary reach of imagination to suppose have been formed by successive subsidences of this immense sea, as barrier after barrier gave away, until, at length, by some violent convulsion of nature, the collected waters burst their fetters, and through the valley of the Hudson, and of the St. Lawrence forced a passage to their mother ocean.

Evidences, many and strong, to support a supposition of this nature, abound in every section of this region.

In the course of our explorations, from possessing a knowledge of their elevation, these ridges were a sure guide to determine the relative heights of different points that occurred on our route.

A more beautiful site, for the location of a Railroad, could not be desired, than the summit of these ridges, were not the uniformity of their course frequently broken by sharp angles, and interrupted at intervals by deep gullies, caused by the long continued action of small streams carrying away the very light material of which they are composed.

The slope from the ridges in many places, is regular and gradual, until the elevation is reduced to 300 feet above the Lake, when it becomes broken, and unsuitable for our purpose.

This ridge we found to extend on the line of our survey about 30 miles from the point where we were first enabled to avail ourselves of its advantages.

After running, for some distance, to the right of the travelled road to Adams, we followed through a favorable depression a route by which we crossed the Road, and approached the valley of Stony Brook; this we crossed, but at a point which subsequent investigation has shown could be improved—a heavy embankment of some length is here necessary; and indeed this starting line presents several embankments of considerable extent.

Continuing, for a short distance, over uneaven ground, we at length struck the

slope from the ridge; and pursuing it on a rising grade, passed near the tavern of N. Talcott, on the Adams road, seven miles from Watertown; and crossed the Brook, south-west of his house, between the bridge at the road, and the saw mill.

To attain this point we had constantly risen since we left Stony Brook, but at no point did we exceed 33 feet per mile.

In this distance considerable limestone rock is met, but in locating, I have avoided the necessity of cutting, by embanking at the points it is presented, and only removing the highest ridges that are composed of a loose soil.

The embankments are mostly made from side hills, easy of access, and, where we have calculated to use them, composed of light sand and gravel.

Our general course to attain this point was S. 45°W. a few curves will occur, but projected from radii of great extent; and I may here mention, in reference to the entire line, that, at no place will we be compelled to submit to radii of objectionable curvatures.

By assuming a position near Talcott's Mill, and glancing at the country below, at becomes evident, that, to reach Adams Village, we are imperatively compelled to attain this point—the ground to the West falls off very rapidly, and is broken into vallies and ridges, that forbid a passage in any other direction, if it is desired to maintain the level near the ridge.

It had been suggested, that the route to Adams might be improved, by pursuing a more easterly direction from Watertown—striking the valley of the North Branch of Sandy Creek, and following it to Adams; but although our explorations showed that the valley would afford a feasible line, could it be attained, yet, it was demonstrated that it could no where be reached nearer than Adams itself, without resorting to heavier ascents than the maximum grade we had adopted.

Passing from Talcott's mill through a short range of light woods, the line crossed the Adams road, and presently returned. Our course still ranged S. 45° W., and was quite direct, excepting an occasional gentle inclination to the left, to maintain our side-hill elevation.

Immediately after leaving Talcott's mill our profiles show a quick descent, and, soon after, nearly as rapid a rise, and some embankment, but much of this could be avoided by keeping closer to the side-hill. Points of rock show themselves still further to the East, but there exists no necessity for excavating a yard of rock, unless it be for the purposes of culverts.

Near Heath's Creek we descend for 37 chains to the place of crossing—thence we pursue our course, on a line almost naturally prepared, over a light sandy soil, and upon an easy grade until we attain a point 11 miles from the starting station. This last run lies at the foot of the ridge, on the borders of heavy woods of White cedar, Rock-elm, Black-ash, and Hemlock.

From Heath's Creek to within a mile of Sandy Creek at Adams, our profiles do not show an average grading of eighteen inches.

Arrived in the vicinity of the North Branch of Sandy Creek, it became a question to determine the most advisable place to cross the valley of this Creek. Explorations were made in different directions to enable us to approach nearer the centre of Adams village; while the regular survey was carried, by the aid of a ravine, that most opportunely presented itself, at a favorable point, across the valley, and struck on the south bank, ground similar to that followed by our line from the north.

To diminish the height of embankment and of trestling, and also the depth of excavation, I have placed upon the profiles a grade of 33 feet per mile. The sudden occurrence of vallies of this discription—their great width, and their depth below our general line of level, render it imperative, either to resort to a grade, equal to that I have selected, or to make, at an increased expense, deeper cuttings and heavier embankments.

To effect this crossing we have an excavation 42 chains in length, and of an average depth of 8 feet, while the embankment, bridging, or trestling, will be 33 chains in length, and 16 feet in height.

The grade can be reduced by deepening the excavation, or by elevating the embankment, but subsequent examination convinced me that, by crossing the valley at a yet greater distance from Adams Village, the grade could be made less than 30 feet per mile, and without accruing any additional expense.

By the lines of examination, made about Adams, a feasible route was indicated. crossing the road east of the church, and passing the Creek above the upper Mill Pond. By adopting this line the amount of bridging would be diminished; but I apprehend the expense would be more than proportionably increased, by the additional cutting, that would be necessary.

Another plan suggested was to curve to the east at the point our excavation commences; and by making a semi-circular sweep, touch the western part of the village, and arrive at the opposite bank of the valley. But, to effect this, we should be necessitated to descend and rise rapidly, while the objections are increased by adding curves of small radii.

More extensive examinations may, however, develope a favorable line, originating on a high level near Heath's Creek, east of the point at which we crossed, and passing through the upper part of the village, at an additional expense not objectionable, over the line first adopted.

The crossing of the valley was effected not much over a quarter of a mile west of the village, and a branch rail-way, would cheaply secure every advantage.

From the south bank of the valley we proceeded towards Mannsville, still keeping at the foot of the ridge, and bordering on heavy woods. By curving to the west, much of the rise and fall, shown upon this section of the profiles, could be avoided but I question whether any reduction could be effected in the expense.

Much of this range of land inclines to the west, and for a certain distance, a choice of level can be had, but it soon breaks into irregular shapes, and is cut up by deep ravines—the bridging of which would be far more formidable, than to resort to grades of twenty-five to thirty feet per mile.

Some time was occupied in examining for a crossing place at the South Branch of Big Sandy Creek. By going to the east of the course we had pursued, and which was direct to Mannsville, we should be involved in difficulties, from which there would be no escape. An examination to the west, presented no advisable point, unless we returned, and crossed the valley of the north Branch, far west of Adams, and on a much lower level. Accordingly I carried out the line, on a spur of the ridge, and crossed the mill pond, east of the old brick store, at the junction of the roads near Gidding's tavern. The distance is 12 chains, and the depth from thirty-five to forty feet.

Continuing our line across the road, we struck upon a range of large stones or boulders, mostly of a primitive formation, that we traced for several miles. Their presence in this locality affords matter for interesting speculation. They lie at the foot of the ridge, and at the head of a great plane that slopes to the west—the heavier masses are nearer the Lake, which is distant about six miles, and the smaller stones lie high on the slope of the ridge. Do we not here behold what must now be the appearance of the bottom of Lake Ontario, receding from the shore? The light gravel and sand thrown in ridges on the beach; the smaller stones upon the verge of the water; while, below its bed and distant from the shore, lay rocks and boulders, tossed so high up the slope that the pressure of the water could no longer move them to and fro; we are here about 350 feet above the lake. As these stones were quite massive and deeply imbedded, their removal is avoided by striking a series of short grades, and embanking wherever they are presented. We still continued without any difficulty, upon a direct course, excepting a few gentle curves to conform somewhat to the sinuosities of the ridge, until we past the lands of Wm. C. Pierpoint Esq., about a quarter of a mile west of his mansion. A gradual descent was then commenced, and Skinner's Creek struck west of Mannsville. This creek forms a deep ravine through the sandy ridge, at least fifty feet below our grade line, and is crossed by a bridge nine chains in length.

An attempt was made to pass through Mannsville, upon the level of the principal street, but it proved to be higher by about seventy feet, than was expedient, and would have compelled us, as far as our examinations showed, to cross two formidable gulfs. By falling to the west, until these gulfs unite, the crossing is found to be favorable.

Proceeding, upon a moderate descent, through a dense forest, we reached French's Creek, which we passed west of the travelled road: and again entered an extensive wood, which we followed, nearly parellel to the road, until we reached Little Sandy Creek at Washingtonville.

An embankment and a short cutting bring us to the Creek. Here our bridge is 12 chains in length.

From Sandy Creek to Pulaski, we still continued upon a descending grade. Cuttings and embankments of a moderate depth occur. Passing through the western part of the village, we curve to the left, and cross Salmon River, in the rear of the Court House, by a bridge 2.60 chains in length; which is the only bridge on this section of the road; and, in connection with the very slight work necessary for grading, particularly from Pulaski to Pineville, causes it to be the cheapest section on the entire route

At Washingtonville we were 278 feet, and at Pulaski, 131 feet, above Lake Ontario, and distant from its shore three miles 73 chains. From Pulaski to Pineville we proceed to the right of the travelled road, and in a direction south of east. At Pineville our grade is 291 feet above the Lake level.

Until we reached Pineville, our course had not been difficult to explore; but from Spooner's tavern at Pineville, to Fuller's tavern in Williamstown, we encountered many obstacles, and much time elapsed before a feasible line could be discovered. Long continued wet swales and swamps, interminable forests, stretching for miles in every direction, and covered with pines, in many cases upwards of six feet in diameter, so completely concealed the character of the country from the eye, that it was only by patient and oft renewed re-researches, running many fruitless lines, and perambulating the entire section, many miles square, that, at length, a practicable route, rewarded the determination with which the examination was prosecuted. I cannot forbear an allusion in this place to the zeal and energy displayed by my principal assistant, Mr. R. F. Livingston, to whom this portion of the survey was confided, and to whose activity and intelligence, I am indebted, for the favorable result of the exploration in this wild region.

The general course, upon which the survey was finally protracted from Pineville, was S. 45° E., passing near the junction of the Oswego and Pulaski stage roads, and thence running, nearly parallel to the Rome road, to the vicinity of the Williamstown Mills, on the West Branch of Fish Creek.

The highest level, attained in the course of the survey, was about two miles and a half north of Fuller's tavern, where we were 410 feet above the plane of reference.

In falling from the Williamstown plains into the valley of the West Branch of Fish Creek, we are compelled to submit to considerable cutting, and to a long and heavy embankment. The proximity of the Creek, and the necessity of crossing frequently, has led me to estimate much of this embankment, as effected by trestling or bridging.

The course of this valley was pursued for ten miles, on a grade, no where exceeding five feet per mile, until we reached Camden village. The hill called the Hog's Back was flanked at its upper extremity with very slight cutting; and for the entire distance, ground, that required excavation, was touched only when it was needed for the embankment estimated through the valley.

From Camden we followed over the mill pond, west of the village, and upon the surface of a beautiful plain, until we approached Little river. An examination of the valley of this river convinced me that it was impracticable to pass it at any reasonable cost, since, at the most favorable position, its banks were twenty chains apart, and its bed from 50 to 60 feet below our level But, in whatever manner we endeavored to prosecute our survey, we found that much heavy work must necessarily be encountered. Deep cuttings and heavy embankments, on our maximum grade, and frequent crossings of the creek, are the characteristics, for the distance of two miles, until we reach McConnellsville, distance five miles from Camden, and thirteen from Rome. Leaving McConnellsville, at our right, we still followed the valley of the West Branch, until we reached the clearing called the "Forks," on the East Branch of Fish Creek, about two miles below Taberg. Here, near the bridge, on the old State road, by embanking upon the flats, crossing Fish Creek by a high bridge, and excavating a distance of 60 chains, an average depth of 12 feet, through a very light sandy soil, we rise to a plain, which we follow, pursuing our course nearly parallel to the road from Taberg to Rome; passing half a mile south of the tavern of Delos Taft, crossing West Creek near the house of David Brown Esq., and Canada Creek near the Coonradt settlement, on an excellent line, demanding but little grading, until we enter the main street of Rome. Our profiles and estimates do not extend beyond the U. S. Arsenal at the head of the street.

A line more level than that presented on the profiles, at the entrance into Rome, might be attained by curving to the South. The difference of expense would be but trifling. Our courses have indicated that a line entirely straight, for about eight miles, could be carried from the vicinity of Tafts tavern into the principal street of Rome, and it becomes a question for future consideration to determine, whether it would not be preferable, to secure such a long continuation of straight line, to attain one more level by curving.

To those acquainted with this section of country, it may be well to state that, until we pass Williamstown, the ground, in all cases, to the left of the course we pursued, rises rapidly, consequently, to reach Rome from Watertown, were we to attempt pursuing a direct line we should be compelled to have recourse to grades upon which the useful effect of locomotive engines would be greatly diminished, or to resort to that unpopular method of railroad construction, inclined planes and stationary engines. For this reason, only upon a route, comparatively circuitous, can a road be constructed, against the location of which, the objection of steep grades, cannot be advanced.

In addition to the line of which a description has been presented, experimental explorations were made in various directions, and many others would have been made provided our time and facilities allowed.

It will be perceived that, after leaving Mannsville, our levels continued to fall below what I have designated as the level of the ridge, until we reached Pulaski. This departure from the course we had previously been pursuing, did not increase our difficulties, or add to the cost of construction. Proceeding east from Pulaski, up the Salmon River, we discovered the ridge again near Pineville, but beyond that point it could no longer be traced.

Hills and valleys of the most irregular character, and the dense forest, entirely prevented onr detecting the least indication of its existence, south of the Salmon River. I should not, however, be surprised if future examinations should again discover and trace its course through the centre of the town of Albion, the northern part of Parish, and then turning east, pass through Williamstown into Oneida county. I perceived signs of its presence near the Mills at Fish Creek, but its uniformity was so completely destroyed, that it was no longer favorable to our purpose.

While the office duties were proceeding, I directed Mr. Livingston to carry a line of survey from the vicinity of Sandy Creek, above Washingtonville, to Pineville, on the Salmon River, to connect with the line previously carried through Pulaski—this route followed the ridge which still maintained its favorable character. The distance was found to be two miles 60 chains shorter than by the way of Pulaski—but the crossing at Salmon river was much more formidable. This line would avoid the depression in the grade otherwise encountered, but would carry us still further from the Lake, it being distant nearly eight miles. From Mr. Livingston's notes I have prepared a seprrate estimate of its cost which is presented. I would however premise that this examination was hastily made, and that more time and care might indicate a less expensive line.

From the Cultivator.

ROAD MAKING.

No branch of public improvement is of more importance to the farmer, nor indeed to the community at large, than the bettering of our common roads, particularly those which constitute the main avenues to market. These are the great arteries which transmit life, and vigor, and health, to every part of the business community. Our turnpikes have proved a failure, from a mistaken parsimony in their construction, and their needless multiplication. Railroads will do upon the great thoroughfares of commerce and travel; but for the transaction of internal commerce between the great towns and the country, good public roads should have precedence over all others: Because they dispense their benefits to all alike, and exempt us from the mortifying impositions of chartered wealth, and the officious impertinence of a host of subordinate officers. It is upon these public

roads that the immense products of our farms are transported, and that we mostly receive in return the foreign commodities which we consume. If it cost the farmer twelve and a half cents per bushel to transport his grain to navigable waters, or to market, upon a bad road, the actual expense would be diminished more than three-fourths if he could quadruple his load upon a good road; for not only would there be a saving in animal power, and other expenses, to this extent, but there would be a further saving in the wear and tear of carriages, and in delays and accidents incident to bad roads. Roads, like the objects of most other expenditure, are cheapest when well made.

The business of road making has hitherto attracted very little of the public attention. Although the construction of roads is as much an art as common trades, and as much of a science as other branches of civil engineering, where good roads are the order of the day; yet with us the superintendence of their construction and repair is entrusted to all professions—to farmers, mechanics, lawyers, &c. who seldom understand much of the art, and know nothing of the science—and who are too often guided by self-interest, or caprice, and often rather mar than mend, the work of their predecessors.

We have derived many of our improvements from Great Britain; and from no country can we draw more useful teachings, in regard to road making, than from her. For although, fifty years ago, her roads were plobably not so good as ours now are, wonderful improvements have been made in them during the intervening half century. Her turnpikes, which cover, like a net-work, the surface of her island, are constructed upon the true McAdam plan, of preserving the ea thy bed of the road always dry, by an efficient metal or stone covering, and sufficient side drains. Their parish roads are now undergoing a similar improvement. These works, which absord annually an appropriation of a mil lion and a half pounds sterling, or more than six and a half million of dollars, give employment to the pauper population, and thus remunerate the public, in a measure, for this heavy national burden. To make our readers acquainted with some of the leading principles which govern, in the business of road-making, in Great Britain, we will state them, in a summary manner, as we find them laid down in the most recent British publications upon this subject, principally from the Farmers' Series of the Library of Useful Knowledge; promising, however, that although they apply mainly to metal covered roads, they are more or less applicable to the construction of all roads, where utility, durability and ultimate economy, are to be studied.

Foundation.—Eminent men differ upon this point; the one party contending that a *pitched* foundation is necessary to make a substantial and good road; the other, that no pitching is essential. Pitching, as here used, is a foundation formed of large stones.

The weight of opinion is against their use. The best foundation, the use of large stones being dispensed with, is a substratum kept perfectly dry by proper and effectual drainage. If one substance in road-making be harder than another, the harder substance should be upon the surface, and not at the foundation. To lay the softer upon the harder, must have the effect of sacrificing the inferior material.

Drainage.—All exertion to construct or repair roads is considered unavailing until the bed of the road is freed from water, and secured against its return. Of what service can metal (stone) be when the road is immersed in water. Can it consolidate? Can it form a compact and hard substance, when water is amongst it, consuming as it were its very vitals? To correct and prevent a recurrence of the evil, substantial side ditches should be opened, so as to give a slope of one inch in 24, between the crowns of the road and bottoms. If open drains cannot be made on both sides, owing to the declivity of the surface, under drains should be constructed, with outlets, through the bed of the road to the lower side. And if springs exist in the scite of the road, their water must be concentrated, and conducted off by under drains. When a particular piece of road is observed to be continually heavy, and in a bad state, it is either caused by spring water, or is situated in a flat, from which the water cannot escape. These suggestions should not be lost to us. A principal defect in our roads, is the want of efficient drainage. Wherever water is permitted to remain, either upon the surface or substratum, in wet seasons there will be a slough, and the bed of the road will be entirely broken up.

The substance or thickness of materials.—Without a sufficient depth of consolidated materials, there will not be a resistance equal to the weight which a highway is subject to. There must be weight to resist weight. If the weight of metal forming the substance be of an imperfect quality, more will be required than when sound and clean. In proportion to the quantity of deleterious matter contained in the body (as earth, small gravel, soft stone, &c.) must the thickness be increased.—Any matter that is not of a sound nature has no power in road-making, and, therefore, the hard materials alone contained in the roads substance can be calculated upon as possessing the quality to resist weights. Experience has taught, that there can be no real security against a road giving way, taking the year through, unless twelve inches at least of good consolidated materials form the body of a road; and this upon a foundation rendered sound and dry by effectual drainage.

Sort of materials.—Not the *hardest*, but the *toughest* stones, are the best. The first will break, the latter bend. The trappean and busaltic rocks are therefore preferred; then whinstone, dark colored granite and lime-stones.

Preparation and size of materials.—The stone to be employed is first freed from dirt, and then broken so small as to pass through the inch meshes of a wire seive. Some allow the stones to retain the size of two inches, but none larger.—The tougher the nature of the material, the smaller the size should be.

Quantity of materials to be laid on at a time.—When a thick coat is laid on, the destruction of the material is very great before it becomes settled or incorporated with the road. The stones will not allow each another to lie quiet, but are continually elbowing one another, and driving their neighbors to the left and right, above and below. This wears off their angular points, produces mud and dirt, and reduces the stones to an angular form, and prevents their uniting and becoming firm. If there be substance enough already on the road, it will never be right to put on more than a stone's thickness at a time. A cubic yard nicely prepared and broken, to a rod superficial, will be quite enough for a coat, and will be found to last as long as double the quantity put on unprepared and in thick layers. There is no grinding to pieces when thus applied; the angles are preserved, and the materials are out of sight and incorporated in a very little time.—Each stone becomes fixed directly, and keeps its place, thereby escaping the wear and fretting which occur when they are applied in a thick stratum. On new roads, the covering should be applied in thin coats. As soon as one is embedded, apply another, until the desired power is obtained.

"To say nothing of the saving in a course of years, by the durability of a road formed under the new system, and which has been found in some cases, even where the traffic is considerable, by the side of a large town, to last for seven years without an additional stone being applied; to say nothing of the saving to the public in wear and tear of horses, carts and tackle; to say nothing of the comfort of travelling a smooth road, and also to say nothing of employment found for the poor; yet a road can be maintained good and perfect for half the sum, under the new system, which under the old, is expended without improvement."

Spreading.—Cause the load to be shot down a short distance from the place upon which you wish the materials to be finally spread; and direct the spreader to cast every shovel full from him equally, all over the surface, and in such a manner as he would do if he were sowing wheat broadcast. The road will then be not thicker in one place than another, and a section will be produced perfect and true.

The writer on the subject of roads, in the Farmers' Series, suggests some alterations in the British road laws, which have a particular bearing upon our condition, and seem well worthy of our consideration.—He suggests,

1. That the business of road-making and repairing should be entrusted to the authority of a county, and not of a parish; because, first, the *public* interest will govern more, and *private* interest less; and secondly, the limited extent of the funds of a parish will not admit of giving such a salary to a surveyor—an officer there deemed indispensable—*as will secure the services of a person* EDUCATED *in the principles of road management, and otherwise qualified for the*

office of surveyor—an office whose duties are here performed by path-masters.

2. That the means for maintaining roads be no longer obtained by statute labor, which is similar to our road assessments—because the law operates in this respect partially, and the time spent by the farmer in paying this tax, is worth more to him than it benefits the public. He recommends that the cartage be done by contract, by which he calculates a saving of 50 per cent. and that the manual labor be judiciously applied under the supervision of a competent engineer.

3. That the surveyor, or manager, be appointed for a longer period than one year, that he may be enabled to carry out a systematic plan of improvement, and give efficacy to his skill and science.

Scraping.—If it is desirable to keep a road dry at the foundation, it must be equally so at the surface.

MEMORIAL TO CONGRESS FOR THE IMPROVEMENT OF THE ALLEGANY RIVER.

To the Honorable the Senate and House of Representatives of the United States of America, in Congress assembled:

The undersigned, your memorialists, respectfully solicit the attention of your Honorable Bodies, to the subject of the improvement of the Allegany River, for steam navigation between Pittsburg, Pennsylvania, and Olean, New-York. Frequently the attention of the public and on different occasions that of Congress for the last few years, has been called to the importance of the Allegany River, as opening a direct communication from the State of New-York into the vast Valley of the Mississippi; but its claims upon the favorable action of the General Government have hitherto been neglected or overlooked. Such is the geographical position of this River for local trade—extending into the State of New-York, communicating with the Ohio, thence affording a water communication into twelve of the States of this republic—that with the feasibility of the improvement once established, every impartial mind must concede its importance. But at no period has its importance been equal to the present. By the last Legislature of New-York, a loan of three millions of dollars was granted to the New-York and Erie Railroad Company, (before incorporated with a capital of $10,000,000,) also an appropriation made for the immediate construction of the Genesee Valley Canal, from Rochester to this River, both of which improvements are in a state of rapid progress, and are to unite with the Allegany at, or in the vicinity of Olean: so that with these completed, nothing will remain but the improvement of the Allegany to effect the long desired object of an uninterrupted communication by water and railway, from the city of New-York and the other great commercial emporiums of the Atlantic border, to the country bordering upon the Ohio, the Mississippi, Missouri, and their respective tributaries.—Your memorialists would suggest that one important consideration influencing the Legislature of New-York in the construction of the aforesaid improvements, was the strong belief in the practicability of the improvement of this River, and the knowledge of its importance in reference to the trade of the Mississippi Valley. The language of the Directors of the Railroad Company in their Report, is, "that the committee for investigating the subject, became fully satisfied that in the Allegany River, the State of New-York possesses a source of internal navigation unequalled during its continuance, for cheapness, security, and expedition—that its waters gathered among its sources in Pennsylvania, become swelled by the various branches it receives within our limits, to a deep, smooth, and capacious River, flowing over a pebbled bottom, unobstructed by rocks or sand-bars, with a uniform descent from our State line, (192 miles,) to the great western emporium of Pittsburg; that the navigation of this stream remains open frequently until mid winter—that it invariably opens within the first ten days of March, and often before that time, and always remains open, and perfectly available for the purpose of descending navigation, for at least six and frequently for 10 and 12 weeks in the spring; and finally that merchandise placed on its banks, may be delivered in the ware-houses of Pittsburg, in three days from the State line, and at an expense not exceeding fifteen cents per hundred pounds. It must be apparent, (the Report continues,) how important it is to this State, and particularly to the merchants of our commercial metropolis, to have this navigation, aptly termed "the key of the Mississippi," placed within their reach.—Opening as it does into the immense basin drained by that mighty river, it will enable our own metropolis to pour through its deep safe, and rapid channel, in the early spring, the supplies for a population already exceeding three millions of souls." Of no less importance would the improvement of the Allegany be to the State of Pennsylvania, through which it chiefly passes—by opening for settlement extensive tracts of vacant lands adjacent to the River, in insuring to Pittsburg, (her manufacturing emporium,) the trade of the north eastern section of the Union, in the increased commerce upon the lines of Canal and Railroad, completed and in progress, that unite her eastern border with this River at Pittsburg, at Portsmouth, at Franklin, and at Warren; from the numerous navigable streams that reach far into the interior and flow into the Allegany, which would become the avenues of more extensive trade; and from the general wealth which would be created by an enlarged market for the mineral productions (coal, salt and iron ore,) that extensively abound in the western part of this State.

Your memorialists feel confident in the belief that the feasibility of rendering the River navigable for regular steam navigation is sufficiently established to warrant your Honorable bodies in making an immediate appropriation for its improvement.—Already various steamboats have frequently ascended the River, some to Franklin, (115 miles,) some to Warren, (180 miles,) and one to Olean a distance from Pittsburg of 250 miles, without obstruction or injury. In the different surveys made of the River by competent Engineers—as that of Judge Geddes, in the summer of 1826, under the authority of the State of Pennsylvania, again in 1828, by Edward F. Gay, Esq., also of Pennsylvania; and in the same summer by Col. Kearney, U. S. Topographical Engineer, in pursuance of a resolution of Congress—they all agree in their observations as to the general features of the River, and in the fact, that it can be rendered navigable for steamboats, at a small expense; also in the mode by which the improvement might be effected. The Allegany for a greater part of its course, flows not through a valley like most other Rivers, but through a great ravine, from one to four hundred feet below the common bed of the adjacent country. Another peculiarity of this stream is the regular succession of alternate ripples and deep pools The ripples are generally short, and the descent inconsiderable, over which the water flows with a smooth but rapid current, though not so swift but that a steam boat of light draft and ordinary power can ascend them without difficulty, as has been done repeatedly. The current in the pools is very gentle at low water, but during high water, it becomes very nearly uniform. Although the River seems to have worn for itself its present depressed bed, by cutting through various horizontal strata of rock, yet there are no rocks strictly so called in its channel, nothing but round pebbles. The ripples are composed exclusively of these, apparantly scooped out of the pools above. No River is therefore better adapted to improvement by artificial means, than the Allegany, either by a succession of low dams and locks, or by merely concentrating the channel upon the ripples, so as to give sufficient depth of water at all seasons for steamboats. It is indeed a remarkable fact, that the Allegany should pursue an even course through so mountainous a country from Olean to Pittsburg, (250 miles,) with the average descent of only about two and a half feet per mile, without one perpendicular fall, or impediment that cannot easily be removed, and would seem to indicate the design of nature that its bed should yet become the resort of extensive trade, from all parts of the Union.

Your memorialists are aware of the objections to local improvements by the General Government, but they present this subject to the consideration of your Honorable Bodies, with the fullest persuasion that it can be regarded in no other light than as a work of great national importance, and one which upon its completion, cannot fail to "promote the public welfare, and facilitate the common defence." To establish its public utility it need but be stated that the Allegany upon improvement will become the connecting link in the great chain of communication between the Hudson and the Mississippi—the North-Eastern and South-Western States—a communication more direct, safe, and expeditious than can elsewhere be found—that all of the New-England States, the States of New-York and Pennsylvania, and all those bordering upon the Ohio, Missouri, and Mississippi, and the navigable waters communicating

with them, comprising at least twenty of the States and Territories of the Union—are directly interested, and would be extensively benefitted by this improvement.

Improve the Allegany River to Olean, and from that point a water communication is obtained of over 12,000 miles, far into the heart of the most fertile country on the globe, upon whose plain, as has been forcibly stated, "Europe might comfortably seat all of her nations." Communicating with so fertile a country, so boundless in extent, its resources now but partially developed, it would be impossible to estimate the vast amount of trade that would flow through this source into the Mississippi Valley, from all of the commercial towns upon the Atlantic border, and the return supplies that they would derive of all the necessary products of the earth, for their ever increasing population. The public utility of this improvement is then evident. That it would facilitate the common defence in time of war in the transportation of troops, clothing, supplies, and munitions of war, is equally evident. And this consideration alone is sufficient, in the opinion of your memorialists, to warrant the General Government in an appropriation for the improvement—from a proper regard to the prudent maxim: "in peace we should prepare for war;" and from the experience we obtained of the want of such a communication during our last war, in the vexatious delays and immense expense we were subjected to in the transportation of our troops, &c., from Pittsburg to the Northern frontier—which was, as has been ascertained, not less than $3,000,000.

Never perhaps has the spirit of enterprise so universally pervaded our whole country, as at the present period. States are vieing with each other in the construction of works of internal improvement, railroads, and canals are traversing the Union in every direction, by means of which the most remote portions are brought in almost immediate vicinage—a greater community of interest, by increased commerce, is thus created—sectional asperities are removed, and the general wealth of the republic vastly augmented.

Your memorialists would notice a few of these contemplated improvements which have a bearing upon the subject of the Allegany River. The New-York and Erie Railroad from the Hudson to this River, and the Genesee Valley Canal have already been noticed. The State of Massachusetts has projected a Railroad from the city of Boston to unite with the New-York improvements, by which the New-England States would come in for a participation of the advantages of the Allegany. A Railroad is in contemplation to extend from the city of Charleston, South Carolina, to Cincinnati, Ohio, which will there intersect the line of communication of which the Allegany is a part. The great Railroad from New-Orleans to Louisville, Ky., through the States of Louisiana, Mississippi, Tennessee and Kentucky, one of the most stupendous projects of the age, which is now in progress, will, upon its completion and upon the improvement of the Allegany River, in connection with the New-York and Erie Railroad, complete a chain of internal communication from the city of New-York to New-Orleans, a distance of three thousand miles, unsurpassed in extent, expedition, and magnificence, by any other of like nature in the world; and as estimated would bring these two great commercial emporiums within but one week's travel of each other. The completion of these different improvements, may be safely counted upon within a few years. It is impossible in this brief space, to enumerate the advantages that would then result to the Union at large, by the improvement of this one avenue, the facilities it would afford to general commerce, the wealth it would create, or at all estimate the vast amount of trade that would find its way through its channel. This must continue to increase with the same wonderful rapidity that has marked the developement of the resources of the plain of the Mississippi, and its unparalled augmentation in wealth and population.

Your memorialists would call the attention of your Honorable Bodies to the fact, that the country bordering upon the Allegany River, is rich in mineral products; there being in this section very numerous and extensive beds of bituminous coal, salt, and iron ore, all of which are articles of increasing demand, in the eastern section of our country, and from which their supplies would chiefly be drawn.

Such is the present abundance of our national treasury, that the small diversion of sufficient to improve the Allegany River, would not be felt, and compared with its importance in case of war alone, the expense should not be regarded as the least objection. We have the sanction of frequent precedents of appropriations for similar improvements—they are regarded by the people in a favorable light, as an unfailing source of increased wealth to every department of industry—facilitating trade, opening the sequestered portions of the country, developing their resources, and as affording the strongest ligaments to unite us together as a nation, by making the interests of the most remote sections—emphatically ONE.

The subject of the improvement of the Allegany River between Pittsburg, in the State of Pennsylvania, and Olean, in the State of New-York, is respectfully submitted with the confident hope, that the wishes of your memorialists will be granted—by a liberal appropriation for that purpose, and thereby add to the happiness and prosperity of a very large portion of your fellow citizens. And your memorialists will ever pray, &c.

From the Farmers' Register.

EXTRACTS FROM THE REPORT OF PROFESSOR DUCATEL'S SURVEY OF MARYLAND.

Geological Examination of Dorchester, Somerset, and Worcester Counties, on the Eastern Shore of Maryland.

These three counties, comprising more than one-third of the territory of Maryland, east of the Chesapeake bay, though presenting but little variety in their mineralogical and geological features, are yet not devoid of interest in these respects, while in others they offer subjects of consideration of the deepest importance to the prosperity of the State.

The most prominent geological feature in this district is a succession of sandy hillocks, in what are termed the upper portions of these counties, being a continuation of the ridge dividing the courses of the waters that empty themselves to the east into the bay of Delaware, and to the west into the Chesapeake. These hills of sand are themselves arranged in ridges, running generally north-east and south-west, diminishing in elevation towards the southern extremity of the peninsula, forming a curve on its eastern boundary, and presenting every appearance of a series of sandy beaches produced by successive retreats of an ocean. No organic remains of any kind are known to have been found within this portion of our territory, excepting a deposite of oyster shells at the head of Taylor's Creek, two miles above the fork of the Nanticoke, and ten miles below the fossiliferous deposite occurring on the north-west branch of this river, and previously referred to as the newer pliocene formation. This deposite is overlaid by soil six feet in depth. The shells contained in it are much in the same condition as those occurring in the accumulations supposed to have been made by the aboriginal inhabitants of the country; *i. e.* the valves are separated, and are not, so far as perceived, associated with any other marine shells.—They are, however, perforated and covered with *serpulæ*, as if they had lain long, after the death of their inhabitants, at the bottom of the sea. But they are at a great distance from any actual oyster beds, and are in a more advanced state of disintegration than the fossil oysters heretofore observed; whilst, on the other hand, they are covered, as aforesaid, by a thick stratum of sand, no where else remarked to overlie Indian banks.

The lower portion of the peninsula lying in Maryland, embracing Dorchester, Somerset, and Worcester, is a low level country, mostly a deposite of stiff clay, excepting on the margin of the rivers and creeks, where the country is wavy and the soil sandy. The sand hills, on the borders of the rivers, are always situated on their south or south-eastern sides, and extend but a short distance inland. In some instances they form distinct ridges or waves of sand, running in various directions; sometimes parallel with the course of the river, and when occurring at the extremity of necks, transversely, or across the points. The intervening necks, sloping gently to the south and south-east, terminate in extensive marshes, which in high tides are frequently entirely submerged. In the midst of these marshes there are occasional sand hills, or hummocks; but rarely of any great extent.

The sameness in the geological constitution of the necks of land, just referred to, is evinced in the digging of wells, from which this section of country is exclusively supplied with water for domestic purposes. At a depth of from ten to twelve feet, penetrating through the stiff clay, there is inva-

riably encountered a stratum of clean white sand, with gravel, varying from one, to two or three feet in thickness. Out of this an abundant supply of good water can be obtained; but beneath it there is always found a soft black mud, with an offensive odor, and filled with decayed vegetable matter, composed principally of a coarse grass, similar to that growing upon the present marshes. In some places this mud is reported to be of great depth. It does not appear, however, to have ever been accurately sounded; but in one instance, already alluded to in a previous report, at Cambridge, it was traversed, and is stated to have been found overlaying a fossil deposite, the shells of which are referable to the older pliocene marls.

Another remarkable feature in the geology of this country is the occurrence of a ledge of water-worn stones, composed of quartz and sandstone, constituting gravel and boulders of various sizes, from twenty to several hundred pounds in weight.—These stones were first observed between Todd's Point and at the head of Little Choptank; they were afterwards found scattered over a narrow zone of land, between Monie Creek and the Manokin.—They are said to occur at the head of Back Creek, on the south side of Manokin, and were finally again observed near the mouth of Marumsco Creek, on Pocomoke Bay. At this last mentioned spot—being a knoll of dry ground in the marshes, protruding into the bay—the beach is covered with these stones, washing out of the bank. All of them are a close grained sandstone, with small veins of quartz, the sandstone being of the character of that occurring on the Blue Ridge, different from that constituting the *white rocks* at the mouth of the Patapsco, but similar to those larger masses that are found strewed over the surface in the upper parts of the Eastern Shore of Maryland, in Cecil county. These eratic masses form, with the exception of the bog iron ore —which will be presently more particularly referred to—the only stony bodies that occur in the three Eastern Shore counties, now under examination.*

Such are the great geological features of this section of country. A more detailed account of its physical geography will now be given under separate heads, for each of the three counties embraced within it.

Dorchester County, lying between the Choptank and Nanticoke rivers, requires perhaps more than any other county on the Eastern Shore, the assistance which would necessarily be afforded by an accurate topographical survey, in adopting measures to bring into operation her natural resources. Placed between two large rivers, her facilities for sending the produce of her soil to a market are yet not great, and mostly confined to the least productive part of her territory. The central portion of the county, most susceptible of great and permanent improvement, and even at this time the most productive, is deprived of an outlet for her agricultural staples, corn and wheat; and the no less valuable source of wealth, which she possesses, in her magnificent growth of timber. The natural channels of egress through the Blackwater and Transquaking have long since failed to be available in any thing more than a limited degree, these rivers serving now rather to increase the obstacles to the navigation of the bay into which they empty. Fishing Bay, their common estuary, offers scarcely more than five feet of water, at high tides, over a deep and extensive mud flat, which it is utterly impracticable to remove. The inconvenience arising from this cause is felt by a large portion of the county, and has suggested the application to the legislature, for the opening of a canal communication between the Blackwater and the Choptank. Such a canal would but partially remedy the inconvenience, whilst a more comprehensive view of the benefit to be derived, points to the practicability of connecting the Nanticoke with the Choptank. This is believed to be entirely practicable, and the advantages to be obtained from the connection of these two rivers, by means of a canal traversing the heads of navigation of the Blackwater, Transquaking and Chicamaconico—a project to be effected at a trifling expense—are great and obvious. A communication of this kind would not only furnish an outlet for the already valuable products of the county, but could be used as a means of conveying to it those materials, such as marl, lime, &c. (of which an abundance would be thus brought within a convenient reach,) that are necessary in order to enhance the productiveness of its soil, and bring it into that state of improvement of which it is susceptible. Other advantages may be expected to accrue from the excavation of a canal in the direction just referred to; among which, not the least important would be to render it subservient to the effectual and thorough drainage of a large extent of country, at present uncultivable, and not only itself insalubrious, but the main cause of the unhealthiness of that by which it is surrounded. It would seem to be at all times a subject worthy of the attention of a government that wishes to increase the quantity of nutriment, as well as to improve the salubrity of a country, and consequently to augment its population and prosperity, to employ suitable means to effect a complete drainage of every morassy district, within its dominion, of whatever extent.—In the present case the proposed improvement forms, however, only part of a scheme of internal navigation that might, it is believed, be advantageously pursued for the benefit of a large portion of the Eastern Shore of Maryland.

In the upper part of Dorchester county, the soil is mostly a sandy loam, well adapted, with proper management, to the growth of corn, rye, and oats. The character of soil belongs more especially to those portions lying on the rivers, and extends, with very few exceptions, over a narrow slip of land on the Choptank, as far as Hill's Point, on the bay shore. The neck between the Big and Little Choptank is a low flat country, mostly composed of a stiff clay soil, covered with a plentiful growth of pine, sweet-gum, oak and dogwood, but suffering greatly from a want of convenient drainage; an evil that might be remedied, and by which thousands of acres of land, now of little value, would be reclaimed and rendered fit for cultivation. With the advantages possessed by this section of country, in her now extensive deposites of shells on the river banks, her sea-ooze, together with her proximity and easy access to the marl deposites of Talbot county, it ought to become one of the most productive and flourishing portions of the State.

The necks and islands, forming the western and south-western portions of the country, likewise present us with low and level lands and a stiff clay soil, mostly well timbered with pine, white, black, and willow oak, sweet-gum, &c. The situations on the islands are delightful and generally reputed healthy.

Meekin's Neck, on the bay shore, is marshy, and this is the case of nearly one half of Hooper's Island, the extent of which is nearly fourteen miles in length, and from one to two in breadth; such portions of the island as are arable have a productive soil. At the head of Honga river and bay, there are extensive meadows; and where the soil, also a clayey loam, is cultivated, it is said, to yield abundantly. Bishops-head Neck offers the same character of soil and physical aspect. Throughout the whole of this district the depth of wells is rarely found to exceed ten feet, penetrating the clay to sand, from which the water issues, seldom perfectly clear, and occasionally slightly brackish.

At the heads of Big and Little Blackwater Rivers there are also extensive marshes; the country is very level, low and swampy; the soil a stiff clay; timber principally oaks and sweet-gum. Between the Blackwater and Transquaking, around Buckstown, the country is more elevated, the soil lighter, with a growth of very large oaks and American poplars. The wells here are sunk to the depth of twelve feet, through clay, reaching gravel and sand.

Towards the head of the Transquaking, and between it and the Chicamacomico, the soil is a clay-loam, that would yield very good crops of grain, if properly improved. Beyond the Chicamacomico the country is more uneven, the soil lighter, sometimes sandy, the level of the country rising towards Vienna. Wherever the soil is stiff, it is covered by a heavy growth of oaks and gum.

Hurley's Neck, along the Nanticoke, south of Vienna, is a level stiff clay, well wooded, for the distance of about seven miles, after which it terminates in an extensive marsh.

No fossil deposites, similar to those occurring so abundantly north of the Choptank, have been discovered in Dorchester county, that would answer for agricultural purposes; but the large accumulations of shells found at Horn Point, at Oyster-shell Point, and other places, together with the deposite on Taylor's Creek, already referred to, might be made eminently serviceable if burnt into lime. The only mineral

* A ledge of submarine rock is said to be off Todd's Point; and another to Benoni's Point, on the Talbot side of the Choptank.

formations of any value are the deposites of bog-ore, at the heads of Transquaking and Chicamacomico, and on Reedy Creek, in the vicinity of Federalsburg. This ore is compact, heavy, free from phosphate of iron, and would probably yield from 40 to 50 per cent. of good metal. Some inclination having been manifested by an enterprising proprietor of an extensive deposite of ore, on the Chicamacomico, to work it in place, it was thought more advisable to recommend that it should be forwarded to the Baltimore market, where it would probably command from $3 to $4 a ton.

Somerset county presents, in its physical geography, as might have been expected, great features of resemblance with the county that has just been described. Its upper portions are very sandy and rolling—a succession in fact of sand hills, gently inclining to the south, and terminating in a level deposite of stiff clay—as if at one time this part of the country had been a sea beach, from which the waters have receded to a considerable distance beyond the mud flats that formed at the same period of time the shallow bottom of the ocean, and extended several miles from her shores.—But what is here supposed to have been formerly an extensive mud flat, is now a populous country, in many places well cultivated, every where very improvable, possessing a productive soil, well timbered, and intersected by numerous creeks and rivers. These form the *necks* of the county, falling by an imperceptible slope into marshes many miles in extent, with here and there a hummock, crowned with some lofty pines, or a herd of grazing cattle looming against the horizon, to relieve the monotony of the scenery. The waters of the sound, by which these marshes are limited, are not seen, unless perhaps from the top of some hummock, and are only indicated by the occasional passage of some skiff, whose white swollen sails contrast agreeably with the luxuriant dark-green growth of these grassy plains.

Without having reason to believe that the waters of the Chesapeake bay have absolutely diminished, it is nevertheless true that the amount of dry land is increasing on the Eastern Shore of Maryland, by the filling up of creeks, rivers, and small bays, at the confluence of its muddy streams. The flats of Fishing Bay and Pocomoke Bay furnish us with examples of this, upon a sufficiently large scale, to produce, in no great lapse of time, very remarkable changes in the geography of this part of our territory.

That portion of the neck of land lying between the Nanticoke and the Wicomico, and contiguous to the former river, is within a narrow stripe, wavy and sandy, inclining moderately to the S. E., and terminating in marshes. The intervening country is level, with a stiff clay soil; this being the character, as must already have been perceived, of all those portions of the Eastern Shore, comprised within what are termed the necks. Generally speaking, the N. and N. W. parts of these necks, extending along the rivers and creeks, have a light soil; in the central portions, the soil is clayey, and the S. and S. E. extremities are marshy; such is the character of Hungry Neck, between the Wicomico River and Monie Creek, and the description will answer for the Manokin Neck; though in this there does not appear to be the same uniformity in the character of the clay, which varies from a white and yellow stiff clay, to a black clayey loam, equally various in its degrees of productiveness and in the kinds of crops which it can be made profitably to yield. The upper parts of this neck are covered with magnificent oaks, sweet gums, maples and beech; the lower portions support a growth of lofty pines, with an undergrowth of holly and sweet-gum, and verging upon the marshes, that extend across the neck from the Wicomico to the Manokin, the pines are small, probably a new growth. The soil of the lands that terminate the neck—Big and Little Beele's Islands—on the north-west side, is a sandy loam, very productive in corn and sweet potatoes.

The aspect of the country between the Manokin and Annemessex, presents us with the usual almost dead level of clayey soil, covered partly with oaks, sweet gum, maple, &c., the pine predominating towards the lower end, and on approaching the marshes, the timber having been in a great measure destroyed, there remains but a scanty growth of small pines. The extensive marshes, called the Jericho marshes form the extreme end of the necks, on the borders, and in the midst of which, are some few inhabited spots, more remarkable for their great salubrity, than, as might perhaps have been supposed, for the dreariness of their situations. To become convinced that health and comfort are sometimes found where they are very little expected, it is only necessary to pay a visit to the hospitable residence of Capt. Davy, at the head of the salt marshes of Jericho.

Annemessex Neck, whose soil and appearance would require the same description as that already given of similar portions of the country, is thickly settled towards the lower end, by a hardy population of boat-builders and boatmen; the latter supporting themselves principally by the sale of oysters, clams, and terrapins. These men may be instanced as further evidences of the healthiness of the marshy districts of country upon salt water. Whatever may be the influence of these marshes at a distance, judging from the appearance alone of those who inhabit them, or constantly frequent them, they are not the seats of disease; for it would be difficult, in any other section of our country, to find a more hardy and robust set of men, than the residents on the Little Annemessex; and yet it is not to all that the praise of unexceptionable habits can be extended.

From the head of Little Annemessex, the eye looks over the broad expanse of salt marshes, reaching to the southern limits of our State—Watkin's Point being lost somewhere among them. Bounding these marshes to the north, there is a well wooded country, with a good soil and highly improvable, extending to the Pocomoke Bay and River, and comprising the district, of Rehoboth. Marumsco Neck, towards the latter district, is also well wooded, the country and level, soil generally clay loam, in some places at the head of creeks more uneven and sandy.

Such is the account, and it will, it is believed, be found substantially correct, that may be given of the lowest portions of Somerset county. It has already been said, that the northern part of the country is sandy. It is especially so between Barren creek, and Salisbury; but from Barren creek, in the direction of Quantico, to Whitehaven, the soil passes from a sandy loam to the stiff clay bottoms, described as forming the principal soil of the necks. Along the Wicomico river, on either side, the soil is mostly sandy. On the eastern side of this river, and reaching from it towards the south, the soil varies from sandy, sandy loam to clay loam; and a northerly direction from Princess Anne to Salisbury leads successively over clay, clayey loam, sandy loam, and through a swampy district, to the sand ridges of the upper portion of the county.

The only mineral product of Somerset county is *bog-ore*, of which there is an abundant deposite, of excellent quality, at the head of Barren Creek. It has been raised in considerable quantity, and continues to be profitably extracted by Mr. Brattan, who delivers it at Baltimore for $3 the ton. A large supply of this ore might be obtained from this and other neighboring localities. It is also found at the heads of Back and Dividing Creeks; but samples examined from these places indicate an inferior quality of ore.

The mineral springs of Barren Creek deserve more attention than they have lately received. The waters have been analyzed, and were found to contain oxide of iron, soda, and magnesia, combined with muriatic acid. They belong therefore, to the class of alkaline chalybeates, are tonic and diuretic, and have been found eminently serviceable in billious disorders. The well known curative properties of the waters, the comfortable accommodations at the springs, with the obliging disposition of the proprietor, and of the tenant, Mr. Levin L. Porter, ought to furnish strong inducements, to invalids of the Eastern Shore of Maryland, to resort to them now, as they were wont to do in former times.

No fossil deposites, answering as marl, have been found in Somerset county; but a material almost as valuable occurs abundantly in various places, constituting those accumulations of oyster shells, believed to have been made on the site of ancient Indian settlements. The spots upon which these shell banks were observed, are, on the Nanticoke, at the mouth of Witipquin Creek, and at the Sandflea Landing; on the Wicomico, at Long Point, where there occurs one of the most extensive banks of the kind known, the shells therein, being deposited at the depth of from three to nine feet, extending nearly a quarter of a mile along the shore, and several hundred yards inland; on the Manokin, Maddox island and Fishing island are covered by similar accumulations; and on the Pocomoke,

another occurs at Shelltown, about two miles above the mouth of the river. Banks of the same kind are found in other places, but of a more limited extent.

The value of this material has already been stated in a preceding report, but it cannot be too strongly impressed upon the farmers of the lower counties on the Eastern Shore of Maryland. *It is the principal agricultural resource which they possess, by a proper application of which they may double the produce of their lands.* In the upper counties of the Eastern Shore, where the worth of the material is appreciated, it is made to undergo two operations: it is passed through a coarse sieve, in order to separate the black highly fertilizing mould with which the shells are associated, and the fine fragments of these; the coarse clean shells are then burnt into lime. The sifted article readily commands from three to four cents a bushel: the lime sells at from six to nine cents, according to its quality. By referring to the section "On the comparative value of shell lime and stone lime," your Excellency will perceive that the difference in value, between the two articles, for agricultural purposes, is very trifling, whilst the difference in price is considerable. Can any farmer doubt that the discovery, on the Eastern Shore, of limestone quarries even of moderate extent, and to be used solely for the conversion of the stone into lime, would be of immense benefit to the country? The equivalents of such quarries are found in the shell banks that have just been indicated. They should no longer be neglected.

Worcester county has long felt the want of some parental assistance, to enable her to bring fully into action her natural resources. She has asked for three capital improvements, of which two have been reported necessary and practicable; viz. the cleaning out of the Pocomoke river, so as to render it navigable for flat-boats, at least about fifteen miles above where it is now available, or seventeen miles beyond Snowhill, at present the head of navigation; and a canal communication between Sinepuxent bay and the Delaware. To understand the value of these improvements, it is necessary to possess an outline of the geography of the county.

This county is bordered on the east by the Atlantic Ocean; but between this ocean and the cultivable portions of the county there is a prolonged sandy beach, varying from a few hundred yards to a quarter of a mile and upwards in breadth, and extending the whole length of the coast without a single outlet to the sea from Indian river, in Delaware, to the southern extremity of Chincoteague island in Virginia. Between this beach and the main land lies Sinepuxent bay, from one to four or five miles wide, and nearly thirty miles in length. It is a shallow sheet of water, navigable only to a short distance above South Point, at the lower end of Sinepuxent Neck. The entrance to the bay is reputed to be also very shallow. Sinepuxent Neck, about ten miles long, lies between Assateague or Trap Creek and Sinepuxent Sound, at the head of the bay. The produce of this neck, and of country on the Assateague, which, comprising the Berlin district, are amongst the most flourishing portions of the county, has thus to be sent down a long bay through a difficult entrance, to encounter finally the dangers of an ocean navigation in search of a market, whilst an easy, short, and safe transportation could be readily obtained. To effect this latter object, it has been proposed to connect Trap Creek by the St. Martin's and Indian Rivers, with the Delaware Bay, inside of Cape Henlopen. The surveys for this substantial improvement have been made, and its easy accomplishment, at a moderate expense, demonstrated.

The other improvement, solicited by Worcester county—the clearing of the Pocomoke—has likewise been found to be practicable. Viewed in connection with the canal communication just referred to, it acquires more importance than is at first sight apparent. The Pocomoke river rises in an extensive swamp, situated partly in Maryland and partly in Delaware, called the Cypress Swamp, from the profuse growth of this valuable timber, by which it is covered. The bed of the river, now obstructed by large trees, lying across it in every direction, passes through the heart of the county, dividing it into two nearly equal portions. Owing to the obstacles presented by the fallen trees into its bed, its downward navigation commences only a few miles above Snowhill, after which it is free for schooners over a distance of about twenty miles, to the mouth of the river in Pocomoke Bay, on the Chesapeake side of the county. It has been proposed to remove these impediments as far up as the use of the river is found to be impeded by this cause; and the advantages to be thence derived are shown to be considerable. It would facilitate the access to a vast body of valuable timber, and to extensive deposites of iron ore of good quality; and by confining the waters of the river within their natural channel, it would effect the drainage of a large tract of land, now an almost impenetrable swamp, covering doubtless a rich and fertile bottom. These are interesting considerations, whose importance becomes enhanced by the fact of the practicability of farther connecting, by a canal navigation, the head waters of the Pocomoke with the St. Martin River, and its projected communication with the Delaware, thus establishing a complete thoroughfare through the county, from one bay to the other.

But to render this project of internal navigation complete, another improvement seems to be required. The mud flat in Pocomoke Bay, already alluded to, forms, as is well known, a serious impediment to the free egress from the mouth of the river, through the sound into the Chesapeake, and the inquiry has been made as to the possibility of removing it. Attention having been turned to the subject, the removal was concluded to be quite impracticable, as well from its nature as from its extent; being the natural effect of causes, that, as *they* cannot be removed, would be constantly giving rise to the same results.—Whatever remedy might be partially applied would be therefore but temporary, very expensive, and would do but imperfectly, what, it is considered, can be accomplished in a more permanent, less costly, and more efficient manner, in another direction, namely: by connecting the Pocomoke with the Annemessex,—a project which has already met with the approbation of the Legislature, and for the performance of which an adequate sum of money has been contingently appropriated.

As this project was brought forward by an honorable Delegate from Somerset, it shows that this county is equally interested in it, as she is in another direction with the proposed connection of the Nanticoke with the Choptank. Viewing these projects connectedly, it will be seen that they are intended to establish an internal communication of some extent, calculated to bring into full operation all the resources of the country through which it will pass, enabling it to send its products to a market by the shortest route, and facilitating to it the means of obtaining the materials necessary for its improvement. Some advantages would likewise be derived from it in case of war, upon which the billigerent spirit of the times compels us unfortunately to calculate as a possible event, by providing against the almost total non-intercourse between one section of the State and another. It forms a part of the duties of the undersigned to report to your Excellency, that the geological constitution of the country is highly favorable to the easy accomplishment of these projects.

The agriculture of Worcester is not in so favorable a condition as it might be brought to with a little more exertion. The soil is alternately sand and clay, or a mixture of both in variable proportions, and entirely deficient in calcareous matter. On the western side of the Pocomoke, the upper portions of this district that are not swampy exhibit a succession of sandy knolls and ridges, with occasional basins, as it were, of level land, composed of stiff clay. The growth is principally pine and sweet gum: but on the branches, and in the swamps, there is seen a profusion of alder, maple, magnolia, kalmia, with the cypresses, of which two species were observed,—one deciduous, called the bald cypress, the other an evergreen. Between the Naseongo and Dividing creeks the soil varies from almost pure sand to a sandy loam, rarely, though sometimes clayey; the pine and sweet gum form the principal growth upon it. Along the margin of the river the soil is very sandy.

East of the Pocomoke the country is more swampy, the runs that feed the river being principally on this side. It is covered by a heavy growth of oak and cypress, and when cleared and drained shows a stiff clay soil. On some portions of the newly cleared land a young growth of papaw was observed, and in some places the less auspicious persimmon makes its appearance. Receding from the river the country, is gently elevated, forming a low dividing ridge between the feeders of the Pocomoke and the waters of the St. Martin river and Sinepuxent bay. This ridge-land runs north

and south, in the direction of the main road through St. Martins, Berlin, and Newark. Sinepuxent neck is a level track of land, with a soil varying from sandy to clayey loam, occasionally passing to a stiff clay. The middle portion of the neck is tolerably well wooded; the extreme end, towards South Point, has been stripped of its timber. This, the Berlin vicinity, and the St. Martin district, are amongst the most flourishing parts of the county.

From Newark to Snowhill, on approaching the river and town, the soil becomes very sandy; and proceeding southwardly, as far as Newtown, the soil passes over a succession of sand hills, barely possessed of a soil. Towards the extreme end of the connty, continuing along the Pocomoke, the country is more level, with a more substantial soil, said to yield good corn crops, and is much better wooded.

Crossing the peninsula in the direction of the dividing line between Maryland and Virginia, the country, at first level, soon appears gently undulatory, with a mixed soil, frequently a stiff clay, to within two or three miles of the sea side, when it becomes decidedly hilly; occasionally well wooded with pine, oak, hickory, and dogwood, having a good loamy soil, that could be made very productive in corn and oats. This sea side, as it is called, is an uneven country, stretching along Sinepuxent Sound descending occasionally by a gentle slope, and sometimes encroaching upon it in the shape of extended marshes. The ridgeland, between the sound and river, is more level, soil more clayey and equally improveable, but no where in a good state of cultivation.

Sinepuxent Bay or Sound, to which reference has so frequently been made, forms a very important feature in the physical geography of Worcester county. The map A. appended to this Report, and furnished for its illustration by the Topographical Engineer of the State, exhibits its actual appearance contrasted with that it bears in the maps and charts now extant. Its condition, as a navigable sheet of water, has been fully described in the "Report of the Commissioness of the States of Delaware, Maryland, and Virginia, for the survey of the sounds, between Cape Charles, and Cape Henlopen," submitted last year to the General Assembly of Maryland. For present purposes it is only necessary to consider it as a narrow and shallow sea, interspersed with broken marshes and shoals, composed of oyster shells, mixed with clam, scallop and other marine exuviæ. It is interesting in a geological respect, and not a little so, as will immediately be shown, for the agricultural resources which it actually does, and can more extensively be made to yield.

It is an interesting fact connected with the past and present condition of Sinepuxent Sound, that since the closing up of some inlets admitting the ocean into it, its waters have become thus comparatively fresh, the oysters and clams, by which they were formerly thickly inhabited, have died, leaving extensive beds of their exuviæ. These accumulations of shells, or *oyster rocks*, as they are here termed, seem to point at the manner in which similar deposites, now far inland, and constituting the shell-marl deposites of other districts, have been made. They are evidently the quiet and gradual accumulation of years, covered by a deposition of sand or mud, varying, according to circumstances, with the altering condition of the country where they are now found, and in some measure serve to explain the mode of formation of our fossiliferous beds. At no very remote period of time, they will probably furnish the prototypes of a geological formation, hitherto undescribed and characterized by the presence of a new species of zoophytes. In their present state, these oyster rocks afford an abundant supply of a very valuable material, already put to good account, but that ought to be much more extensively employed. They are now dredged, and their contents, consisting of oyster shells, clams and other marine shells, incrusted by a zoophytic production which has received the name of *Bunyan*, are burnt into lime. From this source not only an important and profitable branch of industry is created, but an invaluable product obtained for the improvement of the whole of Worcester county. The question has been asked, whether the lime obtained from this source is good? It may at once be answered, that it is as good as from any other quarter; but a more satisfactory reply will perhaps be found in the third section of this report. Indian shell banks also are fonnd on Sinepuxent Neck, where they have been partially applied, and always with the best results, which ought to be an encouragement to their more liberel employment.

The mineral product of Worcester county is confined to the bog-ore, occurring abundantly on the Naseongo, where it has been worked with variable success, being unfortunately too much mixed with phrosphate of iron. A deposite of ore of better quality has been discovered on the Pocomoke, in the fork between this river and Duncan's mill-branch, and it is again met with in the swamps around Newtown.

A more general view of the application that can be made of the knowledge so far acquired, respecting the physical geography of the three counties just described, remains now to be taken.

Agricultural resources of the lower counties on the Eastern Shore of Maryland.

The agricultural improvements of Dorchester, Somerset, and Worcester counties, fall far short of what they might be made to attain, by a better system of cultivation, and a more liberal employment of the resources which this section of the State possesses. But to effect a thorough improvement, the attention should be first directed to the congeniality of the soil, in each district, for that species of growth from which a crop is expected. Corn and wheat are the staple commodities of the Eastern Shore, but in the present condition of things the latter is so precarious a resource, that corn may be said to be the principal produce and main dependence of the lower counties. And yet their various soils are capable of producing a number of other crops: rye, oats, beans, potatoes, (common and sweet,) and the root crops generally. But it is not only in limiting the variety of their crops, that the agriculturists of this section of country err; they neglect to take into account the peculiar susceptibilities of the various kinds of soil, to produce certain crops in preference to others; and thus an injudicious system of husbandry is followed, resulting most frequently in disappointment. On some of the light soils described as belonging to the upper portions of these counties, wheat cannot be raised, whilst these same soils may be made to yield profitable returns of corn, rye, and oats; it is therefore worse than useless to attempt to raise wheat upon such lands. The opinion that oats exhaust the soil, is an unfounded prejudice; for any system of rotation, with proper management, appears to be beneficial. Those parts, on the other hand, that possess a clay soil, with variable proportions of sand, admit of the alternate extraction from them, of corn and wheat crops, provided they be followed up by clover, cut and turned in, with lime; or if grazed not too closely.

Another popular belief, founded upon prejudice, is, that plaster will not act upon land contiguous to salt water. It is not so. Lands, whether near or remote from the sea, upon which *gypsum* did not seem to take kindly, have been found, *after being marled or limed*, to derive the usual benefits imparted by this valuable material.

In some parts of Somerset, a small portion it is true, as yet, the crop of sweet potatoes is the main one, and is found very profitable, as is evident by the thriving condition of the small farms on Big and Little Deele's Islands; whilst intelligent farmers, in other parts of the county, have turned their attention advantageously to the cultivation of beans, peas, &c. But there is yet another growth that bids fair to become of great value to the agricultural interest of the Eastern Shore of Maryland, namely, the *palma christi*, or castor bean plant, sometimes known by the name of *mole plant*.

An attempt was made in the Report of last year, to excite the interest of the farmers of Queen Anne and Caroline counties, in behalf of this new crop. It is to be regretted that they have not extensively, if at all, availed themselves of the suggestion—the bean having increased in value far beyond the most sanguine anticipations.—There ought to be, therefore, no further delay to the introduction of this growth as one of the staple commodoties of Maryland.—Without having been as yet able to ascertain the precise cause of the extraordinary demand for this article, within a few years, there is still reason to believe that the call for it will continue to be great; since, notwithstanding its extended cultivation in consequence of the high prices obtained in preceding years, it now commands a higher price than at any former period. It has been stated that the oil expressed from the beans is employed in large quantity in the manufactories of England for greasing the machinery by which these establishments are put into operation.

The culture of the palma christi presents no difficulties. It is said to thrive best in good corn lands, yielding, according to the quality of the soil, from twenty-five to forty bushels per acre. The land requires the same preparation as for corn; and the bean is planted like this grain,—in hills on which two or three plants are suffered to grow; the subsequent tillage being also the same as that practised for corn. The most tedious part of the management of this crop is the gathering of fruit, which forms a cluster with a pyramidal termination; the lower portion being occupied by the male flowers that yield no seed, and the upper by the female flowers. In the female flowers, the ovary, which is roundish and three-sided supports three linear reddish stigmas, forked at their apex, The fruit, properly speaking, is a round capsule, with three projecting sides, covered with rough spines, and divided into three cells, each containing one seed. The flowers appear in July, and the seed ripens throughout August and September. If suffered to do so on the plant, the cupsule bursts with considerable force, projecting the seed at a distance, and scattering it about the field. To avoid this is the only extra attention required by this growth, and this is done by anticipating the maturity of the fruit. The directions are, to visit the plantation a little before the commencement of the ripening season, removing those clusters that approach to maturity, (which is known by a change of color, from grayish green to a light pea-green,) and conveying them to the drying ground, where, by the effect of the sun's heat, they burst, and dislodge their seeds. The only preparation for the drying ground is to provide a small place, cleaned and levelled as for a thrashing floor, upon which the clusters are scattered. It would be advisable to locate this spot in the neighborhood of the barn, or near a shed, so as to facilitate the removal of the plants, in case of protracted wet weather, to some sheltered situation. Transient showers of rain do not, however, damage it, otherwise than by blackening the seed, whereby its sale might be injured, although it does not diminish its productiveness in oil. The occupation of gathering having once commenced, it should be so arranged as to visit each plant twice a week, morning and evening, until the whole crop has been secured. It may then be sent to a market, where, at the time of writing this Report, it commands three dollars a bushel; or, it may be made to yield its oil by the following process, as practised in Northampton county, Virginia.

The seeds are first to be thoroughly cleaned of dust, and of portions of the capsules that may have adhered to them. They are then introduced into shallow iron drawers, arranged on both sides of a furnace, where they are exposed to a gentle heat; the object of this first operation being to render the oil more easy of expression.—From these drawers they are conveyed into a powerful screw-press, by the operation of which the oil is obtained. So far however, the oil is impure: It must now, therefore, be transferred to clean iron boilers, previously supplied with water. As the boiling proceeds, the impurities that rise to the surface are skimmed off, and the clear purified oil finally makes its appearance, floating on the water. It is now carefully removed, and a second time subjected to the boiling process, with a small quantity of water, until the latter liquid has been entirely dissipated. This is ascertained by taking out a small portion into a vial, and observing whether it preserves its transparency as it cools. Some care is required not to push the heat too far, as then the oil would acquire a brownish hue and a hot peppery taste, which would at all events unfit it for use as a medicine. One bushel of seeds yields about one gallon and three-quarters of oil, at an expense of about 25 cents a bushel, which is refunded by the sale of the *pumice*, found to be excellent manure for corn crops. Acknowledgments are due to Mr. Smith, of Northampton county, Va., an intelligent and experienced planter, of palma christi, and manufacturer of castor oil, in the vicinity of Eastville, for the information contained in the above paragraphs.

It is needless, after what has just been said, to expatiate upon the value of the plant. That the soil and climate of at least the lower portions of the Eastern Shore of Maryland are congenial to its growth, cannot be doubted. The praiseworthy example (crowned, it is believed, with entire success) has already been set to the inhabitants of Somerset, by one of the most intelligent farmers of the county—Col. Arnold E. Jones.

Persons well acquainted with the cultivation of rice confidently assert and believe, that there are many spots on the Eastern Shore of Maryland, well calculated to the production of this important agricultural commodity. Rice has been rsised in Maryland, in the vicinity of Salisbury, at the head of the Wicomico, and a promising attempt, the result of which has not been ascertained was recently being made opposite Vienna, on the Nanticoke. It would seem desirable to encourage such attempts, as further conducive to the practical illustration of the possibility of reclaiming a vast body of lands at present of little value. These are the marshes and cripples that occur on the margin of the large rivers on the Eastern Shore of Maryland. An examination of the actual condition of these marshes justifies the belief that they might, to a certain extent, be drained; whether sufficiently to be made permanently arable, or only to the extent of serving as more firm and safe pasturages, remains to be tried. It is thought that the single operation, though one not unattended with difficulties, of diverting a part of the course of the river so as to cause it to pass between the marsh and the mainland, would greatly contribute to their drainage. This appears from the fact, that their most elevated parts are those contiguous to the river, inclining moderately towards the firm land, adjoining which the marsh is always found to be the softest, and more liable to a total submersion. By insulating these bodies of land, always more or less miry, and thus establishing a drainage around them, it is possible they might eventually acquire sufficient consistence, without having recourse to embankments, to afford safe and valuable pasture grounds. The cripples seem irreclaimable by any other means than by embankments,—an operation deemed practicable by those who have given much attention to the subject, and who represents them as best fitted for the cultivation of rice.

Such are the agricultural resources of the lower counties on the Eastern Shore of Maryland, so far as the productiveness of the soil, and its susceptibility of improvement are concerned. It has already been stated, that the only incidental resource possessed by this section of country, is to be derived from the facilities of obtaining calcareous matter (in which the soil is essentially deficient) from the shell banks, oyster banks, and other sources already referred to. But before any hope can be indulged, that the inhabitants of this portion of the State will avail themselves of these means of bringing their lands into a higher state of cultivation than they seem to have any idea that they are capable of, it is necessary to remove a fatal impression, too generally made, that the lime derived from shells is of but little value. The result of the inquiries made to disprove this opinion, will be given in the next section of this Report.

An error equally fatal prevails among the citizens of Maryland, in reference to the counties that have just been passed in review—that they are as devoid of the interest as they have been believed to be of resources. It is hoped that the minute, and at the same time, faithful account given of them—more minute than would otherwise have seemed necessary, will have a tendency to rectify the false judgment so commonly passed upon this portion of our territory, and contribute likewise to cheer those of its inhabitants who have become disheartened at the present aspect of things, and who are too prone to believe that their industry could be better rewarded at a distance.—Industry meets with its just reward every where; but the assertion is safely ventured, that the same amount of enterprise at home, would secure more comfort and happiness, than, under any circumstances, can be expected in a newly settled country, where all that is obtained is at the cost of solid enjoyments. The adventurous merchant and speculator may find a wide field in the "Far West" to satiate, if possible, his thirst for wealth; but the industrious farmer, on the tide waters of the Chesapeake needs no better patrimony than that which he already possesses. A soil easily cultivated, and very improveable, having the means of improvement at hand; the necessaries, and even luxuries of life in abundance; a temperate and healthful climate; a free and constant intercourse with a large commercial emporium, by means of a water communication reaching to the very door of his granaries; surrounded moreover by intelligent neighbors, and a peaceful and orderly population—such are the advantages of which he can boast, as a set-

off against those of any other section of our country. It is full time that he should learn to appreciate them himself.

PRINCIPLES OF VEGETATION.

As every thing which appertains to the production of so important a staple as wheat, must always be of profound concern to the farming interests, we insert the following from a British paper, under the confident belief, that it will elicit attention from every enlightened mind engaged in the pursuits of husbandry. The principles assumed, and facts set forth, will be novel to many of our readers, and will, we hope, set on foot a spirit of inquiry calculated to promote the great interest whose province it is to provide the staff of life for home and foreign consumption.

Principles of Vegetation—Wheat.—At the British Association in Bristol, Mr. O. Webb Hall read a communication "On the Acceleration of the Growth of Wheat." He called the attention of the meeting to a statement of facts by which it would be seen that the usual period allotted to the occupation of the ground for a crop of wheat might be very materially abridged. At an average, this might be estimated at 10 months, though 12 and even 13, were not unusual, and 8 might be considered as the shortest period for the ordinary winter wheat. By a selection of particular seed, and a choice of peculiar situation, wheat sown early in March, has been, on different occasions, ripened before the middle of August, a period scarcely exceeding 5 months. Mr. Hall considers it an unquestionable law of vegetation, that the offspring of a plant of early maturity seeks to become so likewise, even when placed in unpropitious circumstances, and that it recedes with reluctance from the condition of its parent. Hence the seed of a crop which has been ripened in 5 months, has a better prospect of producing another crop equally accelerated than that from a crop which has been longer in ripening. He also asserted, that the acceleration of a crop was farther promoted by thick sowing, which likewise might be considered advantageous in checking and stopping the mildew.

Dr. Richardson referred to the remark of Humbolt, that in South America the wheat crop was ripened in ninety days from the period of sowing, and stated, that about Hudson's Bay, this period was only seventy days. He suggested the probable advantages that might arise from importing seed from the latter country for the purpose of furthering Mr. Hall's views; but this gentleman stated, that he had found that seed imported from a distance, (and he had tried some from Italy,) was liable to become diseased. As connected with the subject of the acceleration of the growth of seeds, Professor Henslow mentioned results of experiments which he had tried upon seeds of a species of Acacia, sent by Sir John Herschell, from the Cape of Good Hope, with directions that they should be steeped in boiling water before they were sown. Some of these were kept at the boiling temperature of 3, 7 and 15 minutes respectively, and had yet germinated very read ily in the open border; whilst those which had not been steeped did not vegetate. It was suggested that these facts might lead to beneficial results, by showing agriculturists that they may possibly be able to steep various seeds, in water sufficiently heated to destroy certain fungi or insects known to be destructive to them, without injuring the vital principle in the seed itself. Mr. Hope mentioned a practice common in some parts of Spain, of baking corn to a certain extent, by exposing it to a temperature of 150° or upwards, for the purpose of destroying an insect by which it was liable to be attacked. Dr. Richardson mentioned that the seeds sold in China for the European market, were previously boiled for the purpose of destroying their vitality, as the jealousy of that people made them anxious to prevent their exportation in a state fitted for germination. Upon sowing these seeds he had, nevertheless, observed that some few of them were still capable of vegetating.

EXTRACTS FROM AN ACCOUNT OF A VISIT TO ICELAND, BY M. EUGENE ROBERT.—The siliceous concretions formed by the geysers of Iceland, cover an extent of four leagues in length, throughout which there are numerous traces of the ancient geysers. We have hence been enabled to observe this singular formation under all its different forms; passing by insensible shades from that of a loose and friable character, the result of a rapid deposition, to the most compact and transparent. We have not only observed impressions of the leaves of the birchtree, of Equiseta and various grasses, but the trunks of the birch are in many places distinctly recognizable, presenting much the appearance of ordinary agatized woods. At the present time none of these plants occur on the island, and we may suppose it probable that their destruction was the result of the invasion of the silica.

The numerous thermal springs, in the midst of which the geysers are situated, occupy large vallies in the interior of the island. Appearances indicate that these waters proceed from deep crevices, in which they have been heated by contact with the volcanic fires. The geysers present the most magnificent exhibition during an inundation of the valley by rain. The rivers proceeding from these springs have often the color of milk, owing to the argillaceous bole which they take up in their passage over the siliceous deposites. Such are the white rivers of Olafsai.

Mt. Hecla, like all the heights of Iceland, is entirely covered with snow. No smoke appeared about its summit. Obsidian occurs in rolled masses on its sides, and pumice stone forms a bed thirty feet in thickness near its base. Fragments of the branches of the birch, the remains of the once flourishing forests of the island, are found in the midst of this bed.

After traversing currents of lava of considerable extent, we arrived at the sulphur beds, or solfataras of Krisark. It is literally a mountain of sulphur, and is undergoing continual increase.—[Bulletin de la Soc. Geol. de France. T. vii. F. 1—2. Paris, 1835 a 1836.]

CIRCULAR.

PHILADELPHIA, November, 1836.

SIR—I take the liberty of informing you, that, within a few months past, I have perfected several very valuable improvements in the Locomotive Steam Engine, which have given better results than have ever been obtained by the best Locomotives in Europe or America, and respectfully call your attention to the following extracts, viz.:

From the Railroad Journal, New-York, July 16, 1836.

"LOCOMOTIVE ENGINES ON INCLINED PLANES.—The Locomotive Steam Engine, 'GEORGE WASHINGTON,' made for the State of Pennsylvania, by William Norris, of Philadelphia, was placed on the Columbia and Philadelphia Railroad, on Saturday afternoon, the 9th instant. On the following morning, her powers were tested, in ascending the Inclined Plane near Philadelphia. This plane is 2800 feet in length, with an ascent in that distance of 196 feet, or at the rate of 369 feet to the mile, or 7 feet rise in 100 feet, or 1 foot in 14. The weight of the Engine is 14,930 lbs. only. The load attached weighed 19,200 lbs. including the weight of 24 persons who were on the Tender and Burthen Car. The Engine started immediately at the base, without a running start, and dragged up said load of 19,200 lbs. the above distance of 2800 feet, in the space of two minutes and one second, or at the rate of 15½ miles per hour; pressure on the boiler a fraction under 60 lbs. to the square inch. The Engine then descended the plane with the same load at various speed, frequently stopping to test the security, the valves being reversed, or set for going ahead; and when it was desired to stop altogether, the steam was let on very slowly, which brought her to a dead stand for a second or two, when she would immediately start up the grade. In this way, stopping and starting at pleasure, the time occupied in descending the 2800 feet, was from 12 to 15 minutes, thus testing the perfect security of her performance on the plane. She again ascended the plane with the same load and took her place on the road, the same morning, ready for use."

From the Pennsylvania Inquirer, July 21.

"IMPORTANT IMPROVEMENT.—THE GEORGE WASHINGTON LOCOMOTIVE.—We invite attention to the following. It notices an improvement of a most important character. A friend, who enjoyed the pleasure of an excursion in a car drawn by this new locomotive, speaks of her beauty and power in the most enthusiastic terms. We trust that some correspondent, acquainted with the subject, who has had an opportunity of examining the GEORGE WASHINGTON, will furnish a detailed account of this new and important improvement.

"FROM THE UNITED STATES GAZETTE.—'Mr. Chandler—The undesigned was yesterday one of a party of about fifty gentlemen, who met at the invitation of Mr. William Norris, to be witnesses to the success of an experiment, which, as the consequences will be of almost incalculable benefit to the public in general, I will endeavor to give you an account of.

"'We assembled at 4 o'clock, A. M., and proceeded to the foot of the inclined plane on the Columbia Railroad, near the Schuylkill, where we found Mr. Norris's new Locomotive Engine, the 'George Washington,' in waiting for us, to test her powers in taking us up the plane without assistance from the stationary power.

"'We started, ascending most majestically the whole distance of 935 yards in 2 minutes and 23 seconds, being at the rate of a mile in $4\frac{1}{2}$ minutes, thereby showing to the world that, thanks to Mr. Norris, the enormous expense of stationary engines on Railroads was no longer necessary.

"'We were unable to ascertain the exact weight of two of the passenger cars, but estimating three tons each, would make our whole weight fourteen tons, and that calculation is believed to be below the mark; the rise in the plane is 7 feet in every 100 feet, or 1 foot in $14\frac{2}{7}$ feet; and the greatest power that has ever been before attained, was, in England, to ascend without any extra weight, 1 foot in 60 feet, and in America, 1 foot in 42 feet. Very little reflection will convince every one of the great importance of Mr. Norris's recent discovery or improvement.

"'The company, amongst whom were several gentlemen of distinguisecd talents, Messrs. Campbell and Roberts, engineers, Mr. Ortlip, superintendent, Mr. Smith, commissioner, Messrs. Minor and Schaeffer, from New-York, Mr. Schwartz, from Paris, &c. &c., breakfasted at the Paoli, and proceeded to Lancaster to dine and celebrate the event.

"'After dinner, it being understood that his Excellency, Governor Ritner, was in the town of Lancaster, and his engagements not allowing of coming all the way to Philadelphia, he accepted an invitation from Mr. Norris, to take a short excursion on the road, for the purpose of seeing the powers of the engine; and judging by his manner and expressions, his gratification must have been more than ordinary.

"'We returned to the city about 8 o'clock in the evening, convinced of the success of our host, Mr. Norris, and having, in the language of one of our party, lived six days in one.'"

From the National Gazette, July 21.

"On Tuesday, the 19th instant, a Locomotive Engine, manufactured by Mr. William Norris, of this city, ascended the Inclined Plane on the Columbia Railroad, drawing with great ease her Tender, and two Passenger Cars, with 53 passengers. Any thing approaching this result has never been attained hitherto, either in England or this country.

"The length of the plane is 2800 feet, the grade 369 feet to the mile, or an ascent of 196 feet in the length of the plane.—The experiment was tried at a very early hour in the morning, while the rails were wet with dew, and of course not in the most favorable condition. The time occupied in passing from the level at the base, to that at the top of the plane, was 2 minutes and 24 seconds. The experiment was witnessed by many scientific gentlemen, among whom the opinion was general, that the improvement of Mr. Norris promises a most important reduction in the expense hitherto attending the transportation on inclined planes. The weight of the Engine with water, 14,930 lbs.; load dragged on the plane, including tender and fuel, cars and passengers, 31,270 lbs. Pressure under 80 lbs. to square inch. It is remarkable that the Engine was blowing off, on her arrival at the top, having acquired speed and power during the ascent."

From the Railroad Journal, New-York, July 30.

"Excursion to Philadelphia, and Remarkable Performance of the Locomotive 'George Washington.'—In pursuance of our request, Mr. Norris made arrangements with the commissioners of the Columbia Railroad, for the use of his locomotive. Tuesday, July the 19th, was the day appointed for the trial. We left here on Monday afternoon, at 4 o'clock, accompanied by Mr. George N. Miner, of this city, Mr. Theodore Schwartz, of Paris, and Messrs. Elliot and Betts, of Alabama. Mr. Schwartz, who was to sail for Europe the next day, gladly made the trip, with a view to carry home his own testimony as an eye witness. Our journey over the Camden and Amboy, and Trenton and Philadelphia Railroads was highly interesting, and the conversation of that evening will long be remembered with pleasure. We arrived at Philadelphia about midnight and after sundry mistakes and mischances succeeded in obtaining some repose. On Tuesday morning, two cars, drawn by horses, set out with a party of upwards of forty. We arrived at the foot of the inclined plane before 6 o'clock, while the rails were yet quite wet with dew. On our arrival, it was found that, owing to accident or design, while the fire was burning, the water had been blown out of the boiler so as to endanger the tubes. The result was a leakage of some consequence during the day. The Engine started at the foot of the plane and on the plane. After proceeding a few feet, the wheels were found to slip, and the Engine returned. It was said that the rails were found to have been *oiled* at this place; a small quantity of sand was strown over the spot, and the Engine again proceeded. She regularly and steadily gained speed as she advanced to the very top, passing over the plane in 2 minutes and 24 seconds. The enthusiasm of feeling manifested cannot be described; so complete a triumph had never been obtained; the doubts that had been entertained by some, and the fears of others, were dispelled in an instant; the eager look that settled upon every one's face, gave way to that of confident success, while all present expressed their gratification in loud and repeated cheers.

"The length of the plane is 2800 feet; the grade 369 feet to the mile, or 1 foot rise in 14.3 feet, which is a much steeper grade than the planes on the Mohawk and Hudson Railroad, those being 1 foot in 18 feet, making an ascent of 196 feet in 2800 feet; weight of Engine with water, 14,930 lbs.; load drawn up the plane, including weight of Tender with water and coal, two Passenger Cars and 53 passengers, 31,270 lbs.; pressure in the boiler, less than 80 lbs. to the square inch; time of running 2 minutes and 24 seconds. It is to be remembered that the rails were wet with dew. As to the oil, it was afterwards mentioned that bets were made with the workmen to a considerable amount, and those having been lost by the successful performance of the Engine on a former day, were now quadrupled, and to save themselves it is not unlikely that this means was provided to accelerate the descent rather than the ascent of the Engine. At the conclusion we shall give the dimensions of this Engine.

"The party again embarked, after examining the workshops, and proceeded to Paoli to breakfast, and thence to Lancaster, the Engine conveying at the same time a number of freight cars.

"The unfortunate location of this road is very evident; frequent and short curves are introduced so uniformly, that it would be supposed that such a location was to be preferred to a direct one. We arrived safely at Lancaster, and partook of an excellent dinner. A number of toasts were given, and conversation turned generally to the subject of internal improvement.—Mr. Roberts, engineer of the Harrisburg road, and Mr. H. R. Campbell, engineer of the Norristown, and of the West Philadelphia Railroad, were present; a number of the company were citizens of Philadelphia. After dinner, the company were presented to Governor Ritner, who was then in town. He afterwards accompanied the party some few miles from Lancaster and back again, when he left us, much gratified with his rapid journey. We returned in a large eight wheel car, a form that we much admired. The whole weight attached to the Engine (tender, &c. included,) must have been over 14 tons, if not 15 tons. The time of running (exclusive of stoppage,) from Lancaster to the head of the Schuylkill inclined plane, was 3 hours and 11 minutes, being a distance of nearly 67 miles. This, it is to be remembered, was over a road having curvatures of less than 600 feet radius, up ascents of sometimes 45 feet per mile. On level and straight portions of the road, a velocity of 47 miles was attained. As the trip had already been protracted, this engine was obliged to leave at the head of the plane, on her return to Lancaster the same evening, and we descended by the rope.

"The following are the dimensions of the 'George Washington' Engine, of Mr. William Norris: Diameter of cylinders $10\frac{1}{4}$ inches; length of stroke $17\frac{5}{8}$ inches; number of tubes 78; outside diameter 2 inches; length 7 feet; diameter of driving wheels 4 feet; diameter of truck 30 inches. The Engine is six wheeled, having two driving wheels. Whole weight of Engine 14,930 lbs., actual weight on driving wheels 8700 lbs.

"It must be remembered that there is no contrivance, as in some engines, for increasing the adhesion, by throwing the weight of the tender upon the engines, the axle being in front of the fire box, preventing any such arrangement. This engine,

we are now informed, is making the regular trips, though a full load has not yet been obtained, on account of the scarcity of cars. The greatest load, as yet, drawn by it over the road, was 119 tons, gross weight, in 22 cars. The engineer confidently expects to draw 150 tons, at 12 or 15 miles per hour. She now usually works with 70 lbs. pressure of steam.

"The following is a list of the names of the gentlemen who were of the party:

"We, the subscribers, were present and witnessed the experiment and complete success of the 'GEORGE WASHINGTON,' in ascending the inclined plane, with a train of cars, containing 54 persons, besides engineers, firemen, &c., up the Columbia Railroad, at Philadelphia, on the 19th July. 1836.

Israel Morris,	Israel Roberts,
William Morrison,	S. Griffits Fisher,
A. M. Eastwick,	Joseph Harrison, Jun.
Franklin Peale,	R. M. Patterson,
T. E. Gubert,	Theodore Schwartz,
F. Blackburne,	E. Durand,
George R. Oat,	Townsend Smith,
Isaac P. Morris,	Frederick Vogel,
George Robbins,	Rufus Tyler,
A. W. Thompson,	Robert B. Davidson,
Frederick Gaul,	Alex'r. Krumbhaar,
William S. Otis,	D. K. Minor,
Alexander M'Clurg,	T. R. Peale,
P. B. Goddard, M.D.;	Octavius A. Norris,
J. Sidney Jones,	Joseph Oat,
Mahlon Ortlip,	James Poultney,
J. C. Cresson,	John E. Garrett,
George N. Miner,	George C. Schaeffer,
M. M. Reeve, M.D.,	H. R. Campbell,
Smith Jenkins,	Daniel Smith,
Thomas Moore,	

Walter Sims, Nashville, Tenn."

From the National Gazette, October 19.

"INCLINED PLANES.—The new Locomotive Steam Engine, 'WASHINGTON COUNTY FARMER,' built for the Commonwealth of Pennsylvania, by Mr. Norris, of this city, was placed on the Columbia Railroad, on Tuesday afternoon.

"The power of the Engine was then tested in ascending the Inclined Plane, which was performed to the complete satisfaction of numerous scientific gentlemen, invited expressly for the occasion.

"The plane is 2800 feet long, ascent in that distance 196 feet, equal to 369 feet to the mile, or 1 foot rise in $14\frac{3}{10}$ feet. Weight of Engine 18,170 lbs. with water included. Load drawn up, 30,116 lbs. including Tender with fuel and water, two large Passenger Cars and 39 passengers. Time of running, 3 minutes and 15 seconds, pressure in the boiler under 70 lbs.

"In descending the plane, the engineer repeatedly came to a dead stand from a great speed, and for some minutes played up and down the grade, thus proving most satisfactorily, the immense power of the Engine, and the perfect safety in its performance. The Engine is a master-piece of machinery and of beautiful exterior.

"The result here obtained has never been equalled by the best Engines in this country or Europe, excepting only similar performances of the 'GEORGE WASHINGTON,' an Engine by the same maker.

"The advantage of this great improvement in Locomotive Engines, is self-evident; Railroads can be constructed at much less cost than heretofore, now that engines can be procured (of the usual weight) to perform on grades of 70 feet or even 100 feet rise in the mile."

From the Pennsylvania Inquirer, October 20.

"INCLINED PLANES.—MR. NORRIS'S ENGINE.—We were much gratified on Tuesday, in witnessing the new Locomotive Steam Engine, built by Mr. Norris, of this city, for the commonwealth of Pennsylvania. It ascended the Inclined Plane in admirable style, and performed, to the entire satisfaction of a numerous party of scientific and other gentlemen who were present.

"In order that our readers may fully understand the nature of the ascent, we annex the following statistics of the Inclined Plane: length, 2800 feet; ascent, 196 feet.

"The above ascent is equal to 369 feet in a mile, and is a rise of 1 foot in $14\frac{3}{10}$ feet.

"The Engine, which is called the 'WASHINGTON COUNTY FARMER,' weighs 18,170 lbs. The load drawn up, including fuel and water, two large Passenger Cars, with 29 passengers, weighed 30,116 pounds. The pressure in the boiler was under 70 lbs., and the ascent occupied 3 minutes and 15 seconds.

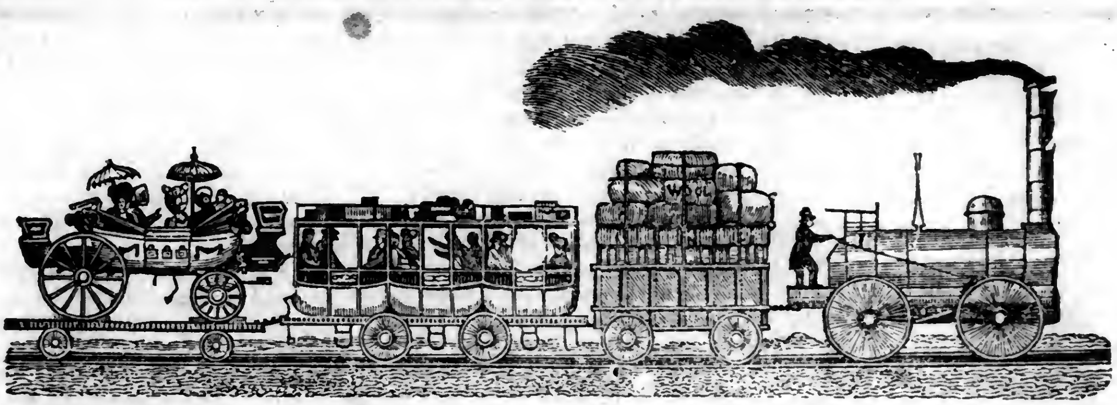
"In descending the plane, the engineer caused the Engine to stop suddenly several times, though previously going at great speed; and he twice moved the Engine up and down the Inclined Plane at pleasure; thus showing at once its great power and safety."

The "GEORGE WASHINGTON" has been, since July 19th, performing daily over the Columbia Railroad, length 82 miles, with trains of from 18 to 25 cars, frequently making two trips per day, and in some instances three trips in 21 hours. The largest number of Cars, in one train, drawn by this Engine over the road, has been 35; 18 loaded, 3 half loaded, and 14 empty, making a load of 128 tons, which was performed in the usual running time of 12 miles per hour. The greatest load drawn by this Engine, has been 137 tons, in 27 cars.

The "WASHINGTON COUNTY FARMER" is now in successful operation; the first load drawn by her over the road, consisted of 28 loaded cars, weighing $141\frac{3}{4}$ tons.—The ascents in this road are very heavy; the least being 28 feet rise per mile, the majority 32 feet and the greatest 47 feet. This Engine, with the load of $141\frac{3}{4}$ tons, passed over the steep ascent of 47 feet per mile, which is upwards of three-fourths of a mile long, at the unprecedented rate of 22 *miles* per hour.

I have just completed extensive buildings and workshops, and am prepared to execute orders for Locomotive Engines, with despatch, all of which shall have my late improvements, and are warranted to be made of the best materials and superior workmanship.

WILLIAM NORRIS, *Philadelphia.*



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D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PRORIETORS.] SATURDAY, DECEMBER 24, 1836. [VOLUME V.—No. 51

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, DECEMBER 24, 1836.

AMERICAN LOCOMOTIVES.

By the following advertisement, we learn —and it affords us pleasure to call to it the attention of our readers interested in Railroads—that Messrs. ROGERS, KETCHUM & GROSVENOR, of Patterson, New-Jersey, have added to their extensive machine shops, one for LOCOMOTIVE ENGINES.

We have more than once enjoyed the pleasure of a visit to their works, where we found ample evidence of the truth of a remark often made by us, that, "to whatever branch of manufacture our countrymen turn their attention, they are sure to excel"—and so, we doubt not, it will be in this new branch of business, undertaken by this enterprising House—and we hope soon to learn, that their skill in this branch has been as successful as in others.

In a few years, we shall not see an imported Locomotive on an American RAILROAD.

DESTRUCTION OF THE PATENT OFFICE.

Our readers will hear with surprise and regret, that the entire Patent Office and its contents have been destroyed by fire.

The destruction commenced in the General Post Office, under the same roof, and could not be arrested until the entire building was in ruins.

The vast collection of models, drawings, &c., the result of the combined ingenuity of the United States for years, is thus swept from existence—a loss never to be repaired

What effect this accident will have upon the proceedings of the Office, we cannot say. Certainly much useless lumber is removed, for which regret in the slightest degree cannot be felt. It would be prudent in all, having unfinished business at this Office, to ascertain the position in which they are left, and repair any deficiencies caused by the fire, without delay.

It is a disgrace to us as a nation, that we cannot place our public offices, especially those of record, in buildings that are fire and water proof. Buildings for the use of the Patent Office, it is true, are now in progress, but they should have been erected long ago.

It is to be hoped, that every effort will be made to expedite their completion, while no expense should be spared in rendering the office every way suited to the wants of the department.

SYRACUSE, DEC. 12, 1836.

TO D. K. MINOR, AND GEO. C. SCHAEFFER.

GENTLEMEN:—I am now able to give you a good account of the Grist, or Flouring Mill, put up at Cato four Corners in Cayuga county. It is now in successful operation and works beyond our expectations.

You will recollect that we have put up an engine there with arms of *twelve feet* in diameter with the shaft placed perpendicular, receiving the steam at the lower end, which, when worked at 120 lbs. to the square inch, will nearly raise the shaft, and arms from their bearing below, and therefore work with very little friction. This engine makes about one thousand revolutions per minute, and the works are driven by cog wheels, instead of bands, as in the

smaller engines, and we can give the stones any velocity we desire.

This engine was designed to drive *three run* of stones, and to use steam at 120 lbs. to the square inch, and to grind one hundred bushels of wheat to the cord of wood; and these anticipations have been more than realized, as we have the three run in operation, and grind eight bushels per hour, to each run, with *less* than 60 lbs. of steam to the square inch; and usually not to excede three-fourths of a cord of wood to the hundred bushels. Another run might be driven with great ease.

The apertures in the arm of this engine are *each* $\frac{3}{16}$ of a *square* inch, but it is intended to reduce them *one half* at least, and use steam at 120 to 150 lbs. to the inch, when I have no doubt of being able to grind over 150 bushels of wheat with a cord of *maple* wood.

Since this mill was put into operation, two other companies have been formed to erect two other mills on the same plan, for flouring.

This experiment sustains my theory that the *long* arm is best, and I intend to make an engine with twenty feet arms, which, I bave no doubt will work *one hundred horse power*.

I have many interesting facts, and shall have others in a few days, in relation to the rotary engine in this mill, which I will communicate to you, and in time, I hope for the next number of the Mechanics Magazine. In the mean time, I am

truly yours.

WM. AVERY.

REPORT ON THE SURVEY OF A ROUTE FOR A RAILROAD FROM WATERTOWN TO ROME.
BY WILLIAM DEWEY, ESQ. TO

(Continued from page 786)

ORVILLE HUNGERORD,	ANDREW Z. MCCARTY
WILLIAM SMITH,	JOHN H. WELLS,
G. C. SHERMAN,	AMBROSE CURTISS,
H. H. COFFEEN,	S. N. DEXTER,
EDMUND KIRBY,	LINUS PARKER,
S. B. ROBERTS,	CALEB CARR,
JESSE ARMSTRONG,	AVERY SKINNER,
	HIRAM HUBBELL,

Commissioners of the Watertown and Rome Railroad.

Since the difference of level between Watertown and Pulaski is only 86 feet, in a distance of 32 miles, or little exceeding $2\frac{1}{2}$ feet per mile, it has been suggested that a line of examination be carried from Watertown, west of the course we pursued, and bordering upon the Lake, maintain a grade nearly horizontal to Pulaski. My opportunities have not allowed an examination of this route, but in addition to its increased distance, I apprehend it will be found impracticable except at a great additional cost. The slight general attention I have devoted to that section induces a belief, that, although a line of a uniform and very moderate grade might be located, yet that it can be effected only by crossing many long and deep ravines, and excavating the ridges between the streams, at a far greater expense than the route we have surveyed. However, an examination, directed especially to this object, might prevent a feasible course.

From Williamstown to Camden, by keeping west of the valley of Fish Creek, it is probable that a line may be found quite as favorable as the one followed down the valley. Much bridging, arising from the frequent sinuosities of the Creek, might thus be avoided, and as the valley is frequently overflown by freshets, the security of the road would be better preserved, were a route further from the Creek to be discovered. Indeed I consider that there are many sections where a more favorable location could be found, but as these opinions were most generally the result of subsequent conviction, I had not an opportunity of subjecting them to the test of an instrumental investigation. While examining the estimates attention should be paid to this subject, since I feel confident that in the ultimate location of the road, I could make a material reduction in the cost per mile, and also considerably diminish, as well as equalize the grades.

When the survey was started at Watertown, it was judged advisable, if practicable, to admit no grade upon the line exceeding 33 feet per mile. I am happy to state that this has been accomplished, nor has it involved much addition of cost. This rate per mile once established as our maximum, I found that, by its occasional occurrence, considerable reduction of expense would result, particularly while approaching and leaving the points selected for our bridges. I have employed it more readily, since it is evident that a locomotive engine should never have attached heavier loads than it can convey with facility over the steepest grade that it may encounter, consequently there is but little policy in resorting to a heavy expenditure, to avoid a steep grade, upon one portion of your road, when necessity compels its use on other portions.

This consideration has induced me to establish the grades, wherever heavy cutting and embankment are requisite, at this maximum rate, but I am of opinion that more extensive examinations would show that our grades could all be reduced below 30 feet, and not cause an increase over the present estimate.

I would not advocate the use of steep grades where, by a reasonable additional expense, they could be avoided, yet I think it would be displaying great disregard to the recent improvement in railroad construction, and their appendages, were they not allowed some weight in determining the location of a Road. Companies, when ordering an Engine, always regulate their directions as to its capacity, by the grades it must ascend, and the amount of labor it is designed to perform. A grade of 40 feet per mile is very far from formidable, and by an Engine of proper construction, can be overcome with much speed, great ease, and conveying a heavy load.

Certainly the wonderful improvements in locomotive Engines daily originated, afford the most gratifying evidence that obstacles to Railroads no longer exist, since few locations can be selected in our country whose ascents cannot be surmounted by these constructions.

On the line of this road there is nothing objectionable in the grades, and it is a gratifying evidence of the feasibility of the route, that you will be subjected to no heavy expense to reduce the ground to a practicable level.

A consideration of the inducements, presented by this road, for the investment of funds, is not particularly a province of your Engineer, unless confided especially to his charge, further than to refer to the cheapness and facility with which the road can be constructed, the ease of its grades, and the efficiency and durability of its superstructure; but when I contemplate the immense extent of fertile country thus afforded a ready communication with the Erie Canal, and the great line of Central Railroads, when this work is beheld in reference to its contemplated extension to the River St. Lawrence, by means of the Cape Vincent Railroad, now surveying under my direction, thus opening a communication with Kingston, at all seasons, and thence to Lake Huron, shortening the distance to the far west six hundred miles, over the route by the lakes, which, in the most favorable season, is scarcely available over five months in the year, I am confident that its importance must strike every mind as great and commanding.

Uniting at some advisable point with the Oswego and Utica Railroad, connecting with a road to Syracuse, and thence south to the great New-York and Erie railroad, it thus opens a quick and almost direct communication with the city of New-York. It is clear that it must, in connection with the Oswego railroad, monopolize the trade and travel of the Canadas, and a large portion of the Lake travel to the west.

An examination of the map will show that the nearest approach to Lake Ontario, from the city of New-York, is at the mouth of Salmon River. Pulaski, a point through which our survey passed, is distant three and a half miles from the mouth of this river.*

Why may we not anticipate, in this age, when enterprise and well directed speculation seize hold of, and convert to some valuable purpose, every useful idea, that an immediate and almost direct means of communication, will be established between the city of New-York and the Lakes, and that this Railroad will constitute an important link in this chain.

Indeed, it demands only a knowledge of the great resources of this section of country, already to long neglected,—its fertile soil, its almost inexhaustible forests, its daily developing mineral wealth, and the remarkable salubrity of its climate, to convince reflecting men that it needs but an opportunity for developement to take an equal rank among the most favored portions of our state.

SUPERSTRUCTURE: I have devoted much attention to the determination of the most

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*** The harbor is now improving under the direction of an U. S. Engineer, and the great inducements for profitable employment of capital at this locality are constantly attracting and enlisting the aid of men of wealth and enterprise.**

advisable mode of superstructure for this road—a mode suited to the materials of the country,—facile of construction, and possessing all the requisities of cheapness, combined with great durability, I am aware of no reasonable objection that can be urged, against the method I have adopted, for the purpose of my estimate, and therefore offer it for the consideration of those to whom the erection of the road may be confided.

More than sixty miles of our line are in the vicinity of immense forests, composed principally of Pine, Spruce, Hemlock, Beech, Oak, Elm, Maple and white Cedar. Hundreds of acres are leveled annually to afford scope for the husbandman's industry, and the noblest timber is committed to the flames, since its seclusion from a market, renders it a worthless article; consequently, since any route for this road must involve many miles of dense forest, it is evident that it is unnecessary to bring upon the line a single stick of timber, provided that of a sufficiently good quality is produced on the ground.

The white Hemlock of this region is remarkable for its great strength, stiffness, and the ease with which it can be worked. It is known that Hemlock of a proper quality, if entirely protected from the action of the atmosphere, will endure for ages. Until lately a despised timber, its properties are now daily developing, and its application, for many useful purposes, becoming universal. Its qualities I have recently more especially examined from being interested in a contract, entered into by T. Dewey, Esq. Civil Engineer, with the corporation of the city of New-York, according to the terms of which, an immense quantity of Hemlock is employed as the substructure to support an expensive hydraulic construction of heavy masonry, used for draining wet lands, in the upper part of the city. Many valuable buildings in New-York are erected upon hemlock foundations. The new Hall of Justice, now rapidly constructing, is built entirely upon a double layer of hemlock logs. These facts exhibit the great confidence reposed in the durability and strength of this timber; and also show that were it possible so to place it that it would be protected from contact with the air, it would constitute the most durable superstructure that could be adopted.

Hemlock timber of the best quality, perfectly sound, of great height, and remarkable straightness, abounds upon our route. My estimate for superstructure is based upon a suppstion that it is used.

Were it deemed advisable to use hemlock for the lower sills only, abundance of white Cear, black Ash, and other good timber, could be found on the line for ties and rails.

Longitudinal sills of hemlock, 12 inches in diameter, hewn upon the upper surface, are laid to receive cross-ties, with gains cut 8 by 8 inches, of similar timber, which are also 12 inches in diameter, and hewn upon the under surface. The cross-ties are properly secured to the lower sills by oaken pins, one inch in diameter, and are placed four feet six inches apart from centre to centre. To these the hemlock rail 7 by 8½ inches is secured by oaken wedges. The surface of the rail is thus left half an inch above the gain, and upon it is laid a ribbon of black-Ash, 5 by 3 inches.

The iron rail being placed upon this ribbon, both are simultaneously fastened to the hemlock rail, by a wrought-iron spike, seven inches in length. The superstructure is then compactly covered with sand and gravel, excepting only the black-Ash ribbon, and the iron rail.

A road so formed would possess strength sufficient to support the weight of the heaviest engine that would be brought to bear upon it; and since all its meterial consits of timber that, in the particular position it occupies, is comparatively imperishable, its expense for repairs will be light when compered with structures of a less enduring nature.

Such is the energetic character of the present age, such the unanticipated extent to which skill and ingenuity have carried improvements in almost every department of science and of art, and such the utilitarian refinement attained in the various manipulations of construction, that fancy can hardly form a conception, or bold speculation anticipate a triumph over physical obstacles, greater than those the realization of which we daily behold.

The alterations made in locomotive engines are astounding in their character, and glorious in their results.

Steam has triumphed over every obstacle yet encountered—time and space are almost eradicated—and yet still it march is onward, from victory to victory, and none can indicate beyond what bound it shall not proceed. May we not be allowed to propose an idea, and anticipate, that the quick minds, and ready arms of our mechanics, will soon mould a vague conceit to a substance and a name?

Emulation is the spur to exertion which has so greatly improved our machinery and manufactured products. Present to the devising genius of our mechanics, inducement sufficient to call into action, their originative faculties, and upon few specified objects will they fail to accomplish any desideratum.

Liberal encouragement and a fostering influence will command such qualities and ensure a beneficial result.

I would suggest to the directors of any company, whose line of road should be located through a wooded country, the propriety of offering a liberal recompense, to any mechanic, who shall furnish a locomotive engine, to be employed in the construction of their work, so formed that the motive power could be detached from the driving wheels, and applied to axles, fitted with circular saws, in such manner that the engine could be used for sawing timber.

A section of the road, a mile or two in extent, being graded, and superstructure laid, the engine could be place upon it—the longitudinal sills and cross ties could be trimmed—the gains cut—the rails prepared of a proper dimension—the black-Ash ribbon formed—every material readily transported to and fro—and the road extended in both directions with facility and economy.

The details of arrangement will be evident to any mechanical mind—the fuel, always the great expense of an engine, would cost nothing—even the saving in the transportation of timber, cut upon the line, to some distant mill site, would be an important item, while the facilities afforded in the progress of the work would be immense.

A method of construction for embankments different from that usually employed, would be requisite—such a mode has been recently adopted in our State, and is much used at the West. By this method, the road can be graded, and at once completed ready for use.

Were a machine of this character invented, and found useful, it requires but little consideration to show that its advantages would be important. It is unnecessary to enter into any details of arrangement, but I would be happy, should this crude idea receive attention, to furnish every information.

From Watertown to Rome, with very few exceptions, the earth we shall cut for our excavations and embankments, consist of very light sand and gravel, easily removed, and forming an excellent foundation for a railroad. Near Watertown, limestone rock abounds, but as it will not interfere with our operations, we need not cut it excepting for culverts and abutments. Clayey soil occurs but occasionally. On the entire line the work is of a lighter character than is often found on similar improvements.

In estimating for culverts, I have supposed in some places, small ones for mere drainage formed of hemlock—while, where plenty of good stone is easily obtained, they are built of masonry.

When a wooden construction is substituted for embankments, I have estimated for a bridged trestle where it could readily be used, and in other places for bridges on Town's plan.

SECTION NO. 1.

Extends from a point one mile and a half from Watertown, near an old stone Distillery, on the road to Adams, to the South Bank of the North Branch of Big Sandy Creek, below Adams.

Distance 12 miles, 19 chains,
Add 1 " 40 " to starting point [from Watertown.
13 miles 59 chains.

Bridging and Trestling	$7,920 00
412 chains Excavation 64,350 Cubic Yards	8,153 00
518 ch's. Embankment 156,517 Cubic Yards	18,402 04
Clearing and grubbing	303 00
Road crossings	210 00
7,448 rods of fencing	4,617 75
Culverts	2,000 00
Add for one mile and 40 chains	5,099 07
Contingencies, 10 per cent.	4,670 55
	$51,376 12

SECTION NO. 2.

Extends from the south bank of the north branch of Sandy Creek at Adams to the south bank of Little Sandy Creek, at Washingtonville.

Distance 11 miles 70 chains,

Bridging and Trestling	$14,470 50
395 ch's. Excavation 75,465 Cubic Yards	6,037 20
497 ch's. Embankment 79,501 Cubic Yards	7,155 09
Clearing and grubbing	462 00
Road crossings	100 00
7,136 Rods of fencing	4,424 32
Culverts	1,500 00
Contingencies, 10 per cent.	3,414 91
	$37,564 02

SECTION NO. 3.

Extends from the south bank of Little Sandy Creek at Weshingtonville to Pineville.

Distanee, 11 miles, 15.20 chains,

Bridging and Trestling	$3,702 00
350.60 chains Excavation 66,441 Cubic Yards	6,644 10
525 chains Embankment 96,594 Cubic Yards	9,659 40
Clearing and grubbing	304 00
Road crossings	100 00
7,006 Rods of fencing	4,343 72
Culverts	375 00
Contingencies	2,512 82
	$27,641 04

SECTION NO. 4.

Extends from Pineville to the west branch of Fish Creek at the Williamstown Mills.

Distance, 11 miles, 4 chains

Bridging and Trestling	$1,584 00
346.50 ch's. Excavation 170,119 Cubic Yards	15,310 71
325.50 ch's. Embankment 111,-226 Cubic Yaros	10,019, 34
Clearing and grubbing	2,064 80
Road crossings	75 00
6,976 Rods of fencing	4,325 12
Culverts	375 00
Contingencies	3,374 49
	$37,119 46

SECTION NO. 5.

Extends from the west branch of Fish Creek near Williamstown Mills to the village of Camden.

Distance 9 miles 54.50 chains,

Bridging and Trestling	$10,494 00
206 chains Excavation 63,791 Cubic Yard:	5,103 28
489 chains Embankment 77,810 Cubic Yards	6,224 80
Clearing and grubbing	891 00
Road crossings	225 00
5,560 Rods of fencing	3,447 20
Culverts	400 00
Contingencies	2,678 52
	$29,463 80

SECTION NO. 6.

Extends from Camden village to Fish Creek Forks.

Distance 8 miles 34 chains,

Bridging and Trestling	$11,088 08
276 chains Excavation 89,469 Cubic Yards,	7,072 30
314 chains Embankment 78,582 Cubic Yards,	8,052 21
Clearing and grubbing	840 00
Road crossings	150 00
4,720 Rods of fencing	2,926 40
Culverts	600 00
Contingencies	3,072 89
	$33,801 88

SECTION NO. 7.

Extends from Fish Creek Forks to the Arsenal at Rome

Distance, 10 miles 48.30 chains,

Bridging and Trestling	$8,462 50
366, chains Excavation 123,525 Cubic Yards	12,352 00
276 chains Embankment 42,230 Cubic Yards	3,800 70
Clearing and grubbing	1,560 00
Road crossings	125 00
6,152 Rods of fencing	2,814 24
Culverts	250 00
Contingencies	3,036 44
	$33,400 88

PINEVILLE ROUTE.

Extends from the south side of Little Sandy Creek, one half mile east of Washingtonville to Pineville.

Distance 8 miles 26 chains,

Bridging and Trestling	$9,768 00
363, chains Excavation 88,866 Cubic Yards	7,109 28
245, chains Embankment 75,710 Bubic Yards	6,056 80
Clearing and grubbing	828 00
4,864 Rods of fencing	3,015 68
Contingencies	2,677 77
	$29,455 53

ESTIMATE FOR SUPERSTRUCTURE.

10,560 feet Longitudinal sills of hemlock 12 by 12 inches hewn, at 50 cts. per 100 feet	$52 80
1,173 Cross-ties of hemlock 12 by 12 inches hewn, at 50 cts. per 100 feet	46 92
Sawing and cutting gains for cross-ties	70 38
10,560 feet Hemlock rail 7 by $8\frac{1}{2}$ inches at $4 per 1000	209 44
2,112 Oaken wedges at $9 per 1000.	19 00
2,112 Oaken pins 1 inch diameter, at $5 per 1000	10 56
17,560 feet Black Ash ribbon, 5 by 3 inches, at $5 per 1000	66 00
25 Tons of Iron-Rail $2\frac{1}{4}$ by $\frac{5}{8}$ inches at $75 per ton	1,875 00
1,877 lbs. wrought iron spikes, 7 inches, at 11 cts.	206 47
750 Splicing plates, 1,134 lbs. at 5 cts.	56 70
Labor of putting down a mile	576 93
Total per mile	$3,190 20

SUMMARY OF COST.

SECTION NO. 1.	13 miles	59 ch's.		$51,476 12
" " 2.	11 "	70 "		37,564 02
" " 3.	11 "	15.20chs.		27,641 04
" " 4.	11 "	4 ch's.		37,119 46
" " 5.	9 "	54.50chs.		29,463 80
" " 6.	8 "	34	"	33,801 88
" " 7.	10 "	48.30	"	33,400 88
	76 "	45.00	"	$250,367 20

Average per mile.	$3,270 09
Superstructure - - - -	3,190 20
Total per mile - - -	6,460 29
76 miles 45 chains at $6,460 29 per mile - - - -	$494,615 95
9 turn outs - - - -	18,000 00
Total	$512,615 95

I have not introduced any items referring to the expense of station houses and other appendages, since they are subject to ready calculation, and must be regulated by the business of the road, and the judgment of the Directors.

All my calculations are based upon a liberal scale, and, should the ideas I entertain, be followed in the execution of the work I have entire confidenee that the result will indicate an essential reduction in the sum estimated.

I have the honor, Gentlemen, of presenting this Report and estimates, with the accompanying Profiles, and remain,

Yours, very Respectfully,

WILLIAM DEWEY.
Civil Engineer.

Pulaski, September, 1836.

RAILROAD MEETING.

"The citizens of Butler county held a meeting at the court house in Butler, on the evening of the 18th inst., for the purpose of consulting on measures to carry into effect the contemplated Railroad from Freeport through Butler to New-Castle. Hon. John Gilmore was called to preside, assisted by Jacob Mechling, and W. Campbell, Esq., and Wm. Stewart and James Potts were appointed Secretaries.

The following resolution offered, by Wm. Beatty, Esq., after a spirited discussion, in which several gentlemen participated, was unanimously adopted :—

Resolved, That a committee of seven be appointed to draft a Memorial to the Legislature of this State for an appropriation to construct a Railroad from Freeport by the way of Butler to New-Castle—and that the same be considered as a part of the Pennsylvania improvements.

Wm. Beatty, Wm. Stewart, S. A. Purviance, C. C. Sullivan, John Gilmore, John Bredin, and Joseph Graham were appointed said committee—and it was ordered that said committee have the Memorial printed, and circulated to obtain signatures.

On motion,

C. C. Sullivan, J. N. Purviance, W. Beatty, Jacob Mechling, and W. Campbell were appointed a committee of correspondence.

Resolved, That F. M'Bride, J. Potts, M. Bredin, A Gilmore, and J. G. Campbell be a committee to procure a lithographic draft of the contemplated improvement, and the adjacent improvements and country around; and that they be also a committee of finance.

Resolved, That the proceedings be signed by the officers and published."

JOHN GILMORE, President.

JACOB MECHLING, } Vice Pres.
WM. CAMPBELL, }

Wm. Stewart, } Secretaries.
James Potts, }

RAILROAD MEETING.

In pursuance of a public notice given, a meeting was held at the Court House in the town of Benton, on Monday, the 7th day of Nov., 1836, to take into consideration the construction of a Railroad from the city of Jefferson, passing through the mineral region in Washington county, and terminating at some point on the Mississippi river in South Missouri.

And also the propriety of appointing delegates to represent this county in a Southern Convention to be held at the town of Jackson on the 2d Monday of November. Whereupon, the meeting was organized by calling Joseph Hunter, Esq., to the chair, and appointing Col. Felix G. Allen, Secretary.

The President having explained the object of the meeting, Dr. Brown offered the following resolution, which was read and adopted:

Resolved, That we esteem the construction of a Railroad from some point on the Mississippi below its conflux with the waters of the Ohio, passing through the mining region in this State, and terminating at some eligible site on the Missouri River, as a work wholly practicable, of infinite advantage to Southern Missouri generally, and inestimable importance to us, therefore,

Resolved, That we will send delegates to the contemplated Railroad Convention, to co-operate with that body in memorializing the Legislature on the subject of constructing a Railroad, as nearly in accordance with the views of this meeting as may be practicable.

Dr. Brown then moved that ten delegates be appointed to represent this county in the proposed convention, which motion prevailed, and thereupon,

Richard C. Woolfork, Esq., moved that the President appoint said delegates, which motion passed in the affirmative, and the chair accordingly selected the fellowing gentlemen:

John Hall, Felix F. Allen, William Myers, John Moore, Dr. Brown, Underwood Beckwith, Drakeford Gray, John R. Dunklin, Richard C. Woolfolk, and on motion by Dr. Brown, the chair was added to the number of the delegates.

On motion by John Moore, Esq., the following resolution was considered and adopted.

Resolved, That the proceedings of this meeting be signed by the Chairman and Secretary, and copies thereof be forwarded to the editors of newspapers in the town of Cape Girardeau, with a request to publish the same—and then,

On motion of R. C. Woolfolk, Esq., the meeting adjourned.

JOSEPH HUNTER, President.
FELIX G. ALLEN, Secretary.

ANOTHER RAILRORD MEETING.

In pursuance of public notice, a large and respectable meeting of the citizens of New-Madrid county was held in Big Prairie, on Monday the 7th Nov., to take into consideration the propriety of sending Delegates to represent this county in the Southern Railroad Convention, to be held in the town of Jackson, on the second Monday of November.

The meeting was organized by calling David Hunter, Esq., to the chair, and appointing Morgan Hill, Secretary.

The object of the meeting having been briefly stated by the chairman, Mr. Charles Emory submitted the following resolutions, which were unanimously adopted:

Resolved, (as the sense of this meeting) That we deem the construction of a Railroad, from some point on the Mississippi, below the mouth of the Ohio, running through the mineral region of this State, and terminating at some suitable place on the Missouri River as a work in every respect practicable, and one in which every citizen in Sonthern Missouri is deeply interested: Therefore,

Resolved, That we will send Delegates to represent this county in the Southern Railroad Convention to be held in Jackson, on the second Monday in this month.

On motion, by Mr. Graham, it was agreed that the chair nominate a committee of five, to appoint Delegates to represent this county in said Convention, and therefore, the chairman nominated said committee, which, after having retired a few minutes, returned the following gentlemen, as having been selected Delegates to represent said county in said Convention.

Needham Sike, Lemuel Maulsby, Morgan Hill. Richard Philips, Charles Seavers, Robert G. Watson, John B. Martin, Martin Toney, John Martin, Alfred Dillard, William W. Hunter, H. P. Maulsby, Asael Smith,—and, on motion by Mr. Russell, the chairman was added to the number.

Mr. Sikes offered the following resolution.

Resolved, That these proceedings be signed by the Chairman and Secretary, and copies thereof be forwarded to the editors of the Southern Advocate, with a request to publish the same.

Which was agreed to.

On motion by Mr. M'Farland, the meeting adjourned,

DAVID HUNTER, Chairman.
MORGAN HILL, Secretary.

DETROIT AND ST. JOSEPH'S RAILROAD.—The Directors have secured the services of Lieut. Centre and Berrien, two of the best practical Engineers in the United States; who have resigned their offices in the army for the purpose of devoting their entire attention to the work.

The road is grubbed as far as Ypsilanti, and ten miles are graded. As a proof of the interest taken in the work, it may be stated that the Directors meet regularly every Friday evening.

MONROEVILLE AND SANDUSKY CITY RAILROAD.—At the annual election, held by the stockholders of this road, at the Railroad Hotel, in Monroevile, on the 17th October.

John G. Camp, Thomas Neill, George Hollister, Forrest Messenger, James Hollister, Jr., Durin H. Tuttle, John Fish, James Hollister, and Henry W. Standart, were unanimously elected directors for the ensuing year.

At a subsequent meeting of the Board, Isaac A. Mills was unanimously elected President; George Hollister, Treasurer: and Edward Baker, Secretary.—[Huron Reflector.]

WATERTOWN AND CAPE VINCENT RAILROAD.—The survey and estimates for this road are completed, and the result submitted to the public in the report of the engineer Mr. Dewey. The report estimates the cost of constructing the road, at $145,965 88 or $5,781.96 per mile. The distance is about 25 miles. This road when constructed is to unite with the Rome and Watertown Road at the latter place, and thus give a continuous route of about 100 miles through a delightful and richly cultivated country.

RAIL PATHS.—Manufacturers, merchants and mechanics seem not to be aware of the ease and advantage, with which a heavy load may be moved on rail paths for short distances by human power. The man, who draws up a weight of one pound ten feet perpendicularly, exerts the power that would move two hundred and forty pounds ten feet on a level railroad; or, which is the same thing, the power that raises up on one pound, or one ton a foot perpendicularly would move that pound, or that ton two hundred and forty feet on a level railroad; and thus the power, that raises a ton eleven feet, would move it forward on a level railroad half a mile. FARRADY, a writer on the steam engine, says that a stout laborer will work for eight hours a day, expending the strength required to raise 3750 pounds one foot each minute. Such a laborer then may move in a day on a level railroad eighty-one tons of 2000 pounds each half a mile, including the weight of the carriage and the load. It is manifest, therefore, that rail tracks, might be used for the great accommodation and profit of manufacturers, merchants and mechanics, and I may add of farmers too. Indeed by a level rail path, a gentleman, might move double his own weight half a mile, as easily as he would walk up a pair of stairs twenty-two feet high.—[Yankee Farmer.]

AMERICAN LOCOMOTIVE IN GERMANY.—The Baltimore American states that an application has been made on the part of the Leipsic and Dresden Railroad Conpany, in Saxony, to the Baltimore and Ohio Railroad Company, for permission to Messrs. Wynans and Gillingham, by whom the engine factory of that corporation is conducted, to make an engine for the company first named, similar to those used on the great western work of Maryland, to be placed on the road between the German cities above mentioned. The application was occasioned by the report of the performances of an engine at the inclined planes, published some months since, under the sanction of the Directors, which report had been re-published in the German papers, and created quite a sensation. The results stated far surpassed any thing which had been deemed practicable even among the highly celebrated mechanicians in Germany.

RAILROAD FROM HOBOKEN TO AMBOY.—At a public meeting in Perth Amboy, James Harriot, Chairman, and James A. Nichols, Secretary, the following resolutions were adopted, viz:

1. Resolved, That we consider the intended Railroad, to be called the People's Railroad, of great importance to our city, and a large portion of the interior of this State, opening a communication from some of our principal manufacturing towns to this port, thereby securing to them a great facility for shipment of their goods intended for abroad, *at all seasons of the year, in vessels of any class;* and receiving of articles from abroad, for the supply of manufactures and consumption, without the expense of re-shipment.

2. Resolved, That we will co-operate with the citizens of the neighboring towns in obtaining the passage of the Bill for said road.

THE NEW DOLLAR. It gives us pleasure to announce—says the Washington Globe of this morning—that the dollar of our own mint is soon to make its appearance. The face of the coin represents a full length figure of Liberty, seated on a rock, with the classic emblem of the *pileus* or liberty-cap surmounting a spear held in the left hand. The right hand rests on the American shield, with its thirteen stripes, crossed by a scroll, on which is the word Liberty. The reverse represents the American eagle, on the wing, drawn accurately from nature; all the heraldic appendages of the old coin being discarded. Over the field are placed irregularly twenty-six stars; the entrance of Michigan into the Union, having been, it seems, anticipated.

The design of the face of the coin was drawn by Mr. Sully, and that of the reverse by Mr. Titian Peale; both under instructions from the Director of the Mint. The dies were executed by Mr. Gobercht, one of the engravers of the mint.

This emission of dollars is the first coined at the mint since the year 1805. It is intended to adopt the same design in the other coins, as soon as it is practicable to do so. [Balt. Am.]

It has been ascertained at Northampton, (Mass.) that good brown sugar can be made from beets in this country, so as to be afforded at 5 and 6 cents the lb.

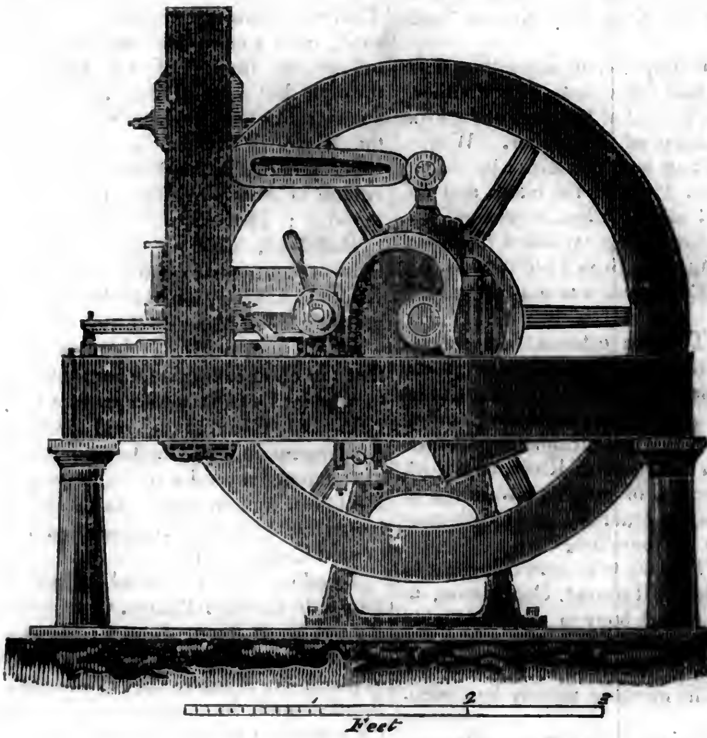
DESCRIPTION OF THE NEW COINING PRESSES LATELY INTRODUCED INTO THE UNITED STATES MINT, PHILADELPHIA. BY FRANKLIN PEALE, ESQ.

TO THE COMMITTEE ON PUBLICATIONS.

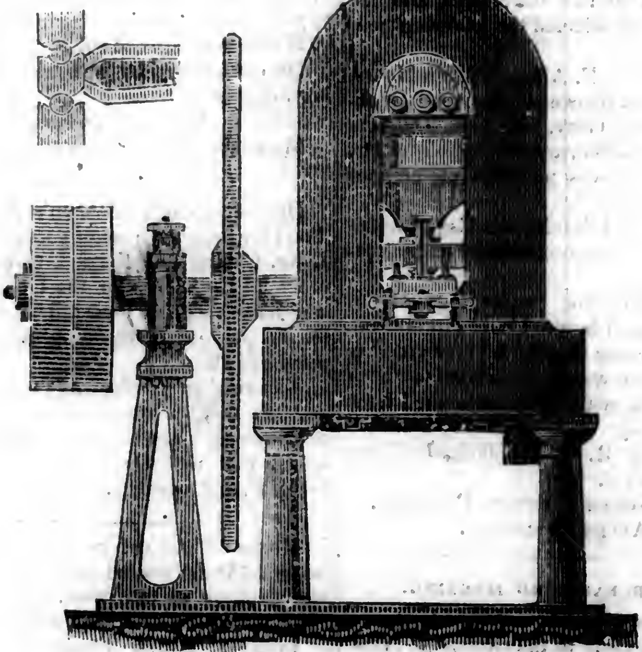
GENTLEMEN:—After seven months of experience, it will not be considered premature, to send for publication, a brief notice of the Coining press, a model of which I had the pleasure to exhibit and describe, at one of the conversation Meetings at the Institute last year.

This press has been in operation since the 23d of March last, the period of the first coinage by steam in the Mint of the United States; and the results, which are more than satisfactory, have authorized us to proceed with the most perfect confidence in the formation of the presses for the Branch Mints at New-Orleans, and at Charlotte and Dahlonega, in North Carolina and Georgia; also, with the manufacture of others for the use of this mint, all of which, it is probable, will be completed at an early period in the coming year.

Side View of the Press.



Front View.



The above design exhibits a side view of the medium size press, intended to strike eagles, quarter dollars, and cents. Three grades have been adopted, corresponding in linear proportions to the numbers $9\frac{1}{2}$, 7 and 6, suited to all the denominations of our coin respectively.

The design exhibits the general proportions and arrangements of parts, consisting of a shaft with a fast and loose pulley

to receive motion by means of a strap from the moving power, whether water, steam, horse or hand:—the latter of course, being least desirable, will only be used, when neither of the others is evailable. Upon this shaft is placed the fly wheel, the momentum of which, during one revolution at the rate of sixty per minute, is found, on trial, to be quite sufficient to overcome the resistance offered by the piece whilst subjected to the pressure of the dies. Upon the same shaft is the crank, which gives motion, through the pitman, to a lever and toggle-joint, the structure of which is exhibited in the left upper corner of the front view presented in the next figure.

The feeding in of the blanks, or planchets, and their discharge after being struck, is performed by an eccentric and set of levers, all combined in so simple a manner, as to be effectual, and not subject to derangement; as much of these parts as are visible in the two views, are faithfully exhibited, but is impossible to discribe them intelligibly without the aid of drawings of the separate parts; and further, since the drawings were executed, changes have been made in the position and form of the eccentric, by which the press has been much improved; a general notice is all that is intended in the present communication.

The feeding tube is a vertical pipe to receive the blanks, in which they are placed by hand, and from which they are taken by the feeders; the latter are so arranged, that when a crooked, or otherwise faulty blank impedes the motion, (not an unfrequent occurrence in coining,) the whole is immediately released from action, and will not again operate until the impediment be removed.

A few familiar facts are added as evidences of the peculiar adaptation of the toggle-joint to coining, as proved by the operation of the press which is the subject of this notice.

1. The pressure acts with increasing force until the close of the operation, at which time its intensity is greatest, and it is always carried to the same extent.

2. No injury occurs from the absence of a blank from between the dies when the blow is given, an accident that results in the destruction, or great injury, to one, if not both, of the dies, in presses of the ordinary construction.

3. An immense saving of labor. From trial, we have ascertained, that a man, with one hand applied by means of a common winch handle, can coin eighty pieces per minute, (the experiment was tried upon cents, which have a diameter of $1\frac{1}{10}$ inches.) A boy, fourteen years of age, was able to coin sixty per minute, without any unusual exertion; and lastly, it was impossible for the operator to tell, by the resistance offered to his exertions, whether the pieces were being coined or not.

It is by no means my wish to be considered the first who has applied the toggle-joint to the striking of coin. It is difficult to say to whom priority belongs; for presses on similar principles, are in use in more than one city of Germany, and their successful operation was witnessed at Carlesrhue, in the Grand Duchy of Baden. Particular advantage has also been derived from a careful examination of the coining presses of Monsieur Thonnellier of Paris. It is just to observe, that none of these presses were perfectly satisfactory. I have, therefore, made my own distribution and proportion of parts, thrown off whatever was complex, and added such as were necessary to its perfection, particularly, the arrangement for the disengagement of the feeders in case of the presence of defective pieces.

Our esteemed friend and fellow citizen, Mr. M. W. Baldwin, several years since, commenced the construction of a press on similar principles. His talents and mechanical skill are amply sufficient for its completion; and it is to be regretted, therefore, that his numerous occupations have prevented his prosecution of the subject.

I take advantage of the present occasion, to make a few remarks on the application of steam power to coinage, as applied in the Royal Mint, on Tower-hill, London, which is one of the greatest curiosities in mechanics that I have seen, exhibiting consumate skill and great resourses. on the part of the inventor, who, if I am not misinformed, was Mr. Boulton of Soho works. For a series of years this machinery was kept rigidly secret; some even of the officers of the Mint not having the favor of seeing it accorded to them, and it might yet have remained so, if it were not for the advancement of liberal principles, which bid fair to keep pace with the rapid increase of mechanical ingenuity and skill.

The direct application of high steam to the screw press, would have answered every purpose, but still better, the substitution of the toggle-joint for the screw has rendered all this ingenious complexity unnecessary; but mechanicians may make their own inferences from the following sketch.

A low pressure engine, is employed to create a vacuum in a large *receiver*, (in this case a misnomer,) by means of an air pump, which serves as a reservoir of power, through the agency of which the pressure of the atmosphere, is exerted as occasion requires both for the *blow* and *recoil* of the screw press, the former, produced by a cylinder and piston, furnished with valves, one of which opens to the reservoir, and the otherto the external air, the latter by a cylinder and piston, constantly acting, but with less power than the former. The valves are moved by levers which are struck at the proper time by a *plug frame* of similar construction to those employed in the ancient atmospheric engine. The power is communicated to the screw by tumbling shafts, connecting rods, and levers, the construction and operation of which could not be rendered intelligible without full drawings for reference. More words would, perhaps, render this brief notice as mysterious as the contrivance of which it treats; I will, therefore, close, by adding that eight of these systems, attached to eight screw presses, constitute the coining power of the British Mint.

From the New-Orleans Standard.

CLIMATE OF NEW-ORLEANS.

It may now be admitted, as fairly proved by sage philosophers, that the climate and health of a place depend as much on its locality as on its latitude in a particular zone or hemisphere; and that as the locality is improved by the arts of civilized life, the climate and health are proportionately meliorated. This is evinced by the experience of all ages and nations; and fortunately the experience of New-Orleans must shortly add another proof to corroborate the truth of this result.

The editor has occasionally recurred to this subject, in the humble hope of disabusing public opinion at a distance, founded on idle or interested rumors of the unhealthiness of this city; and as this opinion has bren one of the greatest obstacles to the greater population and trade of New-Orleans, he need not apologize for again adverting to it, and of acquiring the most authentic details to support his positions. He has obtained a general average for the past three years, ending the 1st of August last, of the state of the thermometer, barometer, hygrometer, weather, winds and rivers, as diligently and carefully prepared by Dr. Barton, from personal observations made with the best instruments at all periods. The following are extracts from the table elaborated.

THERMOMTTER.

	Highest	lowest	monthly mean	range
January	72	28.66	53.54	43.33
February	72.66	49.66	51.42	46
March	75.66	46	59.02	29.66
April	80	54	66.75	26.66
May	86	60	75.58	26
June	89	72	79.74	17
July	88.66	73	80.06	15.67
August	89	73	80.16	16
September	83.66	64.66	77.22	19
October	82	47.16	68.55	35.50
November	77.33	34	59.64	43.33
December	71	35.33	54.97	35.67
			67.22	29.48

BAROMETER.

	Highest	lowest	range
January	30.23	29.70	.53
February	30.20	29.75	.44
March	30.23	29.82	.47
April	30.17	29.76	.41
May	30.17	29.85	.37
June	30.14	29.88	.27
July	30.14	29.95	.19
August	30.02	29.78	.24
September	30.07	29.74	.22
October	30.19	29.83	.37
Nevember	30.31	29.69	.58
December	30.20	29.79	.41
			.40

HYGROMETER OF SAUSSURE.

	Highest	lowest	mean	range
January	43.50	0	19.50	43
February	40	0	31	28
March	40.50	0	18.87	40
April	16.33	17.66	42.25	43
May	61.66	14	45.78	47
June	66.66	23.33	48.65	40
July	52	0	36.54	52
August	56	5	40	51
September	65	26	46	39
October	61.50	1	40	66
November	52.50	0	29	52
December	48	0	21	48

ASPECT OF THE WEATHER.

	clear	cloudy	rainy
January	43.66	34.33	13.33
February	51.33	14 44	8.33
March	45.33	36.66	10.66
April	54	23	12.33
May	69	18	8
June	59.33	17.33	11.66
July	51.33	22	15
August	51.39	18.70	11.76
September	56.73	11.83	10.83
October	66.43	12.70	3
November	57.73	43.86	7
December	50.73	23.30	6.80

The average quantity of rain in January of the three years, was 4.66 ; in February 2.25 ; in March 2.59 ; in April 6.21 ; in May 2.95 ; in June 6.16 ; in July 6.38 ; in August 5.72 ; in September 5.66 ; in October 1.37 ; in November 3.18 ; and in December 2.87 : from which it will be seen that more rain falls in April, June, July and August, than in other months ; and that October and February are the driest months in the year.

During the same three years, from 1st August 1983 to 1st August 1836, the average retrocession of the Mississippi River from high water mark was 7.90 feet in January, 5.13 in Febuary, 4.27 in March, 2.94 in April, 4.63 in May, 4.72 in June, 5.82 in July, 7.97 in August, 13.10 in September, 13.33 in October, 12.34 in November and 8.84 in December—the river being highest in April and lowest in October. Dr. Barton has found that the Mississippi deposites 1 line of earthy particles in every 10 inches of water : that is one foot alluvion in 120 feet water. It might be useful as well as curious to ascertain when the river makes the most deposites ; and what impetus or power is necessary to remove deposites or obstructions occasionally or continuously applied. The solution of this might be of great advantage in improving the navigation of the river at its mouth.

But as a mere abstract view of a subject does not always give a positive idea, let us ascertain the climate of New-Orleans as compared with that of some principal cities ; by showing the latitude ; the distribution of heat in the different seasons, according to the mean temperature ; and the maximum temperature of the warmest month with the minimum of the coldest. The statements of other cities are taken from Ure's Dictionary of Chemistry, those of this city from Dr. Barton's table.

	Latitude	Mean temp. of year	Do of winter	Do of spring	Do of summer	Do of fall	Do warmest month	Do of coldest
Edingurg	55.57	47.8	38 6	46.4	58.2	48.4	59.4	38.3
Dublin	53 21	49.2	39.2	47.3	59.6	50	61	35 4
Geneva	46.12	49.3	34.9	47.6	65	50	66.6	34.2
Vienna	48.12	50.6	32.8	51.2	69.2	50.6	70.6	26.6
Paris	48.50	51	38.6	49.2	64.6	51.4	65.3	36
London	51 30	50.4	39.6	48.6	53.2	50.2	64.4	37.8
Philad'a.	39.56	53 4	32.2	51.4	74	56.6	77	32.7
New-York	40 40	53 8	29.8	51 2	79.2	51.6	80.6	25.4
Cincianati	39 06	53.8	32.9	54.4	72 8	54.4	74 3	30 2
Marseilles	43.17	59	45.5	67.6	72 5	60	74.6	44.4
Rome	41.53	60 4	45.8	57.8	75.2	62.8	77	42.2
Natchez	31 23	64.8	48.6	65.4	79.2	65.8	79.7	47
Cairo	30.02	72 4	58.4	73.6	85.1	70 5	85.8	55.8
N. Orleans	30	67.2	53.31	67.1	80	68 4	80	54 4
Vera Cruz	19.11	77.8	72	77.9	81.5	78.6	81.5	71
Havana	23 10	78.2	71.2	79	83 3	79	84	70

It may be remarked that these observations on the climate of New-Orleans, include part of 1833, when there was an epidemic, and the extremes of temperature were unusually great ; and that the winters '33–'34 and '34–'35 were remarkably cold in this city. And it will be perceived that though the average range of temperature in New-Orleans throughout three years of that kind, was not 30 degrees, the range in Philadelphia, New-York, Cincinnati, Natchez and even Rome was much greater : also that the extremes of heat and cold in New-Orleans are proportioned to those in Paris and Marseilles ; and consequently the health of this city, so far as it depends on climates is or can be as good as the health of Marseilles or Paris. *Quod erat Demonstrandum.*

Agriculture, &c.

From the Farmer's Register.

ACCOUNT OF THE LATE ROBERT BARCLAY, ESQ. OF URY, A CELEBRATED AGRICULTURIST.

Extracted from Mr. Robertson's Agricultural Survey of Kincardineshire.

But the man who exerted himself most for the improvement of the country ; the man whose labors in agriculture were the most strenuous and well conducted ; and whose example had the most prevalent and most extensive influence, was the late Mr. Barclay of Ury. His, indeed, were no common powers. Of the most athletic form of body, endowed with the most ardent, energetic, and comprehensive mind, he employed his great talents as an agriculturist with the most unwearied perseverance, and to the happiest and most beneficial results. The subject which he had to work upon and to improve, or rather to subdue, was of the most obdurate nature, and to most people would have been unconquerable. But he was not of a nature to be intimidated. Difficulties tended only to excite his activity ; and, adhering tenaciously to his own preconceived and well adjusted plans, he was ultimately successful

The estate of Ury, the chief subject of his improvements, lies on both sides of the water of Cowie, and extends from Stonehaven, in a northwesterly direction, for nearly five miles. The house of Ury is situated about a mile and a half from Stonehaven, on the north banks of the Cowie. This rivulet, whose banks have been destined to receive so much embellishment from the hands of Mr. Barclay, is a small trouting stream, in general of no great capacity ; but there are times when the mountain torrents, from which it is derived, come down so suddenly, and with so much impetuosity, as to swell it, in some places, more than twelve feet above its usual level. Happily, however, at Ury house, where this occurs, it is confined within strong natural bulwarks of rock, so as to prevent devastation.

Mr. Barclay succeeded his father to this estate, in the year 1760. At that time there was, except a few old trees around the mansion house, scarcely a single shrub of any value on the whole property. The Cowie, which runs for above three miles through the lands of Ury, had, in the lapse of ages, worn itself a deep channel ; the land on either hand shelving towards it, in an angle more or less accute, in proportion as the soil was more or less adhesive. In general, through the whole extent of this course, springs of water from the circumjacent grounds were continually oozing to the banks, and forming into marshes and quagmires, which from time to time burst, and were precipitated, by land slips, into the river. Thus, every year the banks were becoming wider, by the breaking down from the overhanging braes of some new piece of land, to be slipped, in its turn, into the stream, which, being periodically flooded, swept the whole into the sea. The only product of these banks was a few natural alders, of no value whatever, and a coarse kind of aquatic herbage, to which cattle had hardly any access, and on which, if they had, they would scarcely have fed.

The arable land was divided into a number of small farms, each having a right of pasturage on the contiguous hills. The tillage was superficially performed with very imperfect implements. Almost every field was incumbered with obstructions of one kind or other—such as, pools of stagnant water—quagmires, where the cattle were ever in danger of losing their lives—great baulks of unploughed land between the ridges—but, above all, stones abounded, not merely on the surface, but through the whole depth of the soil. There were no enclosures ; no lime was used as a manure ; and the only crops were bear and oats. There was no cart nor wheel-carriage of any kind ; nor was there even a road. In short, no place at that time abounded more in the evils attending the ancient system, nor enjoyed fewer of the advantages of modern husbandry, than the lands of Ury.

Mr. Barclay, who had acquired his ideas of agriculture on the fertile plains of Norfolk, could ill brook a state of husbandry like this. So soon, therefore, as he succeeded to the estate, he set, about its improvement in a style which soon appeared to be neither superficial nor fleeting, but, to the utmost degree, radical and permanent. For this purpose, in addition to the lands that were at all times in the hands of the family, he took into his own management all the farms in the vicinity of the mansion, as the leases expired. And as none of them were of long endurance, he had, in the course of about 30 years improved most thoroughly 903 acres of arable land, besides planting from 900 to 1000 acres with wood. Of the above quantity of arable land, there were originally about 300 acres, which were altogether either marsh or heath. Of the remaining 600, which were let to tenants, about one-fourth part, or 150 acres, consisted of baulks, wastes, marshes, and pools, interspersed through every field ; the quantity in actual tillage never having exceeded 450 acres. So that, on the whole, Mr. Barclay, has meliorated about 450 acres, and brought them, from a very imperfect, to the most correct state of culture ; and improved, from a state originally of the

most barren and forbidding appearance, about 450 acres more, which are now in a high degree of fertility.

The means by which all this has been accomplished, will form the subject of the following investigation, and fall to be related under these different heads. 1. Draining. 2. Trench-plonghing. 3. Removal and disposal of stones. 4. Application of lime. 5. Enclosing. And, 6. Rotation of crops. Plantations will form the subject of a separate section; as will comparative value, another.

1. *Draining.*—This primary step towards improvement was so indispensable on the lands of Ury, that out of 52 fields, into which Mr. Barclay divided his improved lands, there was only one in which draining was not required. The sub soil of nearly the whole was also of such an adhesive nature, that the spring water could not filter through, nor draw to any considerable distance. So much was this the case, that it was frequently requisite to form the ditches within a few yards of each other. before the purpose of complete drainage could be accomplished. One field, consisting of 25 English acres, is, in particular, still pointed out as a remarkable instance of this. It cost £150 for merely the opening of the ditches, though these were contracted for at the low rate o. three farthings the ell. This gives 48,000 ells for the field, or 1920 for the acre. And if we suppose the ditches to have been two and a half feet wide, (and, in such a marshy soil, less would not have kept them from falling in,) the ground thus cast up would amount to more than one-third part of the whole mass; and the drains must have been, at the average, within less than five feet of each other. To this expense of opening or casting the drains, there falls to be added, the expense of filling with stones and covering again with earth. The filling with stones, at the rate of one cartload to three ells, would require 16,000 such loads; a large part of which, if not the whole, must have been brought from a considerable distance, as it is more than probable the marsh could not, of itself, furnish such a quantity. This labor, together with the expense of laying the stones in the ditches, and covering them with earth, cannot, on the most moderate estimate, be calculated at less than double the first expense, or £450 for the whole; thus making more than at the rate of £20 the acre for draining alone. The field itself, having been thus so completely turned inside out, has altered its aspect from its originally mossy hue, to a dale white, the color of the clayey sub-soil; which having been thoroughly pulverized by trench-ploughing, and a copious application of lime, is now, not merely fully dry, but become considerably fertile. The total expense laid out on this field, would be little short of £40 the acre; for independent of drainage, Mr. Barclay's other means of improvement generally cost him, per acre, about £18. This expense, in the present instance, would probably do more than purchase the land after it has been improved, and would certainly have deterred any common cultivator from making the attempt. But Mr. Barclay was not a man to be easily moved from his purpose; and, having once resolved to bring his whole lands into a full state of cultivation, this field, which would otherwise have remained a blot on the surface, would not have been left unimproved although it should have cost ten times the sum.

Mr. Barclay's drains were generally two feet and a half wide at top, ten inches wide at bottom, and about three feet deep. Less dimensions as to breadth might perhaps have served every purpose of draining; but the expense of casting them would have been very little, if at all, diminished by narrower ditches. For in a soil, of which one half the substance consists of stones and gravel, and the other half of an adhesive clay intermixed with these, it becomes impracticable to cast a very narrow ditch. To this it may be added that as the lands of Ury had such a profusion of stones on the surface, it became a relief, in the trouble of clearing them away, to have large ditches into which they might be put.

2. *Trench-ploughing.*—The next operation was trench-ploughing; and there were two objects in view from this labor; 1. To acquire a depth of soil; and, next, to get rid of stones: and the work was persevered in till both were accomplished. Previous to Mr. Barclay's operations, the quantity of stones upon the lands of Ury was, as has been already stated, immense, both on the surface and through the whole depth which the plough had ever reached. The tillage had been but superficially performed; nor, indeed, had the tenants either skill or ability to perform it better. But Mr. Barclay soon made his lands assume a different appearance; and from being the most incumbered with stones, and from having the thinnest staple of soil, they became the least incumbered, and of the deepest soil in the county. This was not, however, an easy acquisition, nor was it accomplished at little cost. With a set of uncommonly strong implements, and with six, and sometimes eight, heavy horses in the draught, he made the plough to descend, in spite of every obstruction, sixteen or eighteen inches at once; and, after carrying off the stones, as they were turned up, as from a quarry, he repeated the operation, till, in the end, he obtained a free soil of fourteen inches deep, and of a mould fit for every agricultural purpose. The quantity of stones thus removed was in general very great, and in some cases, almost incredible—even to the amount of more than a thousand cart loads from an acre. And the surface of the land itself was observed to have become evidently ten or twelve inches lower by the operation.

3. *Disposal of the Stones.*—This would have been a work of weary labor, had not Mr. Barclay found out beneficial purposes for almost the whole. The draining, already noticed, consumed them in myriads. Perhaps more than 100,000 cart-loads or 100,000 tons weight, were thus disposed of. On this point, however, one can speak only from probable conjecture; for, of such a multifarious distribution, no account was ever attempted to be kept. But, judging merely from the vast extent of drains that were made in progress of this branch of improvement, over nearly 900 acres, and which certainly amounted to several hundred thousand ells, the quantity of stones requisite to fill these could not be less than as now stated, but was probable much greater.

It has been already remarked, that when Mr. Barclay succeeded to the estate, there was not a road on it. But as he clearly perceived that well made roads, so essential to all improvement, were indispensably required at Ury, so he set about the construction of them without delay, and was assisted in this useful work by the statute-labor of that district of the county. The length of road altogether, that was thus made through his lands, with all its ramifications, extends to about eight miles, and consumed, to good purpose, many thousand cart loads of stones.

He had another expedient still, namely, the filling up of hollows and pools. This is a branch of improvement that does not fall in the way of every cultivator; but Mr. Barclay had it in abundance. The inequality in the surface of many of the fields of Ury is still very apparent; but it was much more so before he dressed them in their present form. In almost every field there were deep hollows, which in the winter, or in rainy weather, became pools, some larger and some less, of stagnated water. These did not owe their origin at all to springs, but existed merely in consequence of their situation, incumbent on an adhesive sub-soil that admitted of no filtration. In the winter they were always full, but grew less as the season became drier; and some of them, in the prevalence of the drought of summer, became, through evaporation alone, altogether dry.

It is evident, that whatever might be the produce of coarse herbage that might occasionally grow in these hollows, or by the margin of these pools, there could be no crop of grain raised from them. But this was not adapted to Mr. Barclay's ideas of the use of soil, and he resolved to rid himself of them at once. His method was this:—He first caused a trench to be made, no matter to what depth, till he laid them completely dry, and thus got access to the soil at the bottom. This soil was generally of a considerable thickness, and had been acquired by a gradual accumulation of the finer particles of soil that had been washed down from the conterminous heights, and had been rendered of a still more fructifying nature from the residum of the vegetables which, from year to year, had alternately grown up and decayed upon their margin This was too valuable to be lost. He therefore caused it to be cut out, and to be either carted or wheeled out with a barrow, beyond the limits of the hollow. The next work was to cast in stones from the contiguous fields, and to fill it up, not merely for the space occupied by the soil now taken out, but to as great a height as the water was wont to stand in the winter season. The last operation was to carry back the excavated soil, and spread it upon the surface of

the stones. Thus, a noxious pool was converted into soil the most valuable in the field. I am credibly informed, that, in many of these old pools, the quantity of stones carted into them is upwards of six feet in depth: and that the number of such instances of improvement, from that extent downwards to that of two or three feet of filling up, is very considerable indeed.

After all, these three ways of disposing of the stones, though they must have consumed a quantity almost inconceivable, have not been able completely to swallow them up; for, so very much did they abound originally, that many thousand cart-loads are still to be seen, that were tumbled, as the last resource, over the banks towards the channel of the river.

4. *Application of Lime.*—After the various and expensive operations of draining, trench-ploughing, and removal of stones, immediately followed the application of lime. Previous to the era of Mr. Barclay, the use of lime as a manure was, in this county, very circumscribed, though not altogether unknown in this respect; but, in these days, its powers appear to have been overrated. This may be inferred from the practice which then prevailed, of sowing it over the surface by the hand from a sheet, by which means, a few bushels were made to overspread an acre. The effect which this meagre sprinkling had upon the soil, is not indeed stated; but it could not have been considerable. There is, however, more reason to admire than to despise, in this particular, the exertions of those ancient husbandmen, when we reflect on the state of the roads at the time, by which the carriage of three bushels in a bag, on the back of a horse, was a work of greater labor than now to bring on a cart, three bolls. It may be remarked also, that the thin staple of earth which they had to manure, would require a proportional less quantity to produce an effect. But, be this as it may, the soil formed by Mr. Barclay, being so much deeper than the general soil of the country, required a more liberal allowance of lime, and he gave it a more liberal allowance accordingly. He never applied less, in any case, than forty bolls of shells to the acre, but more generally from fifty to seventy bolls; so that the average may be justly stated at sixty bolls to the English acre. In one particular case, viz. in his garden, which he had trenched to the depth of five feet, he applied no less than at the rate of five hundred bolls to the acre;—a quantity probably more than enough to saturate the whole mass; and, of course, a misapplication, so far as the excess might extend. The boll here specified is what is called the water measure (from being used on shipboard) or Stonehaven barley measure, of 33 Scotch pints to the firlot, or 132 to the boll.*

This bountiful application of lime seems to have had the desired effect; for, during the whole time of Mr. Barclay's practice, which extended to a period of 38 years, he never had occasion to apply lime a second time, except in two instances, in which, as the first application did not seem to operate so powerfully as he expected, he repeated the dose.

The lime which Mr. Barclay generally made use of, was imported at Stonehaven from Lord Elgin's limeworks, at Charleston on the Frith of Forth. Stonehaven may be about a mile and a half, at an average, from the different fields to which it was to be applied. This easy distance of land-carriage was a favorable circumstance to his improvements, and almost the only favorable one that attended them. The price of lime was, at first, only 1s. 11d. the boll: it was afterwards increased to 2s.; from which it rose, penny by penny, till it came to 2s. 5d., which was the highest rate that Mr. Barclay had ever to pay. These all seem moderate rates, when compared with 3s. 8d., the present price (in 1807). But this is only a seeming, not a real cheapness; for if we compare the different prices of lime with the prices of labor or of grain, at the different periods, there can be little doubt that 23 pence in 1760 was fully equal in value to 46 pence in the present year.

As Mr. Barclay applied lime to 903 acres on this estate, and limed about thirty acres a second time, and all at the rate of 60 bolls an acre, on an average, the quantity altogether thus made use of will be found to amount to 55,780 bolls; and this, at 2s. 2d., the medium rate of price per boll, will amount to 6064*l.* 10s as the prime cost of the lime.

Mr. Barclay's importation of lime was not, every year, in equal quantities. In some years it did not exceed 1000 bolls; in other years there were more than 2000 imported; and, one year, the importation is stated at 4000 and upwards,—thus varying as the exigency of the case required. In like manner, his successor, who inherits a goodly portion of his father's ardor and energy of mind, had in one year, lately, as much land under a course of improvement, as to require an importation of 6000 bolls of lime shells at once.

5. *Enclosing.*—When Mr. Barclay succeeded to Ury, there was not a single enclosure on the whole estate. Indeed, in a country where artificial grasses are unknown and where the only pasture among the arable lands consists of wastes, baulks, and marshes, scattered in various directions, of every size, and in every kind of irregular shape, among the different corn fields, enclosures can make no part of the system. In fact, they could be of no use; for no beneficial application of them could be effected. A country enclosed must always be a country that, in other respects, has undergone some degree of improvement.

Mr. Barclay, in the course of improving his lands to the extent already stated, caused them to be enclosed, field by field, as soon as the previous meliorations had taken place. The whole estate is divided into fifty-two enclosures of various sizes, from fifteen to thirty-five acres, with only four fields below the first size, and five that are above the second. The least field is of four acres, and the largest of sixty. The fences are almost all of ditch and thorn hedge; the one serving as a ready conveyance to the water, and the other as a shelter for the cattle. Very few of the fences at Ury are composed of stones, notwithstanding the superabundance of that material, which lay originally at hand upon every ridge. But the stones, there, were little calculated for building, being all round, water-worn bullets, very inapplicable to a wall of any description, either with or without mortar. Most of the thorn fences have thriven exceedingly. They are, in fact, too luxuriant, some of them being little less than twenty feet high. This height gives excellent shelter to the cattle; but has a bad effect upon the hedges themselves, as the lower part, being too much overshaded, becomes open and unfencible, and requires much care, by the application of paling from time to time, to keep the cattle properly confined. It has been remarked, in general, on this branch of Mr. Barclay's meliorations, that his fences have been more accurately constructed, and more attention paid to the rearing of them, in the latter part of his improvements, than in the beginning—a circumstance which ought to be expected, as his hedgers would naturally become more expert, and perform the operation more correctly, the longer they were accustomed to the work.

A circumstance in the construction of the gates is worthy of notice, which is, that the horizontal bars are set edgeways up and down, and thus afford, by their position, the greatest strength from a given weight of wood. This may seem so obviously the best mode, as to require no particular remark; yet it is astonishing how little such minutiæ are attended to.

6. *Rotation of Crops.*—After the lands were brought into tilth, and had a due application of lime, Mr. Barclay's first crop was oats; after which began his general rotation of a four years' course—1. Turnips; 2. Barley; 3. Clover and other grasses; 4. Wheat; then turnips as at first.

Though wheat is stated as the last in the course I shall begin with it—as part of the culture bestowed on it, in the course of the rotation, was preparatory to the crop of turnips which followed.

Wheat.—This was sown on one furrow from lea after the clover, the ground being previously dunged at the rate of twelve three-horse cartloads of well made farmyard muck to the English acre. The time of tillage was from the first of October to the middle of November; the quantity of seed nine pecks to the acre, or about two and one-third Winchester bushels. The produce varied considerably, according to the seasons. It was, in some years, not more than five bolls; in other years, it was ten: but on an average of years, it amounted to about six bolls and a half, or twenty-seven and a half Winchester bushels, from the English acre. The measure here understood is by the Stonehaven peas firlot of twenty-two Scots pints; being thus about three and a half per cent. more than the Linlithgow standard. Mr. Barclay, by the time his improvements had extended over most of his lands, had, in some years, 130 acres in wheat.

Turnips.—Mr. Barclay having applied the dung to the preceding crop of wheat, left nothing to be performed to the turnip land but the tillage only. This gave him a great

* This boll is rather more than 4 bushels. See Scottish measures p. 98, vol. 1 of Far. Reg.—Ed.

advantage in the operations of that busy seed time, in which celerity in the progress is frequently more conducive to the prosperity of the crop than any other circumstance.

The ground, being brought into a complete state of pulverization by frequent ploughings, was sown, in the first and second weeks of June, by broadcast, at the rate of one pound weight of seed to the acre. This fashion of sowing the seed, Mr. Barclay had learned in Norfolk, and persevered in it to the last; and, from the very abundant crops which he always raised, it has become matter of doubt with some people, whether to sow broadcast, or in drills, the now general practice, be the most judicious and advantageous method. The greatest objection, perhaps, to the broadcast system, arises from the difficulty, in that mode of culture, of cleaning the land from weeds, as it admits of aid, neither from machinery, nor from the power of animal draught, to assist in the operation; but all must be performed by manual labor alone. Mr. Barclay's land, however, was previously so fully pulverized, and so free of all weeds, either from root or by seed, that very little hoeing was required. The only thing almost to be done, in his fields, was to set off the turnips, by thinning, to a proper distance; a work, indeed, that required no little dexterity. Mr. Barclay, however, had his people so well trained to this nice operation (in which he was remarkably expert himself,) that they could, each of them, go over half an acre in a day; so that, although he sometimes had 130 acres in turnips, the work of thinning, which was constantly done by the hoe, was always accomplished in due season. The crop, in consequence of thus meeting with no neglect, prospered exceedingly; and the plants set off by these different operations—first at three, then at six, and lastly at twelve inches distance, turnip from turnip—soon filled the whole surface, and grew to be a crop of from thirty to forty-five tons weight the English acre. The crop would indeed sometimes exceed the last, but never fell short of the first of these quantities. This vast supply of green food was consumed in two ways—in the fattening of cattle, and the feeding of sheep.

Cattle.—Of cattle, Mr. Barclay had two sets. One set of from five to seven years old, and weighing, each, from forty to sixty stones, at sixteen lib. to the stone Amsterdam, was bought in annually, in the months of July and August. The number of this class was from sixty to seventy, which were picked up in the different fairs in the country or neighborhood, at from 10 to 12*l*. a piece. They were first laid upon his clover fields, then on after grass from the first cutting; and in the course of the season had also a range over the whole stubble land, till about the middle of October, when he began to draw the turnips for them, from the different fields or enclosures under that crop. His method was to draw alternately from one half to two-thirds of the surface on the *best* of the land, and to leave the remainder to be eaten on the ground. On the inferior parts of the field however, he left the whole to be thus consumed by the cattle or sheep (afterwards mentioned,) which continued on the spot while the crop lasted. By this method, the least fertile portions of the lands were rendered, for the succeeding crop, nearly as productive as the very best.

These cattle were never fed in houses or in stalls, but at all times in the open fields, to which the turnips were carted, and spread over the surface; and there enriched, by the manure droped, other parts of the grounds, to an extent equal to half of that on which turnips were produced. This practice, however, is not applicable to every situation. The general inclemency of the winter season would render out-doors' feeding impracticable in most cases. But the lands of Ury having a hanging exposure, open only to the south, and intersected by different glens or hollows, are remarkably well sheltered from the storm, from whatever direction it may come; and care was taken to shift the cattle from field to field as the weather required. The lands, too, are particularly dry; so that no bad consequence, from poaching, can arise either to them or to the cattle.

This lot of cattle was fattened off in the course of the winter, and sold, from time to time as they were ready, to butchers from Aberdeen, at from 15*l* to 18*l* each, then weighing from 50 to 72 stones a head. Some of a larger kind, bred by himself, were, after the turnips were done, kept on upon the grass till about the end of June, when, weighing, from 80 to 84 stones each, they were sold at from 20*l* to 21*l* a piece.

Mr Barclay had another set of cattle of an inferior sort, which he bought in, in the month of October yearly, to about the number of four score. They were generally three years old rising four, weighing from 30 to 40 stones, and cost from 7*l* to 8*l* each. These were put into the straw yard, for the purpose of consuming straw and making muck. They were, however, brought out occasionally to the turnip fields, and had a picking from those left by the larger oxen. They got from time to time a larger share, in proportion as the greater cattle were sold off; till, in the end, when the turnip crop was all expended, they were put on the pastures, and completed their feeding by the months of June or July, when they weighed from 40 to 50 stones, and were sold from ten guineas to 12*l* each.

Sheep.—Mr. Barclay bought in about three hundred wedders yearly, in the month of October, from the Highlands of Banffshire, by the water of Avon, in the parish of Kirkmichael. These were a healthy and hardy black-faced breed, weighed about 12 lib. a quarter, and cost about half a guinea a piece. They were first pastured upon the stubble grounds and after grass, till they learned to eat turnips, which were daily portioned out to them till they fed upon them freely. After this, they were taken from the pastures entirely, and put into the turnip fields, where they fed in flakes erected for the purpose, and in which they had a small quantity of hay in racks. Both flakes and racks were movable, and were carried from field to field and from place to place in the same field, as occasion required. These wedders were disposed of from time to time, as they got into condition; beginning by the first of January, and continuing to the first of April; by which time the whole were sold off. The price was from 14s. to 16s. each, and the weight from 13 to 14 lib. the quarter; the advance upon the price having arisen more from the rise in the value of mutton in the market, than from any advance in the weight of the animal.

Mr. Barclay had also a flock of from 250 to 300 breeding ewes, which he kept generally on the unimproved part of the estate, but brought accasionally, in severe weather in winter, to get a share also of the turnips. About 60 or 70 of the oldest of these were kept on the turnips the whole season over, till they had reared their lambs, which were in general so early ready, as to be sold, from the end of March to the beginning of May, at from 10 to 12s each--reckoned a high price then, about the year 1780. His method of rearing these lambs was somewhat singular They were kept constantly in the straw-yard, among clean litter, and under the shelter of a shed; but the dams were turned out to the fields to pick up their food among the turnips, from which they were brought home twice a day, and all night to give suck. By this means, the lambs were always kept under shelter from bad weather, which no doubt contributed to their thriving, and made them sooner ready for the market. After the turnips were all consumed, these ewes were turned to the pastures during the summer, where they got fat generally by the end of July, or beginning of August, when they were sold at about 12s. each.

The labor required in this system of feeding was wonderfully little. Three men, with two carts and four horses, served for the whole purpose of carting off the turnips. One man drove them off, with three horses into the cart, to the different places where they were to be spread. Two remained on the field, pulling the roots, and packing them in the cart, that remained with one horse. When the carter returned with the empty vehicle, he left it with the horse in the shafts, to to be filled in its turn, and with the two tracers now yoked before the other horse in the full cart, set off in full strength, with the loading. In this manner they wrought from morning to night; taking care always to leave the two carts full at night, to be early distributed in the morning, before a new supply could arrive. Two men more were sufficieut to tend the whole quantity of sheep.

Barley.—This succeeded in rotation; and, from the fine order into which the land was previously put, never failed to be a good crop. The quantity of seed was eight pecks (about threeand one-sixth Winchester bushels,) and the produce about seven bolls (about forty-four bushels) at an average, the English acre. The firlot from which the barley boll is measured, contains, in the vicinity of Ury, 33 Scots pints, which is about six per cent. above the Linlithgow standard.

It was with this crop that the seeds were sown for the succeeding clover crop at the

rate of a bushel of rye-grass seeds, and from ten to twelve lib. of the seed of red clover. Such were the quantities used when the land was intended to be one year only in grass; but when it was meant to remain for pasture, there was added a portion of white and yellow clover, together with some rib grass seeds.

Clover.—This was the last crop in the rotation. About two-thirds of the land thus sown out were reserved for hay, for which the proportion of rye-grass sown among it properly fitted it. This was partly cut a second time in the same season, and partly pastured after the first crop was removed. The other third part was pastured from the beginning, as the great number of cattle kept on the lands required to be provided for accordingly.

In this manner, for two or three, and in some cases, four courses of this rotation did Mr. Barclay employ his improved lands. At last, however, he laid them down wholly in pasture; in which they continue to this day, being among the best in the country. The pasture grounds are let from year to year to cattle dealers, and fetch a rent of from forty shillings to two guineas and a half the English acre.

Plantations.—The most brilliant perhaps, of all Mr. Barclay's achievements, at least that which adorns the face of the country, was his plantations. These were formed at a moderate expense, and yet have every appearance of becoming the most valuable part of the property. And thus combining embellishment with utility, he obtained, at the least original disbursement, the most lucrative prospect in future.

Mr. Barclay, from the first, had a propensity to ornament Ury with growing timber. Even in the life time of his father, he projected and carried into effect some embellishment of this kind, in the vicinity of the mansion, which was then but scantily sheltered with wood, while there was not a single tree on any other part of the estate. This project, however, the old gentleman did not much relish; partly, because it was an inovation; and partly from a regard to the welfare of his sheep, which were thereby curtailed, in some measure, of their pasture. Young Mr. Barclay, however, persevered in his intention; but was obliged to cumpromise the matter with the sheep, by leaving them free access to the pasture; which put him to the charge of fencing each tree with three stakes and connecting paling, to guard it against depredation. This young wood prospered greatly; and many beautiful trees in it are still pointed out, which he planted with his own hands. This happened about the year 1756.

This successful experiment encouraged him to extend his plantations; which he did upon a great scale, when, in a few years, he came to the possession of the estate, and had the means of gratifying, uncontrolled, his taste for this ornamental branch of husbandry. The ground which he first fixed on for this purpose, was the banks of the water of Cowie; which, as already stated, flows for about three miles through the lands of Ury. Through this whole extent, there is a bank shelving on each sided towards the stream, on an angle more or less acute, but all too steep for tillage. These banks are, in some places, thirty yards in breadth, and in others, one hundred yards or more, from the water edge to the top of the declivity. Both sides taken together, will at an average, extend to about one hundred yards in breadth on the base; and thus in the course of three miles, will amount to fully one hundred acres.

The whole of this is thickly planted with deciduous trees, or what is here called hard wood; in distincti on from the evergreen or firs, whose timber is comparatively softer and of less value. There are, indeed, a few spruce and silver firs planted near the upper margin, to afford shelter in that more exposed situation. But through nine parts in ten of the whole plantation, there is only hard wood, such oak, ash, elm, &c. These are abundantly sheltered by the natural warmth of the hollow, which is rendered still more mild from its various windings, occasioning one part to be continually protected under cover of another, from whatever quarter the wind may blow. Nothing can exceed the prosperous state of this beautiful plantation. Many of trees are already nine or ten inches in diameter, and from twenty to thirty feet in height below the branches; and there does not appaar to be a misthrven one among the whole; amounting to perhaps 400,000; but there is every rational prospect of, at least, one fourth part coming to complete maturity. The ultimate value must be very great; nor can that prospect be at any great distance of time. In less than half a century hence, the timber wood on this river side (extending to the moderate quantity of 100 acres) will be worth more than all the conterminous 900 acres of areable land put together;—perhaps to more than even the whole arable part of the Ury estate. This assertion will not be deemed too rash, when we reflect that hard wood is now selling at from three to five shillings the cubic foot; and that many thousands of the trees in this plantation contain already more than ten cubic feet of timber each.

It has already been said, that this improvement was obtained at a moderate expense. The precise amount, however, cannot, at this distance of time, be ascertained; but it is not difficult to conceive pretty correctly what it might be. The disbursments, which neither included trench-ploughing, lime, nor removal of stones, would be limited, 1st, to draining of the swamps that originally existed in various places in the banks, and which, from the sloping situation, would admit of great facility in the operation; 2d, of enclosing with dich and hedge; 3d, of the value of the young plants; and, lastly, of the labor of pitting and planting them;—all which, at the moderate rates that prevailed thirty-five or forty years ago, may be safely estimated at a sum not exceeding two pounds the acre, or £200 in all.

Again, the annual value of the land thus given up to planting, falls to be added to the estimate, which will be the greatest article in the account. But this will not, after all, exceed 20*l* a year, or 4s. the acre; which considering the general worthlessness of the pasture, conjoined with its general inaccessibility, will not be deemed too low a rent. If we take the pains to calculate, on the common principles of arithmetic, what all this may amount to, at compound interest, forborne 70 years, we may, from what is already seen, set down as the period of perfection in the wood—it will come to £17,856. But this sum, considerable as it may in this view appear, is little indeed, compared with the value of 100,000 trees, that may then be reasonably expected to have attained to such a state of maturity as to be worth more than twenty shillings each, at an average.

Besides this plantation on the banks of the Cowie, there are others of hard wood in various clumps, belts and hedgerows, around several of the enclosures. There is likewise a beautiful den, planted partly with hard wood, by a small rivulet which flows from the north towards the house of Ury. Altogether, in this den, and in the different clumps, belts and hedgerows, there may be about sixty acres of plantation; and of this there may be about one-third part of hard wood, with two-thirds of different kinds of fir intermixed. The whole is in a very prosperous condition; and, besides being highly ornamental, and affording much shelter, must ultimately be of great value.

The most extensive, however, of the woods of Ury are entirely of fir, upon the hill sides and hill tops of what may be called the back ground of the improved part of the estate. There, Mr. Barclay has planted upwards of eight hundred acres. These hills, thus clothed with wood, being of considerable altitude and seen from far, have a very happy effect in enlivening the general aspect of the country. The wood itself, however, is not all thriving. In the lower parts of the hills, where the soil is tolerably good, and where the exposure is not too severe, the firs are doing well, and have every apperance of being valuable; but, further up the hill, they get worse and worse; till, at the utmost summit, they have nearly failed altogether. This is owing, in a great measure, to the extreme sterility of the soil on these high and bleak situations; but in part also, to Mr. Barclay himself having made an improper selection of the kind of wood. He had an ill-judged partiality for the Scotch fir, esteeming it the most hardy of the pine race, and the most adapted to the climate of the country. This induced him to plant these more exposed places, almost exclusively, with this kind. Time, however, has shown, that the Scotch fir is not all a hardy plant, but among the most delicate and feeble of the fir species; and will thrive no where, unless it be in some favorite situation, such as in the deep glens in the interior of the highlands where, there can be no question, it grows to a large size, and is a most valuable timber. In all plantions however, along the eastern coast, the larix seems a much more hardy tree, and better adapt-

ed for an alpine exposure. Of this there is a striking example to be met with at Ury itself; where a small plot, planted with larix on the top of one of the hills, continues still vigorous and thriving: while all around, the feeble Scotch firs, after thriving a few years against the sterility of the soil, and the coldness of the exposure, have dwindled down to the size of juniper bushes.

It may be observed, with regard to the plantations on the hilly parts of Ury, that although they cannot be compared with those raised on the lower grounds, yet there is still such a considerable proportion that continue in a thriving condition, as must make them, on the whole, a very profitable concern. The original expense of planting would probably not exceed 15s. the acre; while the value of the pasture on such a wretched soil, can hardly be estimated at any thing at all. So that the whole expense, even calculating it on compound interest to the present day would not exceed £2500; a sum far less than the present value of the thriving part of the plantation, were it appreciated at only sixpence a tree.

When Mr. Barclay commenced his operations, in the year 1760, he employed only the people of the country, that were bred on his own lands, or in the vicinity. At this time the scene of his improvements was very limited in extent, and the number of his work people not great. But in proportion as he acquired the occupation of more of his own lands, his improvements expanded more widely; and more people, from the neighborhood, to carry them on, were required. These, however, were of a cast not altogether to his mind; for he did not meet with that alert service from them that that corresponded with his own ideas of activity. This set him upon getting servants from a more enlightened part of the country; and accordingly he engaged some from the county of Norfolk in England. With the assistance of these English servants, he set himself to the training of his own people to a more dexterous habit of working, and to a more thorough knowledge of his operations; some of which, such as draining, hoeing, planting, enclosing &c. were entirely new; and all of them being on an improved principle, were of course so far an alteration of the common practice. His discipline was severe, but it was very correct. He would admit of no slovenly practice—no slighting of the work. Nor did he require any thing of his people but what he could do himself; for while he delivered out his directions in the most clear and distinct manner, he could, with his own hand, show them the true mode of performance. He could even enforce his authority with something more effective than verbal injunctions; for it is said that the clownish obstinacy of his people was not unfrequently corrected by manual discipline. I have indeed met with different people that confess (and even in some measure glory in it,) that they had the knowledge of their work beat into them by Mr. Barclay. This strict government had the happiest consequences; for not a little of the general dexterity (to be afterwards noticed) in the Kincardineshire laborers, is still to be traced to the original system of their *education*, established by Mr. Barclay of Ury. His establishments was indeed very extensive. At Ury alone, he had, in general, from 40 to 60 people constantly employed, either in the common operations of husbandry, or in the extraordinary work of improvement. He employed also from 24 to 32 work horses. He never employed oxen. He could endure no sluggish motion; and his operations were all conducted in a style of too much celerity to admit of the slow pace of the ox.

Along with his Englishmen from Norfolk, he imported several of the Norfolk implements of husbandry; more especially the wheeled plough, and large eight horse wagon. The first of these, as being unquestionably the most correct implement of tillage, at the time, met with a favorable reception in the country, and soon spread to a considerable distance. The more simple and equally effective Scotch plough, improved by Small, has now, however, almost entirely superseded it. The large wagon never came into general use; nor did it extend its influence beyond Mr. Barclay's own lands. It is too expensive and too unwieldy a machine to obtain much footing in Scotland.

Mr. Barclay's operations, however extensive on the lands of Ury, were by no means limited to that estate. His improving hand was stretched over a much larger expanse of country. On his other lands of Allardice, Hallgreen and Davo, situated about ten or twelve miles from Ury, he made many essential meliorations; though not to such an extent as upon Ury, which, being his favorite place of residence, he exerted himself more strenuously towards the decoration. He had also different places in lease to which his improvements were extended.

If we confine our ideas of the benefit conferred on the county, by Mr. Barclay's improvements, to the meliorations which he effected on the lands actually under his own management, his exertions, in this respect, must rank him high in the view of every intelligent and reflecting mind. But his value, as a cultivator, was not so circumscribed. There are other circumstances, that, as an agriculturist, have extended much further the circle of his usefulness. Among these may be stated the happy consequences, arising from his having instructed so many of his laborers in the most correct mode of cultivation, who, diverging in various directions, have carried the knowledge, thus acquired, to every place where they have been employed. To have been in the service of Mr. Barclay, always was, and still is, a great recommendation to any servant. Some of these have even advanced themselves into a higher class, and are distinguished as tenants, by a spirit of industry and exertion becoming the disciples of such a great master. His example all along, had also a wide and extensive range. The fame of his improvements spread far; and the light thence diffused, has beamed in a thousand directions over the face of the whole land.

Comparative value.—What may be the real value to the estate itself of Ury, from the improvements made on it by Mr. Barclay is perhaps not very easy to ascertain.

The only facts on the subject that I have to state are first, that 47 years ago, when Mr. Barclay succeeded to the property, the rent of all that part of the estate which he afterwards improved, was £200 a year. 2d. that the rent now of the pastures, as they come, to be let, year by year, runs from £2 to £2 12s. 6d. the English acre. The quantity of improved land is 903 acres; of which, about 300 acres were entirely waste land, and afforded no rent at all. The improved land, however, is not all in pasture. There are three farms, comprehending 334 acres, which are under lease at a rent of from 25s to 30s. the acre. The rent, however, of the whole estate, amounts to about £1650 a year; and there can be little question that, were it now to let, it would bring £1800, or nine times its original value. It must not however be disguised, that, owing to the fall of the value of money this property would have rented, at present though there had not a single improvement been made on it, at £400 a year. But this at all events, leaves £1400 a year, as the increase of rent made by these improvements alone, on this part of the property. Now, though it should be made to appear that Mr. Barclay's improvements should have cost him even more than a principal equal to the above £1400 as interest, yet, as there still remains the value of the plantations—a value that is rapidly increasing—there can be no doubt whatever that Mr. Barclay augmented his fortune by his improvements, very considerably indeed.

Mr. Barclay began his operations in the year 1760; and continued unremittingly to improve and embellish till about 1795. A year previous to this, being elected member of parliament for the county, in the room of Lord Adam Gordon, a stop was put, in a great measure, to his agricultural pursuits. He died April 8th, 1797, in the 67th year of his age.

Ploughing by Steam.—Some experiments have been tried at Red Moss, near Bolton, Lancashire, in the presence of Mr. Handley, M. P. for Lincolnshire, Mr. Chapman, M. P. for Westmeath, Mr. Smith, of Deanston, and other gentlemen interested in agriculture, with a new and very powerful steam plough, constructed by Mr. Heathcote, M. P. for Tiverton, About six acres of raw moss was turned up in the most extraordinary style; sods eighteen inches in breadth and nine inches in thickness being cut from the furrow, and completely reversed in position, the upper surface being placed exactly where the lower surface had been before. The possibility of ploughing by steam has thus been established, though the machine appears much too complex and costly for common purposes.—[Mining Journal.]

Results of Machinery.—Rapid as the increase of buildings in and about London has been, it is quite outdone by similar operations in Manchester, which is said to contain 700 streets more than it did four years ago.—[Mining Journal.]

CIRCULAR.

PHILADELPHIA, November, 1836.

SIR—I take the liberty of informing you, that, within a few months past, I have perfected several very valuable improvements in the Locomotive Steam Engine, which have given better results than have ever been obtained by the best Locomotives in Europe or America, and respectfully call your attention to the following extracts, viz.:

From the Railroad Journal, New-York, July 16, 1836.

"LOCOMOTIVE ENGINES ON INCLINED PLANES.—The Locomotive Steam Engine, 'GEORGE WASHINGTON,' made for the State of Pennsylvania, by William Norris, of Philadelphia, was placed on the Columbia and Philadelphia Railroad, on Saturday afternoon, the 9th instant. On the following morning, her powers were tested, in ascending the Inclined Plane near Philadelphia. This plane is 2800 feet in length, with an ascent in that distance of 196 feet, or at the rate of 369 feet to the mile, or 7 feet rise in 100 feet, or 1 foot in 14. The weight of the Engine is 14,930 lbs. only. The load attached weighed 19,200 lbs. including the weight of 24 persons who were on the Tender and Burthen Car. The Engine started immediately at the base, without a running start, and dragged up said load of 19,200 lbs. the above distance of 2800 feet, in the space of two minutes and one second, or at the rate of 15½ miles per hour; pressure on the boiler a fraction under 60 lbs. to the square inch. The Engine then descended the plane with the same load at various speed, frequently stopping to test the security, the valves being reversed, or set for going ahead; and when it was desired to stop altogether, the steam was let on very slowly, which brought her to a dead stand for a second or two, when she would immediately start up the grade. In this way, stopping and starting at pleasure, the time occupied in descending the 2800 feet, was from 12 to 15 minutes, thus testing the perfect security of her performance on the plane. She again ascended the plane with the same load and took her place on the road, the same morning, ready for use."

From the Pennsylvania Inquirer, July 21.

"IMPORTANT IMPROVEMENT.—THE GEORGE WASHINGTON LOCOMOTIVE.—We invite attention to the following. It notices an improvement of a most important character. A friend, who enjoyed the pleasure of an excursion in a car drawn by this new locomotive, speaks of her beauty and power in the most enthusiastic terms. We trust that some correspondent, acquainted with the subject, who has had an opportunity of examining the GEORGE WASHINGTON, will furnish a detailed account of this new and important improvement.

"FROM THE UNITED STATES GAZETTE.—'Mr. Chandler—The undesigned was yesterday one of a party of about fifty gentlemen, who met at the invitation of Mr. William Norris, to be witnesses to the success of an experiment, which, as the consequences will be of almost incalculable benefit to the public in general, I will endeavor to give you an account of.

"'We assembled at 4 o'clock, A. M., and proceeded to the foot of the inclined plane on the Columbia Railroad, near the Schuylkill, where we found Mr. Norris's new Locomotive Engine, the 'GEORGE WASHINGTON,' in waiting for us, to test her powers in taking us up the plane without assistance from the stationary power.

"'We started, ascending most majestically the whole distance of 935 yards in 2 minutes and 23 seconds, being at the rate of a mile in 4½ minutes, thereby showing to the world that, thanks to Mr. Norris, the enormous expense of stationary engines on Railroads was no longer necessary.

"'We were unable to ascertain the exact weight of two of the passenger cars, but estimating three tons each, would make our whole weight fourteen tons, and that calculation is believed to be below the mark; the rise in the plane is 7 feet in every 100 feet, or 1 foot in 14$\frac{2}{7}$ feet; and the greatest power that has ever been before attained, was, in England, to ascend without any extra weight, 1 foot in 60 feet, and in America, 1 foot in 42 feet. Very little reflection will convince every one of the great importance of Mr. Norris's recent discovery or improvement.

"'The company, amongst whom were several gentlemen of distinguiseed talents, Messrs. Campbell and Roberts, engineers, Mr. Ortlip, superintendent, Mr. Smith, commissioner, Messrs. Minor and Schaeffer, from New-York, Mr. Schwartz, from Paris, &c. &c., breakfasted at the Paoli, and proceeded to Lancaster to dine and celebrate the event.

"'After dinner, it being understood that his Excellency, Governor Ritner, was in the town of Lancaster, and his engagements not allowing of coming all the way to Philadelphia, he accepted an invitation from Mr. Norris, to take a short excursion on the road, for the purpose of seeing the powers of the engine; and judging by his manner and expressions, his gratification must have been more than ordinary.

"'We returned to the city about 8 o'clock in the evening, convinced of the success of our host, Mr. Norris, and having, in the language of one of our party, lived six days in one.'"

From the National Gazette, July 21.

"On Tuesday, the 19th instant, a Locomotive Engine, manufactured by Mr. William Norris, of this city, ascended the Inclined Plane on the Columbia Railroad, drawing with great ease her Tender, and two Passenger Cars, with 53 passengers. Any thing approaching this result has never been attained hitherto, either in England or this country.

"The length of the plane is 2800 feet, the grade 369 feet to the mile, or an ascent of 196 feet in the length of the plane.—The experiment was tried at a very early hour in the morning, while the rails were wet with dew, and of course not in the most favorable condition. The time occupied in passing from the level at the base, to that at the top of the plane, was 2 minutes and 24 seconds. The experiment was witnessed by many scientific gentlemen, among whom the opinion was general, that the improvement of Mr. Norris promises a most important reduction in the expense hitherto attending the transportation on inclined planes. The weight of the Engine with water, 14,930 lbs.; load dragged on the plane, including tender and fuel, cars and passengers, 31,270 lbs. Pressure under 80 lbs. to square inch. It is remarkable that the Engine was blowing off, on her arrival at the top, having acquired speed and power during the ascent."

From the Railroad Journal, New-York, July 30.

"EXCURSION TO PHILADELPHIA, AND REMARKABLE PERFORMANCE OF THE LOCOMOTIVE 'GEORGE WASHINGTON.'—In pursuance of our request, Mr. Norris made arrangements with the commissioners of the Columbia Railroad, for the use of his locomotive. Tuesday, July the 19th, was the day appointed for the trial. We left here on Monday afternoon, at 4 o'clock, accompanied by Mr. George N. Miner, of this city, Mr. Theodore Schwartz, of Paris, and Messrs. Elliot and Betts, of Alabama. Mr. Schwartz, who was to sail for Europe the next day, gladly made the trip, with a view to carry home his own testimony as an eye witness. Our journey over the Camden and Amboy, and Trenton and Philadelphia Railroads was highly interesting, and the conversation of that evening will long be remembered with pleasure. We arrived at Philadelphia about midnight and after sundry mistakes and mischances succeeded in obtaining some repose. On Tuesday morning, two cars, drawn by horses, set out with a party of upwards of forty. We arrived at the foot of the inclined plane before 6 o'clock, while the rails were yet quite wet with dew. On our arrival, it was found that, owing to accident or design, while the fire was burning, the water had been blown out of the boiler so as to endanger the tubes. The result was a leakage of some consequence during the day. The Engine started at the foot of the plane and on the plane. After proceeding a few feet, the wheels were found to slip, and the Engine returned. It was said that the rails were found to have been *oiled* at this place; a small quantity of sand was strown over the spot, and the Engine again proceeded. She regularly and steadily gained speed as she advanced to the very top, passing over the plane in 2 minutes and 24 seconds. The enthusiasm of feeling manifested cannot be described; so complete a triumph had never been obtained; the doubts that had been entertained by some, and the fears of others, were dispelled in an instant; the eager look that settled upon every one's face, gave way to that of confident success, while all present expressed their gratification in loud and repeated cheers.

"The length of the plane is 2800 feet; the grade 369 feet to the mile, or 1 foot rise in 14.3 feet, which is a much steeper grade than the planes on the Mohawk and Hudson Railroad, those being 1 foot in 18 feet, making an ascent of 196 feet in 2800 feet; weight of Engine with water, 14,930 lbs.; load drawn up the plane, including weight of Tender with water and coal, two Pas-

senger Cars and 53 passengers, 31,270 lbs.; pressure in the boiler, less than 80 lbs. to the square inch; time of running 2 minutes and 24 seconds. It is to be remembered that the rails were wet with dew. As to the oil, it was afterwards mentioned that bets were made with the workmen to a considerable amount, and those having been lost by the successful performance of the Engine on a former day, were now quadrupled, and to save themselves it is not unlikely that this means was provided to accelerate the descent rather than the ascent of the Engine. At the conclusion we shall give the dimensions of this Engine.

"The party again embarked, after examining the workshops, and proceeded to Paoli to breakfast, and thence to Lancaster, the Engine conveying at the same time a number of freight cars.

"The unfortunate location of this road is very evident; frequent and short curves are introduced so uniformly, that it would be supposed that such a location was to be preferred to a direct one. We arrived safely at Lancaster, and partook of an excellent dinner. A number of toasts were given, and conversation turned generally to the subject of internal improvement.—Mr. Roberts, engineer of the Harrisburg road, and Mr. H. R. Campbell, engineer of the Norristown, and of the West Philadelphia Railroad, were present; a number of the company were citizens of Philadelphia. After dinner, the company were presented to Governor Ritner, who was then in town. He afterwards accompanied the party some few miles from Lancaster and back again, when he left us, much gratified with his rapid journey. We returned in a large eight wheel car, a form that we much admired. The whole weight attached to the Engine (tender, &c. included,) must have been over 14 tons, if not 15 tons. The time of running (exclusive of stoppage,) from Lancaster to the head of the Schuylkill inclined plane, was 3 hours and 11 minutes, being a distance of nearly 67 miles. This, it is to be remembered, was over a road having curvatures of less than 600 feet radius, up ascents of sometimes 45 feet per mile. On level and straight portions of the road, a velocity of 47 miles was attained. As the trip had already been protracted, this engine was obliged to leave at the head of the plane, on her return to Lancaster the same evening, and we descended by the rope.

"The following are the dimensions of the 'GEORGE WASHINGTON' Engine, of Mr. William Norris: Diameter of cylinders $10\frac{1}{4}$ inches; length of stroke $17\frac{5}{8}$ inches; number of tubes 78; outside diameter 2 inches; length 7 feet; diameter of driving wheels 4 feet; diameter of truck 30 inches. The Engine is six wheeled, having two driving wheels. Whole weight of Engine 14,930 lbs., actual weight on driving wheels 8700 lbs.

"It must be remembered that there is no contrivance, as in some engines, for increasing the adhesion, by throwing the weight of the tender upon the engines, the axle being in front of the fire box, preventing any such arrangement. This engine, we are now informed, is making the regular trips, though a full load has not yet been obtained, on account of the scarcity of cars. The greatest load, as yet, drawn by it over the road, was 119 tons, gross weight, in 22 cars. The engineer confidently expects to draw 150 tons, at 12 or 15 miles per hour She now usually works with 70 lbs. pressure of steam.

"The following is a list of the names of the gentlemen who were of the party:

"We, the subscribers, were present and witnessed the experiment and complete success of the 'GEORGE WASHINGTON,' in ascending the inclined plane, with a train of cars, containing 54 persons, besides engineers, firemen, &c., up the Columbia Railroad, at Philadelphia, on the 19th July. 1836.

Israel Morris,	Israel Roberts,
William Morrison,	S. Griffits Fisher,
A. M. Eastwick,	Joseph Harrison, Jun.
Franklin Peale,	R. M. Patterson,
T. E. Gubert,	Theodore Schwartz,
F. Blackburne,	E. Durand,
George R. Oat,	Townsend Smith,
Isaac P. Morris,	Frederick Vogel,
George Robbins,	Rufus Tyler,
A. W. Thompson,	Robert B. Davidson,
Frederick Gaul,	Alex'r. Krumbhaar,
William S. Otis,	D. K. Minor,
Alexander M'Clurg,	T. R. Peale,
P.B.Goddard,M.D.,	Octavius A. Norris,
J. Sidney Jones,	Joseph Oat,
Mahlon Ortlip,	James Poultney,
J. C. Cresson,	John E. Garrett,
George N. Miner,	George C. Schaeffer,
M. M. Reeve, M.D.,	H. R. Campbell,
Smith Jenkins,	Daniel Smith,
Thomas Moore,	

Walter Sims, Nashville, Tenn."

From the National Gazette, October 19.

"INCLINED PLANES.—The new Locomotive Steam Engine, 'WASHINGTON COUNTY FARMER,' built for the Commonwealth of Pennsylvania, by Mr. Norris, of this city, was placed on the Columbia Railroad, on Tuesday afternoon.

"The power of the Engine was then tested in ascending the Inclined Plane, which was performed to the complete satisfaction of numerous scientific gentlemen, invited expressly for the occasion.

"The plane is 2800 feet long, ascent in that distance 196 feet, equal to 369 feet to the mile, or 1 foot rise in $14\frac{3}{10}$ feet. Weight of Engine 18,170 lbs. with water included. Load drawn up, 30,116 lbs. including Tender with fuel and water, two large Passenger Cars and 39 passengers. Time of running, 3 minutes and 15 seconds, pressure in the boiler under 70 lbs.

"In descending the plane, the engineer repeatedly came to a dead stand from a great speed, and for some minutes played up and down the grade, thus proving most satisfactorily, the immense power of the Engine, and the perfect safety in its performance. The Engine is a master-piece of machinery and of beautiful exterior.

"The result here obtained has never been equalled by the best Engines in this country or Europe, excepting only similar performances of the 'GEORGE WASHINGTON,' an Engine by the same maker.

"The advantage of this great improvement in Locomotive Engines, is self-evident; Railroads can be constructed at much less cost than heretofore, now that engines can be procured (of the usual weight) to perform on grades of 70 feet or even 100 feet rise in the mile."

From the Pennsylvania Inquirer, October 20.

"INCLINED PLANES—MR. NORRIS'S ENGINE.—We were much gratified on Tuesday, in witnessing the new Locomotive Steam Engine, built by Mr. Norris, of this city, for the commonwealth of Pennsylvania. It ascended the Inclined Plane in admirable style, and performed, to the entire satisfaction of a numerous party of scientific and other gentlemen who were present.

"In order that our readers may fully understand the nature of the ascent, we annex the following statistics of the Inclined Plane: length, 2800 feet; ascent, 196 feet.

"The above ascent is equal to 369 feet in a mile, and is a rise of 1 foot in $14\frac{3}{10}$ feet.

"The Engine, which is called the 'WASHINGTON COUNTY FARMER,' weighs 18,170 lbs. The load drawn up, including fuel and water, two large Passenger Cars, with 29 passengers, weighed 30,116 pounds. The pressure in the boiler was under 70 lbs., and the ascent occupied 3 minutes and 15 seconds.

"In descending the plane, the engineer caused the Engine to stop suddenly several times, though previously going at great speed; and he twice moved the Engine up and down the Inclined Plane at pleasure; thus showing at once its great power and safety."

The "GEORGE WASHINGTON" has been, since July 19th, performing daily over the Columbia Railroad, length 82 miles, with trains of from 18 to 25 cars, frequently making two trips per day, and in some instances three trips in 21 hours. The largest number of Cars, in one train, drawn by this Engine over the road, has been 35; 18 loaded, 3 half loaded, and 14 empty, making a load of 128 tons, which was performed in the usual running time of 12 miles per hour. The greatest load drawn by this Engine, has been 137 tons, in 27 cars.

The "WASHINGTON COUNTY FARMER" is now in successful operation; the first load drawn by her over the road, consisted of 28 loaded cars, weighing $141\frac{3}{4}$ tons.—The ascents in this road are very heavy; the least being 28 feet rise per mile, the majority 32 feet and the greatest 47 feet. This Engine, with the load of $141\frac{3}{4}$ tons, passed over the steep ascent of 47 feet per mile, which is upwards of three-fourths of a mile long, at the unprecedented rate of 22 *miles* per hour.

I have just completed extensive buildings and workshops, and am prepared to execute orders for Locomotive Engines, with despatch, all of which shall have my late improvements, and are warranted to be made of the best materials and superior workmanship.

WILLIAM NORRIS, *Philadelphia.*

AN ENGINEER, regularly bred to the Profession in England, as well as to that of a Topographical Surveyor and Draughtsman, is desirous of obtaining employment in the United States. He has lately, for several years, been a salaried officer of one of the Principal Land Companies in the British Provinces, from the agents of which he can produce unexceptionable references.

On the subject of Railways he would feel particularly at home, having had much experience in their survey and formation while in England, and he confidently hopes that he would give satisfaction in all the other branches of the Profession.

Apply to the Office of this paper, 132 Nassau-st, or to Dr. Bartlett, at the office of the Albion, Ceder-street.

TO PLOUGHMEN.

THE Subscriber has upwards of three hundred acres of meadow land, in the sod, near the city of New York, that he wishes to have PLOUGHED, as early in the course of the next year as practicable. He wishes to CONTRACT for the whole, or any part. It must be ploughed four inches deep, the furrow must be turned completely over, so that the whole will lie flat—to plough a great part of this land advantageously and speedily, a double team of light cattle is preferable to one pair of heavy oxen. Provender for men and cattle can be procured on the premises. Apply by letter, directed to Anthony Dey, 63 Cedar-street, corner Nassau-street, New-York, by mail or otherwise, stating terms etc.

rr4t—12m—48 A. DEY,

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co. No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. NO. 44—7t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durpee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County. State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long

Rochester, May 22d, 1836. 19y-tf.

An English Engineer, who has had the advantage of some experience, and is in possesion of good testimonials, is desirous of being employed on a Railroad or under an Engineer of character in the United State, as Assistant.

Address this office—post paid.

50—3t

An Engineer is desirous of obtaining a situation, on some work, either Railroad or Canal; he would have no objections to go on to any part of the United States.

Satisfactory references given as to character and capacity. Address W. H. W. at this office—post-paid. 504t.

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

							lbs.	
350 tons	$2\frac{1}{2}$	by	$\frac{5}{8}$,	15 ft	in length,	weighing	$4\frac{68}{100}$	per ft.
280 "	2	"	$\frac{1}{2}$,	"	"	"	$3\frac{50}{100}$	"
70 "	$1\frac{1}{2}$	"	$\frac{1}{2}$,	"	"	"	$2\frac{1}{2}$	"
80 "	$1\frac{1}{4}$	"	$\frac{3}{8}$,	"	"	"	$1\frac{25}{100}$	"
90 "	1	"	$\frac{3}{8}$,	"	"	"	$\frac{7}{8}$	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾ 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28-tf Philadelphia, No. 4, South Front st.

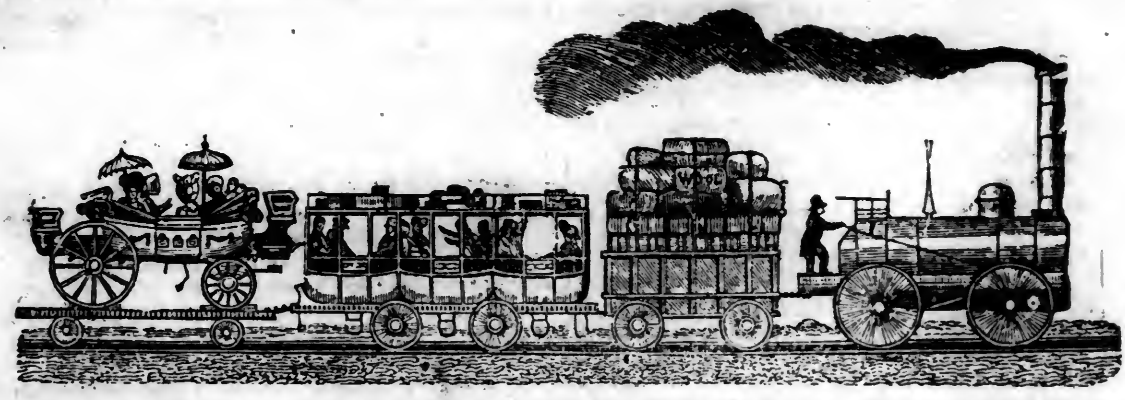
ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.
4—ytf



AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 132 NASSAU STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, DECEMBER 31, 1836. [VOLUME V.—No. 52

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, DECEMBER 31, 1836.

We beg leave to return thanks to those gentlemen who have already remitted the subscription for 1837.

The small sum due to us is but a trifle from each subscriber, while to us it constitutes the whole amount of our means. May we therefore be permitted to urge upon our readers, the necessity of prompt payment. This is the last number of the year 1836.

THIRD AND FOURTH ANNUAL REPORTS OF THE OFFICERS OF THE TUSCUMBIA, COURTLAND AND DECATUR RAILROAD COMPANY.

COURTLAND, August 1st, 1836.

To the Stockholders of the Tuscumbia, Courtland and Decatur Railroad Company.

GENTLEMEN:—The anxiously looked for, Report of the Engineer has been received. and together with that of the Treasurer, is herewith transmitted.

The Engineer has made out a full and specific account of the cost of the Road, in its several items; the cost of the various property of the Company appertaining to the Road, and of our receipts and expenditures from the time that operations were first commenced, up to the present. It appears that, notwithstanding, the numerous disappointments and misfortunes that have, from time to time, befallen the Company, the total amount of receipts has exceeded the total amount of expenditures, by a sum a little upwards of twenty thousand dollars, or nearly five per cent. upon our investment for the entire period, since the Road first began to be used. This, though a small profit, should nevertheless, afford us much encouragement, when we take into consideration the adverse circumstances under which it has accrued. In the first instance, we were either disappointed in the receipt of Engines contrated for, or else when received, they were found to be unfit for the purpose for which they were intended. By this means we were, in the first place, hindered in the execution of our business, in the second, lost the confidence of the public, who, in consequence refused to give us employment, and, thirdly, were put to much actual expense in making our Engines suitable instruments for the purposes of the Company. In addition to these considerations, the Engineer assures us, upon the most satisfactory data, that could Locomotive power have been exclusively employed from the first, the expenditures of the Road up to the date of the Report, would have been diminished at least ten thousand dollars. Such diminution of expenditure would have raised the sum of profits to 30.000 dollars, or near seven per cent. upon the investment, up to this date. From all the information derived from the Reports of the different departments, we may safely predict the future prosperity of the Company. We may rest assured that our expenditures will be continually decreasing while our receipts will be continually increasing. We are now fully prepared to fabricate for ourselves every species of machinery relating to the Road, having for our chief workman, an English-bred mechanic of the first reputation. The embankment of the Road, which is now the principal object of repairs, when consolidated by time, will have been rendered almost independant of repairs.—The labor we employ must necessarily grow cheaper as laborers multiply and population becomes more dense. While the increase of population, productive labor, commerce, manufactures, agriculture, wealth and travel, must greatly advance the business and emoluments of the Road. Thus while time will operate progressively, to reduce expenditure, on the one hand, it will progressively enlarge our receipts, upon the other. And there cannot exist a doubt, that the ratios of these two progressions will be sufficient, speedily, to ensure an income that ought to satisfy the desires of the Company.

It is a fortunate circumstance for the Company, that their improvement has been in advance of all schemes for similar improvement in this region of the United States. It will, on this account, tend to give direction to subsequent improvement in the same region.—There was much talk in South Carolina of connecting their great Western Railroad with this, and although the plan was eventually abandoned, yet it is worthy of remark and full of encouragement for us, that our comparatively small establishment, should have been a matter of grave deliberation, in determining the route of that stupendous High Way. A connexion, however, will ultimately, take place. A South-Western branch must strike off from some point on the Charleston and Cincinnati Road, and will certainly have its origin on this side of the Mountains, as it is not to be supposed that a company would incur the expense of cutting a second pass through the mountains, when one already existed. This branch will have its direction through the Tennessee Valley, and must either be connected with our Road, or take a parallel route, and come in competition with it. But as competition would operate injuriously on both contending interests, nothing is more evident, than that co-operation

and coincidence would, on both sides, be preferred; indeed, a different supposition would be preposterous in the extreme.

The Georgia Improvement which may be regarded as a matter already determined upon, will next claim our attention, as it will become directly tributary to ours. The roap from Augusta to Athens is now under contract, and in the course of construction.—From Athens it will *double* (to use a nautical term) the Southern extremity of the Alleghany Mountains, and terminate at a point on the Tennessee River a little below the Suck. The intermediate link of connexion between our road and this will assuredly be supplied as soon as found to be called for. Indeed, we already have a certainty of a road from Decatur to Huntsville or some eligible point in the county of Madison.

The contemplated road which is to connect the city of Mobile with the navigable waters of the Tennessee River, becomes a third guarantee of our future prosperity; and I am happy in being able to assure the company, upon the most satisfactory information, that it will be entirely in our power to supply the conditions, upon which this road would be made to intersect ours at a point a little to the east of Courtland.

These three stupendous improvements are to pour their trade and travel along the channel of our road, into the great valley of the Mississippi.

Let us suppose the Charleston and Cincinnati Railroed to be carried into execution; and also the projected roads in Virginia, running towards the North and towards the South, through the towns of Lynchburg and Abington, to the junction of the French Broad and Nolichuckey rivers; and it is evident that the vast majority of the travel from the States of South and North Carolina, from Virginia, Maryland, Delaware, and New-Jersey, and a great portion of that from Pennsylvania, New-York and the New-England States, with their great commercial and manufacturing cities, in short from the Old States generally to the New, will direct its current along our own high-way, and down the Tennessee river and Nashville and New-Orleans Railroad into the great emporium of the West and South-West.

The passage through the Alleghany and Cumberland Mountains will be in the nature of a great Sea-port—where the commercial and social intercourse of two connecting regions will be concentrated—and it appears to be our good fortune to occupy, as it were, the focus in point of position.

The Georgia Road, too, will render heavy contributions, and that from Mobile will deliver its burdens at a central point, to pass along our Eastern or Western division, according to particular destination.

Let us, then, continue to cherish those sanguine anticipations which we have all along indulged, and instead of becoming discouraged, rather let it be our chief concern, to perfect and mature our work, and be prepared in the resources that may be put in requisition for the construction of a *second track*, to meet the demands that may in future be made upon us.

Respectfully submitted,

BENJAMIN SHERROD, President of the Tuscumbia, Courtland and Decatur Railroad Company.

ENGINEER AND GENERAL SUPERINTENDENT'S OFFICE.
TUSCUMBIA, August 1st, 1836.

To the President and Directors of the Tuscumbia, Courtland and Decatur Railroad Company.

GENTLEMEN:—In compliance with the regulations of the Company, I beg leave to submit the following brief Report, showing the operations in this department, from the period of the last annual Report from the Engineer department 4th March 1834. At the date of that report, the Railroad had been completed to Town Creek, say 14¾ miles above Tuscumbia, and was in rapid progress of construction, for the remaining 8 miles to Courtland. The space between Courtland and Decatur had just been let to contract, and the contractors were beginning upon the work. By 4th July the road was completed, and opened as far as Courtland. And on the 15th December of the same year, [1834] the work was accomplished to the Town of Decatur, and the Locomotive with her train of Cars, passed through the whole extent of the road for the first time. Thus it will be seen that 28¼ miles of the road were accomplished in a little over 9 months.

Before the road was quite completed, business began to accumulate. In anticipation of that event large quantities of Merchandize, destined for the upper Tennessee, had been sent to Courtland, to remain until a thorough transit should be afforded. But unfortunately for the Community as well as the Company we had been disappointed in the receipt of Cars as well as Locomotives. Two Locomotive Engines had been purchased at the North, to be delivered to us early in the season. One of which was received in February, 1835, without tender-car or tank, both of which was supplied, after some loss of time, at our own works; but when the Engine came to be put on the road it was found not to answer the purpose, being deficient in almost every important respect. This Engine had been purchased second handed from the Philadelphia, Germantown and Norristown Railroad Company—an article which they had tried to their own satisfaction, and were no doubt, pleased at the opportunity of disposing of it. The other Engine did not arrive until about the 1st of January—this Engine was made at the West Point Foundry, New-York, and had the appearance of a good article, and indeed performed well for a few weeks—but owing to a defect in the castings of the cylinders, as well as a bad arrangement in the slides that carry the crossheads, one of the cylinders gave way on the 15th of June, immediately under the exhaust passage, bursting open nearly its whole length; the metal in that part being only about an eight of an inch in thickness. The Engine of course was perfectly useless until new cylinders could be procured. Not being prepared with tools at our own works to remedy the difficulty. I wrote to Mr. Kemble, the manager of the West Point Foundry, advising him of the deficiency of the Engine, and requesting that he would, with all practicable despatch, make a new pair of cylinders, as well as slides, and forward them to us. Which he promised to do. We waited on his promise till quite late in the fall, say October or November, expecting daily to hear of the anxiously looked for articles; till at last despairing of any futher news from the West Point Foundry, we set to work at our own shops and accomplished the job, so that said Engine has been in service since sometime in January last, and answers a good purpose. From the West Point Foundry we have not even to this day heard a word of excuse or apology for the treatment given us.

Our Car establishment was also extremely limited at the period of opening the road, amounting to but about 15 lumber, and 3 pleasure cars, instead of from 50 to 75, the number required.

Owing to these various disappointments in regard to Motive power, we were compelled to resort to the only alternative left to us, horses, to do the business. And in the use of this kind of Power the want of cars was much more sensibly felt than it would have been with Engines, owing to the limited speed of horses; besides this the Railroad having been just completed as the winter set in, and the horse path not being gravelled, the path very soon became almost impassable for horses. In consequence, it was entirely beyond our means to perform the transportation that was offered to us during the winter of 1834 and '35, and a large portion of the business had to seek another channel. This was not all, it effected very materially our business for the succeeding year. The community who had been disposed to patronise us from the first, not aware of the true causes producing the inability of the Company to perform what had so confidently been expected from them, became soured in their feelings towards the Railroad, and determined not to encourage the Company any further, until it should prove itself fully adequate to the transportation of all the freights that should be offered. By about the 1st July 1835 the number of Cars had been so far augmented that we began to be able to keep up with the business; every exertion was continued to be made, to increase the number of Cars, and at the same time two new Locomotive Engines were ordered, one from M. W. Baldwin of Philadelphia, and the other from Liverpool. The former was placed upon the road about the 1st of June last, but the latter has not yet arrived, owing as we understand to the great number of orders on hand before ours. It is, however, a gratifying fact to state, that since about the 1st July 1835, we have had the capacity to accomplish the business that was offered, although at an immense expense, owing to the mixture of motive power, used upon the road. From the period last above mentioned up to this date I presume about ⅓ to ½ of the business was done by horses, and the remainder by Locomotives, to viz: One small Engine, the "Fulton," the "Comet," since January last, and the "Triumph," since about the 1st of June. Since the latter Engine was placed on the road no horse power has been used in transportation between Tuscumbia and Decatur. I say we were able to do the business that was offered, and I confidently believe we had the capacity to do double the amount that was presented since October or November last, and our car establishment having been continually augmenting, we feel perfectly assured, that although the business, the ensuing year, is expected to be fully dou-

ble what it was the last 12 months, yet we shall be enabled without difficulty to give it despatch.

The following statement will exhibit the investments of the Company:—viz.

Cost of Railroad,	$218,566 49
Property at Tuscumbia Landing,	44,667 03
Railroad works at Tuscumbia,	6,929 72
Property at Tuscumbia,	9,667 97
Property at Leighton,	2,822 90
Property at Jonesborough,	615 18
Property at Courtland,	3,369 82
Property at Hillsborough,	737 17
Property at Fennell's turnout,	213 69
Property at Decatur,	30,286 73
Locomotives,	26,189 71
Horses,	4,510 00
Cars,	21,676 00
Negroes,	9,575 00
Instruments,	394 25
Real Estate,	1,683 34
Railroad Iron, on hand,	183 75
Railroad Timber, on hand,	285 52
Lumber,	884 91
Office Furniture,	346 07
Moveable property,	2,364 50
Harness,	532 00
Stone Coal,	7,875 51
Stock on hand, in Smith shop and Foundry,	27,943 16
Stock on hand, in Car shop,	2,705 38
Casting on hand,	1,167 14
Provender on hand,	491 21
Fuel on hand,	434 00
Unguent on hand,	610 95
Provision on hand,	696 52
Clothing on hand,	466 09
Total,	$428,891 71

The cost of the Railroad is composed of the following items:—viz:

Timber account,	$48,395 89
Iron,	38,450 39
Graduation,	42,372 68
Construction,	29,406 12
Right of Way,	11,100 45
Masonry,	3,540 77
Bridging,	4,523 75
Grubbing and chopping,	3,242 22
Ditching,	655 41
Extra work,	2,362 06
Turn outs,	1,003 23
Horse path,	4,360 33
General incidental expenses,	3,566 47
Improvements since the road was opened, including several turn outs, the inclined plane at Decatur, &c., &c.	9,538 49
Engineering account,	15,950 23
Total,	$218,566 49

Property at Tuscumbia Landing consists of 4 acres of land, wharves, warehouses, machinery, offices, &c.

Railroad Works at Tuscumbia consist of a lot of ground, occupied by Company's shops and foundry.

Property at Tuscumbia consists of several lots of ground, warehouses and offices in Tuscumbia.

Property in Decatur consists of wharves, warehouses, machinery, and all real estate of the company at that point.

Property at Leighton, Jonesborough, Courtland, Hillsborough and Fennell's turn out, consists of warehouses, water-stations, stables, &c., at those respective places.

Locomotives embrace the locomotive establishment, consisting of four locomotive engines, viz: the "Fulton," "Pennsylvania," "Comet" and "Triumph.

The "Fulton," made by Edward Bury, of Liverpool, stands charged at $4,915 04. She was first put upon the road about the 1st of June 1834, and has been a useful engine for her class. She is small, weighing only about 5 tons; 8 inch cylinders, and 16 inch stroke, driving wheels 4½ feet diameter.

The "Pennsylvania" is the engine (before spoken of) which was bought from the Philadelphia, Germantown and Norristown Railroad Company, and stands charged at $5,880 37. This engine has been of no service on the road; weighs about 9 or 10 tons, and about ¾ of her weight on the driving wheels, which renders it altogether too heavy for the good of the road; her boiler is also deficient in fire-surface, so that she is not capable of generating a sufficiency of steam. Her cylinders 10 inches diameter, 18 inches stroke, driving wheels 4½ feet in diameter. After a trial on the road with this engine, she was taken off and placed along side of the machine shop, where she has been used to this day, to drive the machinery about the works. A common engine is being put up to answer this purpose, and as soon as this is effected, we design taking her to pieces, enlarging the boiler, and putting her on eight wheels, carrying the front part on four small wheels, (two and a half feet diameter,) and using four adhesion or driving wheels, by means of outside cranks and connection; when this is accomplished, she will without doubt, answer a good purpose, and will be easy on the road.

The "Comet" from the West Point Foundry Association, New-York, stands charged at $7,959 82; weighs about 7½ or 8 tons; 10 inch cylinder, and 20 inches stroke; driving wheels 4½ feet diameter. This engine has been of very little use to the Company, until about the first February last, in consequence of the bursting of one of her cylinders, as before described. (in the beginning of this report.) When she was first put on the road she had four wheels of equal diameter, (4½ feet,) but as she had no connection between the hind and fore wheels, the large wheels forward proved to be a disadvantage, and we dispensed with them, and put the forward part of the engine on a truck car with four wheels, 2 feet 6 inches diameter, which causes her to take the curves much better and is found to answer an excellent purpose This engine is used as a freight engine, and performs well.

The "Triumph," made by M. W. Baldwin, of Philadelphia, cost $7,091 56. She was put on the road about the first of June last, and performs well. This engine is on six wheels; weighs 6½ tons (without water;) 10½ inches cylinder, 16 inch stroke. driving wheels 4½ feet in diameter. She is remarkable for the great simplicity of her gearing, and at the same time, for the strength of all her parts. She has been in active service ever since her arrival, and the cost of repairs charged to her, to this date, only amount to $1116. Being placed on six wheels, (and the weight nearly equally divided,) she is very easy on the road, but the want of sufficient adhesion, (in slippy weather,) through her driving wheels is frequently felt, although an apparatus is attached by means of which part of the weight of the tender is brought to bear on the driving wheels. Indeed, the want of adhesion between the driving wheels and the rails, in certain states of the weather, is a deficiency common to all engines, and a plan to obviate this has occupied our attention for some time, and a simple apparatus, which we have in contemplation, is confidently believed, will in a great degree, if not wholly remove this difficulty. The plan proposed is this:—Let a sort of hopper, (to hold a gallon or so,) be arranged just forward of the driving wheels, and above the frame of the engine, from which a tube will be projected downwards to within a small distance of the face of the rail. The hopper being filled with dry sand, will feed through the tube upon the rail. A cock, or regulator will be constructed in the tube to allow the sand to run in such quantities as may be desirable, or shut it off entirely; for want of sand, water may be used—as it is a fact well known, that the adhesion is quite as good with a perfectly wet rail as when perfectly dry.

The account of real estate, embraces such real estate as is not attached to a particular station, in connection with the road; and consists of the following, viz:

Lot Nos. 15 and 16 as laid off in the north half of section 5, township 4, range 11; each 20 acres, at $20 per acre,	$800 00
Six tracts of land, entered by the Company, 19th December, 1833, at Huntsville, being timbered, and situated contiguous to the Railroad, between Courtland and Decatur,	600 54
Lands entered at the Land Office at Courtland, about the same time,	175 30
A tract of land above Moulton, containing stone-coal,	50 00
Two acres of land at Deering's turn out, (not improved.)	57 50
	$1,683 34

Moveable property consists in tools and floating property of all kinds, not attached to a particular station, or property on the road. All the other accounts, comprising the investments of the company, explain themselves.

The receipts of the Company up to this date, as per Agent's reports, amount to $110,312 72.

Of which amount was received for transportation, from the beginning up to the 1st of August, 1835,	$25,680 27
From passengers for same period,	11,408 71

Warehouse commission for do.	11,723 86
General commission do. do.	8,398 86
Total up to 1st Aug. 1835,	$57,206 70
From 1st August 1835, up to date—	
For transportation,	$21,840 09
From passengers,	17,045 26
Warehouse commissions,	2,544 38
General commissions,	11,676 29
	53,106 02
Profits have also been derived from the following sources, viz:	
Smith shop and foundry,	$5,098 59
Carriage shop,	2,701 02
Negro property,	2,503 10
Real estate,	2,225 56
Horse property,	283 25
Sundries,	1,909 09
	14,720 61
Total,	$125,033 33
The expenses from the beginning of the business upon the road to this date, are as follows, viz:	
Agency expenses,	$39,221 15
All other expenses,	65,118 39
	104,330 54
Profits,	$20,693 79
The items in the expense account are as follows, viz:	
Horse power up to 1st Aug. 1835,	$7,683 54
Locomotive power, do. do.,	6,671 79
Car establishment, do. do.,	6,094 90
Repairs,	2,933 21
Paid for 17,321 lbs. cotton burnt December 31st, 1834,	2,205 81
General expenses,	269 51
Agency expenses,	21,148 07
Total up to 1st Aug. 1835,	$47,006 83
Horse power from 1st Aug 1834, to date,	14,348 48
Locomotive power for same period,	6,450 15
Car establishment, do.,	3,386 69
Unguent account, do.,	1,716 33
General expenses, do.,	6,045 48
Agency expenses, do.,	18,073 08
Repairs of the road from beginning to date,	7,312 50
	57,332,71
Total expenses to date,	$104,339 54

A very striking comparison is here presented in the items of Horse power and Locomotives. It is seen that the expense of the former, for the year ending this day amounts to $14,348 48, while the expenses of the latter, for the same period, amount to $6,450 15; and as has been already stated, one half, or two thirds of the business was done by locomotives. It is confidently believed that had the manager of the West Point Foundry made good his promise, (which he ought to have felt bound to do, by much above an ordinary motive,) so that the engine "Comet," could have been put to use in September or October last, it would have made a difference of $10,000, in the expense of motive power. Horses could have been dispensed with almost entirely. The expense of horse power when brought directly in competition with locomotives, and that under the most favorable circumstances, (to the former,) is much more expensive than the latter. But this difference is much increased on a line of Railroad where there is any fluctuation in the business to be done. Ours is peculiarly of this character; as the freight from below is principally brought up in large boats, it is necessary that we should have the capacity to transport almost the contents of a large steamboat in one single day, whilst there will be but little doing till the next boat arrives. Under such circumstances, the Company being prepared to accomplish the maximum of business their power is idle during a considerable recess, but the expense, (if the power is by horses,) is constantly the same; whilst with locomotives, the power being provided for the maximum, it costs nothing during the recess, (except the interest on the capital invested;) because the engine laid up, the engineer who conducts her, takes his place in the shops of the Company and earns his wages there. In short, in the one case, the expense is directly in proportion to the business done, whilst in the other, it is in proportion of the maximum continued for every day in the whole season.

The expenses of the Company up to this time have certainly been very high; and the statement just made is intended to account for a part of this extraordinary expenditure. But this is not the only point in which a reduction is expected to be obtained. Heretofore, and until quite lately, the labor required in loading and despatching goods from the Depot at the Tuscumbia Landing, has been about double of what it is hoped to be in future. Great improvements have been made at that Depot, in facilitating the loading and changing of cars, by means of cranes, turn-rounds, &c

The inclined plane at Decatur, was not completed until last spring; so that all the freights for up the river had to be transferred by means of wagons and drays, from the head of the inclined plane to the landing at the river. All these difficulties being now obviated, we ought to expect to bring our expenses down to their lowest term during the ensuing year.

It has been before stated that the up freight upon the road is likely to be double what it was the past year. This I presume to be a fair calculation; and if an average crop of cotton shall be produced in the Tennessee Valley, the descending freight will be double or treble of what it was the past season; and the passenger account I feel safe in saying will be increased from 25 to 50 per cent. These are flattering prospects ahead, and I confidently believe they will be realized; and henceforth the stockholders may expect to receive at least fair, if not large dividends.

Very respectfully submitted,

DAVID DESHLER.

Engineer and General Superintendent T. C. and D. R. R.

RAILROAD TREASURER'S OFFICE.
TUSCUMBIA, August 1st, 1836.

To the President and Directors of the Tuscumbia, Courtland and Decatur Railroad Company.

GENTLEMEN—The following report will exhibit the situation of this department and the transactions that have transpired from the time of my appointment (11th April 1836) to this day.

In pursuance of resolutions of your Board, exertions have been continually making to get the old balances on stock liquidated; for this purpose, I obtained the services in part, of Mr. Walter Simpson, who proceeded upon that business, under written instructions, (a copy of which is appended to this report, marked No. 1.) He visited nearly every stockholder, who was accessible at the time; and succeeded in closing many of the accounts; but still a long list, amounting to a large sum of money, is standing open, which from one cause or other, could not, up to this date, be brought to a close. This business will continue to occupy my attention until all these accounts are closed. A list of stockholders is appended, marked No. 2, exhibiting the number of shares held by each individual, and the balance due from the same.

From this list, it also appears that the total orginal stock amounts to 3,063 shares, equal $306,300. Of which 258 shares have been transferred to the Company.

Of the 1,500 shares of the additional stock created in June last 1,155 shares have been subscribed, and secured (excepting $7,500) in the way proposed by the resolution of your Board. 345 shares remain to be subscribed: when this shall have been done the total capital stock in the Company will amount to 4,563 shares, equal to $456,300.

An account current, showing the receipts and disbursements in this department is annexed, marked No. 3; by which it appears thet the receipts from various sources have amounted to $207,396 76 cts. and the disbursements, to date, amount to $164,216.23 leaving a balance of cash in the Treasury on this day, of $43,180 50.

A general list of balances is also annexed as drawn from the books of this department. All of which is very respectfully submitted.

DAVID DESHLER, Treasurer,
Of the Tuscumbia, Courtland and Decatur Railroad Company.

A BRIEF ACCOUNT OF THE RAILROAD PROJECT, CONNECTING THE TENNESSEE RIVER, NEAR TUSCUMBIA, BELOW THE MUSCLE SHOALS, WITH THE SAME AT DECATUR, ABOVE SAID SHOALS, FROM THE BEGINNING OF SAID WORK, TO THE COMPLETION THEREOF.

On the 16th January, 1830, the act incorporating the Tuscumbia Railway Com-

pany, was passed by the Legislature of this State, authorizing a capital of $20,000 for the construction of a Railroad from the town of Tuscumbia, to the Tennessee River, a distance of two miles.

The stock was immediately subscribed by the citizens of Tuscumbia, and vicinity, and on the 1st day of May, 1830, the stockholders elected the first board of directors, consisting of 13 members, viz:—M. Tarver, President, A. Barton, James Elliot, B. Merrill, P. G. Godley, Jno. Kennedy, D. S. Goodloe, Jno. Sutherland, Jr., Jno F. Pride, Jno. Haynie, Henry Cook, Thomas Keenan, and David Deshler, Directors.

Surveys were immediately instituted, and the route of the road determined. But owing to the want of power in the charter, to condemn ground for the right of way, and not being enabled to obtain that privilege by purchase, (the principal proprietor utterly refusing to sell the right of way to the Company,) nothing further was done until April, 1831, when the Company succeeded in purchasing the plantation which had presented the difficulty. Contracts for the grading, and for the various materials, were immediately entered into; and on the 5th day of June, 1831, the interesting operation of *breaking ground* took place. The work thus commenced, progressed without material interruption; and on the 12th day of June, 1832, the epoch of its completion was joyously celebrated.

A convention of delegates from the counties of Franklin, Lawrence, and Morgan, had been held at Courtland, on the 8th day of October, 1831, for the purpose of devising the best mode of operation to continue the Tuscumbia Railway to some eligible point on the Tennessee River, above the Muscle Shoals; and in pursuance of measures, then and there adopted, a charter was granted by the Legislature of the State, approved 13th January, 1832, incorporating the Tuscumbia, Courtland and Decatur Railroad Company,—fixing Decatur as the point of termination of the work above the Shoals.

On the 11th day of February, 1832, the board of Directors (appointed by the charter,) met at Courtland, accepted the charter, and appointed their engineer, with instructions, forthwith to commence the surveys, with the view to the location of the Road.

On the 1st Monday in March, 1832, a general meeting of the stockholders was convened at Courtland, to whom was submitted the results obtained by the surveys, as far as actually made; and an approximate estimate presented by the engineer, of the cost of the whole Road. At this meeting, a board of Directors was chosen, in pursuance of the charter, to serve for one year,—viz: Benj. Sherrod, President, H. W. Rhodes, J. T. Sykes, Thomas Coopwod, P. G. Godley, D. S. Goodloe, M. Tarver, B. Merrill, Joseph Trotter, W. H. Whitaker, Peter W. Taylor, William Leetch, and Sterling R. Cockrill, Directors; David Hubbard was appointed Secretary, and in April following, Jack Shackelford was appointed Treasurer of the Company.

In May, 1832, the graduation as far as Leighton, $10\frac{1}{2}$ miles, was put under contract, and in July, the construction for the same space was let. In October of the same year, the remaining space to the town of Courtland, (both grading and construction) was let to contract; and in January 1834, (and soon thereafter,) the whole of the space between Courtland and Decatur was let out to contract, embracing the grading and construction of the Road.

The Road was completed and opened as far as Leighton, on the 20th day of August. 1833, to Courtland, on the 4th of July, 1834, and to Decatur on the 15th December, 1834.

At the second annual election, held at Courtland, on the 1st Monday in March, 1833, the following gentlemen were constituted a board for one year from thence, viz:—Benj. Sherrod, President, D. Hubbard, P. W. Tayler, D. S. Goodloe, M. Tarver, James Fennel, H. W. Rhodes, James T. Sykes, W. Leetch, James B. Wallace, B. Merrill, John L. McRae, and James Elliot, Directors; Jack Shackelford was continued as Treasurer, and D. G. Ligon was appointed Secretary.

At the third annual election, held on the 1st Monday in March, 1834, the following gentlemen composed the board to serve for one year, viz:—Benj. Sherrod, President, M. Tarver, James T. Sykes, D. S. Goodloe, H. W. Rhodes, James Fennel, James B. Wallace, James Elliot, B. Merrill, Birt Harrington, D. Hubbard, John L. McRae, and John Gregg, Directors; James Elliot was appointed General Superintendent and Treasurer, and Jack Shackelford was appointed Secretary.

At the fourth annual election, held on the 1st Monday in March, 1835, the following gentlemen were chosen, to serve for one year, and until their successors should be qualified, viz:—Benj. Sherrod, President, D. Hubbard, M. Tarver, Jack Shackelford, D. S. Goodloe, B. Merrill, James T. Sykes, H. W. Rhodes, James Fennell, John Gregg, James B. Wallace, James Elliot, and John L. McRae, Directors; Simon Jeffries was appointed Secretary; James Elliot was continued the Treasurer of the company. The duties of General Superintendent, were annexed to that of the Engineer. In April, 1836, Mr. Elliot resigned the office of Treasurer, and D. Deshler was appointed Treasurer of the Company.

The Engineer Department, was constituted as follows, viz:—

David Deshler, Chief Engineer from the commencement of the project to date.

F. H. Petrie was employed as Surveyor and draftsman from some time in February, 1832, to May of the same year.

John Taylor was employed as Assistant Engineer in May, 1832, and continued in the service of the Company to the completion of the road.

Franklin Crawford was employed as surveyor, for several months, in the fall of 1832, and again in the same capacity, during the fall and winter of 1833, and 1834; and from the 1st of February, 1834, to the completion of the Road, he was employed as assistant Engineer.

John Wilson was employed as assistant Engineer, from the 18th April, 1834, to the completion of the Road.

In October, 1832, Thomas Limrick was appointed General Agent of the company, to superintend the receiving and forwarding of goods and produce, at the Tuscumbia landing, and in the town of Tuscumbia, and to the current business upon the Road; which situation he has filled, up to this date.

James Fennel was appointed the agent of the Company at Decatur, and has filled that station, from the date of the opening the Road to the present time.

August 1st, 1836.

UNION CANAL.

The Annual statement of the Managers of the Union Canal Company, has been published. From it we learn that owing to the severity of last winter, the operations on the Canal were suspended for five weeks longer than during the preceding season. It was closed by ice on the 27th of November, and the navigation was not resumed until the 3d of April. The tolls received from the 1st of November, 1835, to the same period in 1836, were $133,025.21 being a larger amount than during any previous year, except 1835, when the receipts were $135,254.20.

During the season the navigation has not at any time been interrupted, but has been in admirable order, exempt from breaches, and furnished with an ample supply of water, to have passed with facility a greatly increased trade. This work is an important link in the chain of water communication between the East and West, in the great system of internal improvements in Pennsylvania, which are extending in all directions, and giving facilities to her immense resources in her mineral, agricultural and other productions, which are increasing with unexampled rapidity. The conviction is irresistable that the trade will be augmented so as at no distant period to remunerate the stockholders for their advances. With all these flattering anticipations in view, the finances of the Company are not exempt from temporary embarrassment, and the Managers have been under the necessity of issuing certificates bearing interest, instead of cash payments, on the interest of its debt.

The present condition of the Company, is

Capital invested in the Canal,		$2,618,100
Consisting of 4189 shares of stock, at $200 per share,	$837,800	
Permanent Loans,	$1,780,000	
	$2,618,100	
The annual interest on loans, requires		$106,818

The Board believe that next year the nett income will be adequate to meet the interest, and enable them to dispose of so much of an unsold loan of $525,000, as will enable them to redeem such certificates of interest as may be issued, prior to the period at which they may be made payable.

During the last winter the large Aqueduct on the navigable feeder across the Swatara, and an aqueduct below Reading, were renewed. Part of the line on the summit level, and of the navigable feeder, were also lined with plank. The large waste Wier, near the Water Works has been renewed. Suggestions have been made that the interests of the Company, and the community would be essentially promoted by an enlargement of the locks, so that boats 13 feet wide might navigate the canal. This desirable measure cannot be accomplished by the Board without the aid of the Commonwealth. An experienced engineer has been appointed to examine the whole line of Canal, and report the practicability and cost of so great an undertaking.

STATEMENT

Of the amount of tonnage which passed the Union Canal, from the 1st Nov., 1835, to the 1st Nov., 1836.

		Pounds.
Flour, 75,916 bbls. weighing		16,245,053
Grain, 613,302 bushels,		36,798,137
Whiskey, 14,969 bbls.,		4,490,930
Iron, bar, pig, and castings,	14,120,626	
Iron, railroad,	2,568,889	22,419,266
—— ore,	5,729,751	
Coal, anthracite,		26,230,342
—— bituminous,		15,636,426
Lumber, 13,276,000 feet,		29,740,392
Shingles,		6,642,611
Staves,		950,618
Gypsum,		17,900,877
Fish, 21,130 bbls.,		6,339,140
Salt, 93,914 bushels,		5,634,879
Merchandize,		42,815,096
Tobacco,		1,948,101
Wool,		261,271
Seeds of all kinds,		1,320,645
Bacon,		1,539,536
Cotton,		8,436
Queensware,		5,259,448
Leather,		861,402
Sundries, consisting of butter, lard, pork, lime, limestone, marble, bricks, grindstones, live hogs, fruit, &c. &c.,		23,342,560
		262,385,166

Equal to 117,136 tons.

Total number of boats which passed the Canal this year, 7,022.

Amount of tolls received during the year ending Nov. 1st., 1836, $133,025.21.

Miscellaneous.

Improvements in Steam Carriages on Common Roads.—We noticed in the preceding volume of this Magazine, two inventions of M. Galy Cazalat, which were designed for the improvement of steam carriages. We have since learnt, by a communication from the inventor, that they are part only of a series which has for its object the accomplishment of a problem in which so many have failed, and so much capital has been unproductively expended—the construction of a safe steam carriage, for the conveyance of passengers at a desirable velocity on common roads, which shall be perfectly safe from accidents by explosion, &c.

After a long and careful examination of the subject, and many experiments, on a full scale, M. Galy Cazalat decided, that the following ameliorations were all desirable in the most improved carriages yet known, and most of them necessary; these he conceives he has perfectly accomplished in his steam carriage.

1. An arrangement by which the liability of the axle-tree-crank to break is diminished.

2. A mode of suspension of the engine, &c., which prevents its action from being disturbed by joltage.*

3. An apparatus for guiding the carriage by means of the steam itself, with great facility.

4. An hydraulic break for diminishing the velocity, and, when desirable, entirely stopping a steam carriage, upon a declivity.

5. A steam-generator, of simple construction and little weight; with a fire place in which coal may be used as a fuel without giving out smoke.

6. An apparatus of great simplicity and of easy application, by which explosions of steam generators and boilers may be, at all times, *prevented*.†

7. An apparatus, also of great simplicity, and incapable of derangement, by which the water surface in steam generators and boilers is constantly maintained during the working of the engine at the same level.

It will be evident to all who understand the subject, that supposing M. Galy Cazalat has succeeded to the extent which he describes, he has removed nearly all the more important impediments which have up to this moment obstructed the progress of this valuable application of steam power.

[Mag. Pop. Sc.]

METHOD OF DETERMINING THE VALUE OF BLACK OXIDE OF MANGANESE FOR MANUFACTURING PURPOSES, BY THOMAS THOMPSON, M. D., F. R. S., L. AND E. REGIUS, PROFESSOR OF CHEMISTRY IN THE UNIVERSITY OF GLASGOW.

The manganese to be tested must be reduced to a fine powder, or brought into the state in which it is used by the manufacturers of bleaching-powder. To determine its value, proceed in the following manner:

Into a balanced Florence flask put 600 grains of water, and 75 grains of crystals of oxalic acid. Then add 50 grains of the manganese to be tested; and, as quickly as possible, pour into the flask from 150 to 200 grains of concentrated sulphuric acid. This is best done by having a given weight of sulphuric acid, say 210 grains, previously weighed out in a glass measure, counterpoised on one of the scales of a balance. You pour into the flask as much of the sulphuric acid as you can conveniently.—Then, putting the measure again into the scale, you determine exactly how much has been put in.

A lively effervescence takes place, and carbonic acid gas is disengaged in abundance. Cover the mouth of the flask with paper, and leave it for twenty-four hours; then weigh it again. The loss of weight which the flask has sustained is exactly equal to the quantity of *binoxide* of manganese in the powder examined. Thus, let the loss of weight be 34 grains; the quantity of binoxide of manganese in the 50 grains of the powder which was tested will be 34 grains; or it will contain 68 per cent. of pure binoxide of manganese, and 32 per cent. of impurity.

To understand what takes place, it is necessary to recollect that oxalic acid is composed of

2 atoms carbon	1.5
3 atoms oxygen	3
	4.5

and that of binoxide of manganese is composed of

1 atom manganese	3.5
2 atoms oxygen	2
	5.5

The oxalic acid acts on the binoxide by abstracting one-half of its oxygen, which converts it into carbonic acid; hence the effervescence. 55 grains of pure binoxide of manganese would give out 10 grains of oxygen, which would convert 45 grains of oxalic acid into 55 grains of carbonic acid; which escaping, indicate, by the loss of weight, the quantity of carbonic acid formed. Now, it happens that the weight of the carbonic acid formed is exactly equal to the quantity of binoxide of manganese which gives out its oxygen to the oxalic acid.—Hence the reason of the accuracy of the test.

In other words, an integral particle of binoxide of manganese, which weighs 5.5, gives out 1 atom of oxygen. This atom of oxygen combines with an integrant particle of oxalic acid, weighing 4.5, and converts it into two integrant particles of carbonic acid, which both together weigh 5.5. As this carbonic acid escapes, the loss of weight must be just equal to the quantity of binoxide of manganese in the powder subjected to experiment.

In practice, I find that a small quantity of the binoxide of manganese sometimes escapes the action of the oxalic acid, being probably screened by the great quantity of impurity with which it is mixed. But the deficiency of carbonic acid occasioned by this, is about made up by the moisture which the carbonic acid gas carries off along with it. This renders the error, in general, trifling.

It will be proper to subjoin an example or two of the method of proceeding, to enable the reader to judge of the goodness of this test, and its value to the manufacturer.

The black oxide of manganese employed was subjected to analysis, and found composed of

Binoxide of manganese	68.49
Peroxide of iron	11.85
Water	5.68
Earthy matter	13.98
	100.00

* Examined and approved by the Institute of France, and rewarded with their gold medal, in 1833.

† Examined, tested, and approved by La Societie d'Encouragement of Paris, and rewarded with their lagre gold medal, in December, 1835.

EXPERIMENT 1.

Put into the flask—

Water	599 grains.
Oxalic acid	75
Black oxide	50
Sulphuric acid	184
Total	908

Loss of weight 32.5 grains. It ought to have been 34.245 grains. Error 1.745 grains.

EXPERIMENT 2.

Put into the flask—

Water	600 grains.
Oxalic acid	75
Black oxide	50
Sulphuric acide	154
Total	879

Loss of weight 34.5 grains. It ought to have been 34.245 grains. Here the error is in excess, and amounts to 0.255 grains.

EXPERIMENT 3.

Put into the flask—

Water	600 grains.
Oxalic acid	75
Black oxide	50
Sulphuric aeid	154.1
Total	879.1

Loss of weight 35 grains. Here also the error was in excess, and amounted to 0.755 grains.

Let us take the mean of these three experiments:

Loss of weight by	1st	32.5 grains.
	2nd	34.5
	3rd	35.0
		3)102
Mean		34 grains.

Here the error amounts to 0.245 grains, which is considerably less than one per cent. If, therefore, three trials be made, the error will be under 1 per cent.; so that the method is quite sufficient to indicate very nearly the quantity of binoxide of manganese in any ore. Now, it is the binoxide of manganese alone that is useful to the manufacturer; the sesqui-oxide and red oxide availing very little in the preparation of chlorine, for which almost alone the ore is used by manufactures.

I tried various other proportions of the ingredients, but found the preceding the best. I tried, also, the effect of rubbing up in a mortar the oxalic acid and black oxide. But the error is least when the oxalic acid is merely poured into the water, and the black oxide added before the acid is dissolved. Unless the sulphuric acid be added last, we cannot be sure of our weights.—[Rec. Gen. Sc. June, 1836.]

Evolution of Light during Crystalization.—A dull light sometimes appear while a solution is in the process of crystalizing, but the phenomenon has been considered as accidental and never exhibited at will, or as an experiment. A method has been pointed out by Henri Rose of Berlin, by which this light can be produced at any time.

Put two or three drams of arsenious acid, of a vitreous aspect, in a clear glass matrass, and sprinkle it with an ounce and a half of non fuming, common hydrochloric acid, and half an ounce of water. Heat it to ebullition, let it boil ten or fifteen minutes, then cool it as slowly as possible by gradually lowering the lamp or removing the heat. If the crystals begin to form in a dark place, the creation is accompanied with a vivid light, and the formation of each little crystal is attended with a spark. If the vessel be shaken n great number of crystals are suddenly formed, and as many sparks produced. If a larger proportionate quantity of the materials be taken, such as an ounce or two of arsenious acid, the light, at a favorable moment, will, on shaking the bottle, illuminate a dark chamber. This power of giving light sometimes continues two or three days in succession, but becomes very faint, depending evidently, on the continuance of crystalization, and not on the electricity of friction by agitation.

If the hot solution be suddenly cooled so as to produce a pulverulent mass of the arsenious acid, no light, or at best, a very feeble one, will be seen. The crystalization of sulphate of potash has been most frequently observed to emit light, but always accidentally, and never perhaps in the *pure* sulphate.

Arsenious acid is known to exist in two different isomeric conditions. It is either transparent and vitreous, or porcelainous and opaque. After fusion it is quite transparent, but in time becomes milk white and opaque, without any increase of weight.—Both the specific gravity, however, and the solubility in water are different in these two states. In the opaque acid, commonly used as rats bane, no light has been observed by the author, or at best, a very feeble one, on slow cooling.

The cause of the evolution of light in the case now described, is considered by Rose as unknown, and in need of additional facts to render it intelligible. Berzelius remarked the appearance of light during the crystalization of fluoride of sodium, in a liquid which held that salt in solution.—[Jour. de Pharmacie. Avr.]

Spirit of Wood.—Dumas and Peligot, have lately discovered a very remarkable product which they have named *Spirit of Wood*. It resembles very closely alcohol or spirit of wine. Treated with four times its weight of sulphuric acid, it furnishes an ether which has precisely the same composition and density; and with various acids, benzoic, acetic, oxalic, &c., it yields as many different ethers, for which these gentlemen give exact formulæ. Its chemical agencies and properties appear to be quite as certain and well defined as those of alcohol, and it is presumed that ethers may be obtained from it which alcohol does not yield. Spirit of wood, purified, is already on sale, at Lemire's, Rue de la Verrerie, No. 19, Paris.—[Recuiel Indus. Avril.]

Note on the Assay of Gilded Ware by the Wet Process. By H. Bouligny, Assayer at Evreux.—The art of assaying the precious metals or determining their proportions in alloys, so long stationary, has within a few years made immense progress. M. Gay Lussac, in reducing to form his method of assaying by the wet process, has, if we may so term it, established the limits of this art in relation to silver. This process is nevertheless not generally adopted, notwithstand its precision and other advantages. The application of this method to the analysis of building begins also to spread. It is thus practised: Boil the alloy in a mattrass with nitric acid, and precipitate the silver by the normal solution. The proportion of silver being known, dissolve the chloride of silver in ammonia, and the gold, which is insoluble in that alkali, is recovered in the usual way, and finally weighed.

This process, which is very exact when the alloy contains no tin, appears somewhat complicated to assayers who are not accustomed to chemical manipulations. That which I propose, is founded on the same principles and will appear perhaps of easier execution as it does not require the use of ammonia.

Take a quantity of the alloy containing about 1000 of fine silver, boil it ten minutes in a ground mattrass with 30 grammes of nitric acid at 22°, decant with care into a ground flask of the capacity of about 250 grammes; boil the alloy again five minutes in 15 grammes of nitric acid, at 36° and decant with equal care this solution into the flask; pour into the mattrass 30 grammes of distilled water to remove all the nitrate and add it to the two former solutions. The flask which contains them is to be stopped and set aside. If any particles of nitrate of silver should adhere to the orifice of the mattrass they must be carefully removed and added to the solution in the flask.

Fill the mattrass with distilled water, and reverse it in a crucible to collect the gold which must be dried and weighed. This weight is that of the gold contained in the alloy, which must be brought to unity by the rule of proportion. If, for example there were 1114.82 of alloy and 4 mill. of gold have been obtained, the weight of this metal in 1000 would be the fourth term in the proportion $1114.82 : 4 :: 1000 : x$

$$x = \frac{1000 \times 4}{1114.82} = 3.588$$

The flask containing the solution of silver and copper, will be marked as an assay for silver, and the operation will be completed.

If the alloy contain tin, which would be known by the presence of a white powder at the bottom of the mattrass, this process would by no means answer. Recourse must then be had to cupellation and parting.

In terminating this note, I ought to observe, that this process is applicable only to gilding, which contains as a minimum of gold 150 to 1000 of alloy.—[Annales de Chim. Nov.]

COINS AND MEDALS.—In a lecture lately delivered before the Society of Arts, Mr. Wyon descrcibed our present mode of engraving and multiplying the dies.

The selection of the best cast-steel for the purpose, he observed, was very important, and not sufficiently understood at present. The very fine steel that forms excellent gravers, and other cutting instruments, is unfit for the purpose, for unless hardened with great care, it is very liable to crack. The very coarse steel is also objectionable, as it acquires fissures under the die press. The object therefore is, to select steel of a medium quality—but the best steel may be spoiled, by want of skill in the smith who forges the dies.

When the rough die is brought to a table in the turning lathe, after being softened, the engraver commences his labors, by working out the device with the small tools in intaglio (sunk in,) and when he has completed his work, the die is ready for hardening, which is, in itself, a very simple process, but one that is often attended with serious disappointment to the engraver, for it not unfrequently happens, that the labor of many months is either injured or utterly destroyed, from the steel itself being faulty or heated to excess. But supposing the original die, or as it is technically called, a matrix, to be uninjured by the process of hardening, it is reserved for the purpose, of furnishing a puncheon (or a steel impression in relief.) For this purpose a block of soft steel is turned flat at the bottom and obtusely conical at the top. In this state, its conical surface is compressed into the matrix by a blow from the multiplying die press: this gives us only the commencement of an impression, for the die becomes so hard by compression, as to require frequent annealing and re-striking before it is perfected. An impression taken in this way is called a puncheon, which, when the engraver has given it all the delicacy or finish existing in the original, is then hardened, and serves for the purpose of making dies for coining, by a similar process, viz, impressing the hardened steel into that which is soft.

The distinction, said Mr. Wyon, between striking medals and coins, is very essential, so much so, that I cannot avoid saying a few words on the subject. A medal is usually engraven in high relief, like those upon ancient coins, and it requires a succession of blows, sometimes forty or fifty, with repeated annealings, to make a perfect impression. A modern coin, on the contrary, is usually brought up with one blow, although with disadvantage of the metal being harder. Standard gold, for instance consists of one-twelfth of alloy; medals are usually made of fine gold; the engraving upon the coin is consequently made with a suitable degree of relief.

In striking a coin or a medal, the lateral spread of the metal, which would otherwise ooze out, as it were, from between the dies is prevented by the application of a steel collar, accurately turned to the dimensions of the dies. The number of pieces which may be struck by one pair of dies, not unfrequently amounts to between three and four hundred thousand, but the average amount is much less. Mr. Wyon stated, that he remembered instances of twenty dies being destroyed in one day, owing to the different qualities of steel, and to the casualties to which dies are liable. There are, it appears, eight presses in the coining room of the Mint, and he considers that the destruction of one pair of dies for each press per day, is a very fair proportion, though it is generally rather more.

It must be remembered, that each press produces sixty pieces per minute, without reckoning stoppages occasioned by changing of dies and other contingencies; and Mr. Wyon remarked, that in 1817, the daily produces of coins, in half-crowns, shillings, and sixpences, amounting to the enormous quantity of 343,000 per day, for three months: at that time all the eight presses were employed; but, on the first of last April, there were 125,000 pieces coined with five presses only. From the 4th of June, 1817, to 31st of December, 1833, their were coined in sovereigns and half-sovereigns, 52,187, 265*l.* sterling.—[Arcana of Science, 1835.]

FROM A MEMOIR ON THE ORIGIN OF MT. ETNA, BY M. ELIE DE BEAUMONT, (ED. NEW PHIL. JOUR. AP. 1836.)—It has been ascertained that the greater number of the appearances of flames which accompany the volcanic eruptions, are only the effect of the rays of light which emanate from the incandescent lava, and which are reflected by the molecules of vesicular vapor, and of dust disseminated by the eruption in the atmosphere. In consequence of this observation, doubts have been raised as to whether volcanos, in any case, produce real flames. These doubts have been already removed by Sir H. Davy in regard to Vesuvius, where he ascertained, during a small eruption, the existence of a real jet of flame; and we ourselves have observed on Etna incontestible volcanic flames.—Having left the *Casa inglese* about an hour and a half before daybreak, in order to ascend to the edge of the crater, the feeble light of the stars enabled us to perceive, on the commencement of the acclivity of the upper-cone, a white space whose color was caused by the alteration of the rocks, and by saline efflorescences having a very styptic taste. In the midst of this space, at several points, we distinguished pale and scarcely luminous flames, which seemed to issue from the earth; they occupied the orifices of several irregular openings, which were from one to two yards in width, and were only the enlargements of a tortuous crevice. These flames were evidently produced by a gas disengaged from the crevice, and which did not find the oxygen necessary for its combustion till it reached the external air. The combustion took place almost exactly at the level of the surface of the ground. The flame rarely rose to the height of a yard; it produced a sound somewhat intermittent, pretty analogous to that of several lighted faggots, or rather that which is heard at the bottom of a blast-furnace when the blowing apparatus is badly constructed. The gases produced by the combustion did not impede the breathing, and had a strong odor of sulphurous acid. Sulphuretted hydrogen was also perceptible, but I did not recognize the odor of muriatic acid. Every circumstance, then, announced that the flame was supported by sulphuretted hydrogen, and afterwards, when the sun lighted up the mountain, a long bluish cloud was seen taking its rise from that particular point.

In the interior of the great crater I found several portions of snow, but from many other points of its angular bottom there issued hot vapors, having a whitish color, more or less dense, composed chiefly of watery vapor, but having nevertheless a strong odor of sulphurous and muriatic acids; one or the other of these acids predominated alternately. The surfaces across which the vapors were disengaged were in part covered by saline efflorescences, which were sometimes white, and sometimes colored of an orange-yellow tint by the chloruret of iron, or of a canary-yellow by particles of lava altered by the acid vapors. In some fissures I found white fibrous gypsum, mixed with altered pulverulent yellow lava in which some small nodules of sulphur were disseminated.

The above account of the observations of this distinguished geologist is followed by a statement of his theory of the formation of the mountain. After alluding to the changes of form that have resulted from the frequent production of extensive longitudinal fissures by the earthquakes that accompany or precede an eruption of the volcano, also to the streams of lava that find their exit through these fissures; to the unequal elevation of their sides by the expanding force below, he draws the conclusion that the foundations of Etna are not immovably fixed, but are undergoing frequent changes. Guided by these considerations, and in addition, observing the extreme slowness with which ejected matter is capable of elevating the central peak, and the improbability, from their structure and situation, that the layers composing the mountain are in the position they were originally accumulated, the author arrives at the following deductions.

The surface formerly nearly flat, has been first repeatedly fractured in various lines having a nearly constant direction. The melted matters have been poured out through the fissures thus produced, and their fluidity must have been nearly perfect, for they have flowed through rents of very inconsiderable breadth. These products were then spread on both sides of the fissures, in thin and uniform masses, similar to those composed of basalt, which in so many different countries, and especially in Iceland, are superimposed above one another, forming vast plateaus whose surface remained always nearly horizontal, in consequence of the subdivision of successive lines of eruption on an extensive space.—The eruptions were, like those of the present day, accompanied by disengagements of elastic fluids, which, issuing like the lava itself from the whole extent of the fissures, carried along with them scoriæ and cinders. These scoriæ and cinders falling back like rain, both on the lava and on the neighboring spots, produced those uniform layers of fragmentary substances, which alternate with

the layers of melted matters. But at one period, it would appear that the internal agent which had already fractured so frequently the solid surface, having doubtless exerted an extraordinary energy, *broke up that surface, upraised it, and since that time Etna has existed.*

Great Blast at Craigleith Quarry.—The long time in which preparations for a great explosion at this quarry had been going on, and the effects that were expected to result from the experiment, by a great saving of labor and expense, in at once dislodging a great mass of rock and also lessening, if not altogether removing, the risk which attends the blowing up of smal portions of rock from the flying fragments, rendered the experiment which took place on Saturday the 18th of October, 1834, a subject of much interest both in a public and scientific point of view. It having been intimated by bills that the blast was to take place at three o'clock, long before that hour crowds of people were proceeding along the roads leading to the quarry, and by three o'clock every place which commanded a view of the spot was filled with spectators. At the time when the explosion took place, there were no fewer than ten thousand persons on the grounds around the quarry; and curiosity was so much excited, that even the Castle-hill, and also on the Carstorphine-hill, a great many people were collected. At half past two o'clock, the conductor, inclosed in a block-tin tube twenty-six feet long and half an inch in diameter, was introduced into the bore. The depth of the bore was sixty feet, and seven and a half inches in diameter at the top, and six at the bottom, and was charged with 500 lbs, of Sir Henry Bridge's double-strong blasting powder. At half past three the match was lighted, and in three minutes the explosion took place. The report was not so loud as from a small piece of ordnance; but the effect that was produced was highly satisfactory to all the scientific gentlemen present, and completely fulfilled the expectations that had been conceived by the projector. At the moment of the explosion, the great mass of rock appeared to those at a short distance to be forced upwards, and then to rend in large and deep fissures. It is calculated that upwards of 20,000 tons of solid rock have been displaced by this experiment.—[Ibid.]

Exhibition of Mr. Cochrane's Fire Arms.—We understand that Mr. Cochrane, of whose astonishing and important improvements in fire arms, the newspapers have lately furnished most interesting descriptions, has lately visited Washington and made a series of experiments at the Arsenal, in the presence of several military and scientific gentlemen, who were highly gratified at the result. These experiments were made on Saturday last. Yesterday we had the pleasure of conversing for some time with Mr. Cochrane, on the subject of his invention; and accompanied him to Brown's Hotel, where he showed us, his rifle and carbine. With the permission of Mr. Cochrane, we lay before the public, the following reports of the military gentlemen, in whose presence, and under whose supervision, the experiments were made:— [Alex. Gaz.]

Washington, November 21st, 1836.

Colonel:—The enclosed report of Lieutenant Scott, which I have the honor to submit, fully confirms the high estimate I had formed of Mr. Cochrane's gun, from the experiments instituted by me on Saturday, in conformity with your instructions.

Under my supervision the gun was loaded and discharged 500 times—the results proving its great accuracy, safety, and facility of loading and firing. My attention was particularly called to the apparent danger of ignition, from the contiguity of the charges. But from the experiments freely made by Mr. Cochrane, by placing loose powder in the chambers over the balls, and around the caps, I am convinced that my apprehensions were unfounded.

I do not hesitate to say, that with my closest scrutiny, I could not discover any objections to Mr. Cochrane's invention. It will be well to remark, that the gun was discharged in all, one thousand and eight times, without being cleaned and without missing fire.

The flattened balls accompanying this were fired through an inch plank against a brick wall at a distance of 150 yards.

I am, sir, very respectfully,
Your obedient servant,
George D. Ramsay,
Captain of Ordnance.

Colonel Bomford,
U. S. Ordnance.

The piece was fired this morning 500 times, (making in all 1,008.) It is in the same order it was previous to discharging it. Water was put into the chambers, and left for one hour and ten minutes. Afterwards it was discharged in the same manner as the others, without the least difficulty. It fires with great accuracy. I tried it with Hall's carbine, both being loaded; the firing was commenced, and during the discharging of the nine chambers, the carbine could only be loaded once. Not a cap missed. At the distance of 150 yards—charge, 10 grains of powder, the ball perforated an inch pine board, and was flattened against the brick wall. For simplicity it surpasses any thing of the kind I have yet seen, and as a fire arm, its qualities can be summed up in three words. It is perfect.

John B. Scott,
First Lieut. Artillery.

Washington Arsenal,
Nov. 20th, 1836.

Mr. Cochrane fired the nine chambers in six seconds.

John B. Scott,
First Lieut. Artillery.

From the Northampton Courier.

ELEGANT CHINESE PAINTINGS.

A gentleman who has long been engaged in the Canton trade, often visited that city, and had opportunities to become acquainted with the manners and habits of Chinese, has lately visited Northampton to become acquainted with the state of the silk culture here, from whose scrutinising observations made in China, much valuable information has been obtained. The same gentleman loaned the subscriber a volume of splendid Chinese Paintings, which confirms our practice and culture of the Chinese mulberry as correct and proper. These paintings represent the men, women and children in their national costume, at work—commencing with gathering the mulberry seed, cleaning the same, and then preparing the ground, sowing the seed, transplanting the young seedlings, gathering the foliage, feeding the worms, heading or cutting down the plants to 2 or 4 inches above the ground, as *we do*, and every process of their management, to making up of the silk into skeins, as *we import it*, and the further process of winding the silk upon spools.

There are 28 plates, illustrating the different processes. The out door men laborers are dressed in plain loose frocks and trowsers, descending to the knees; some of the men with bare feet and legs; others with sandals and wooden shoes, adapted to their respective work of getting the plants in forwardness for feeding the worms.—The women, boys and girls are employed in gathering leaves, feeding the worms, reeling silk, &c. Some of the ladies have elegant *loose* dresses, of various brilliant colors, ornamented with wide embroidery around the neck and sleeves. The upper dress is loose, of gay colors, the sleeves large, and extend a little above the elbow; and all the females are dressed in *pantalettes* of various colors, each in contact with the upper dress—the countenance fair, delicate and intelligent, eyes downcast; most of the females have small feet and gay sandals; the hair neatly dressed, ornamented, and all wear bracelets above the wrists. As the original plates can be seen by only a few, it may be desirable to hear some description of each print, for the gratification of those who take some interest in the culture of silk.

The plates make it evident, that although the Chinese sow the mulberry seed *broad cast* as we do small grain, yet they do not let it long grow in that state, nor do they cut it off (as we do grass) for feeding worms, but they transplant it into settings or hills, like our Indian corn, and that it does not grow more than three or four feet in height, and is cut down every year to keep it in a shrubby state. Experience has convinced us that this procedure of taking off the tops to 2 to 4 or even 6 inches above the root, every autumn, and covering the stump with earth, is the best way to secure the Chinese mulberry against the severity of winter, and is also a sure method to multiply the number of trees and increase the quantity of foliage.

Some people have thought that the Chinese mulberry seed grew on trees of some height, like white mulberry (and on this account have been desirous of procuring large trees); so far as we have had experience, this is not the fact with the Canton mulberry, although it may be true of Manilla and other varieties.

The first plate represents the seed grow-

ing very near the ground, like the Canton mulberry, from the seed of which I imported and sowed in 1834. In 1835, one of the seedling trees being laid down, the layer sprouts produced full size mulberries, too late, however, for ripening. The same root this year, 1836, grew branches which were again laid down, and the layer sprouts, when 4 or 5 inches high, again had mulberries formed, which ripened in season for sowing, from which seed I have two small trees carefully preserved, to ascertain its character. After the seed had been gathered, the *same layer sprouts* again, with others, had plump mulberries formed, but were destroyed by birds or fowls. Both crops were formed only a little above the root or foot of the layer tree, and some of them rested on the ground. I have neither seen or heard of any other of the Canton plants producing seed; but what has already occurred here, in the formation and product of seed, together with the representation and the gathering of the seed and the description of the leaf in the Chinese paintings, confirms the opinion, that the *Canton Mulberry*, so called here, is the same as used in China for feeding worms. Experiments have been made this year in feeding worms with the Black, White, Manilla, and the Canton Multicaulis, and the worms evidently preferred the Canton to either of the others. If any one is possessed of the evidence that the Manilla Multicaulis is ever used in China for feeding worms, he is requested to make it known. The first notice we have of it is, that it was cultivated at Manilla as a *tree of ornament*. After being introduced into France, it was found that the silk worm would feed upon the Manilla, as they had done upon the white or black mulberry, in Europe or America. Last year a Manilla multicaulis of 6 or 7 feet in height produced a few seed, which grew several feet from the ground. The seed was planted and two or three of them vegetated and were preserved through the winter, and set out in spring, 1836, and grew about 2½ feet.—The leaves were in shape and size very different from the original tree, and the leaves not more than one quarter as large as the leaves of the parent stock. It may be noted, that a number of old white mulberry trees which have annually borne seed twenty or thirty years, grew within about forty ro[ds] of the Manilla multicaulis; the Multicaulis was exposed last winter on the southerly side of a building, and this year the dead tops have been taken off, but has not produced any seed, or even borne a blossom. D. STEBBINS.

We have watched the progress of Mr. Holcomb, with increasing pleasure. His instruments have undergone the most rigorous test, in comparison with others of European manufacture; the results have in all instances been highly favorable to Mr. Holcomb.

The method of mounting is described as peculiarly simple and happy.

We wish him all manner of success.

REPORT ON MR. HOLCOMB'S REFLECTING TELESCOPE.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, to whom was referred for examination a Reflecting Telescope, made by Mr. Amasa Holcomb, of Southwick, Massachusetts, for the Newark College, Delaware, REPORT:—

That the following description of the instrument is given by Mr. Holcomb: "The telescope submitted to the examination of the Committee is a Reflector on the plan of Sir Wm. Herchel. It is fourteen feet long and ten inches in diameter. It has six different magnifying powers from 70 to 1000."

The Committee proceeded to the examination of the telescope on the evening of the 17th instant. A trial was made of its various powers from 70 to 1000, upon the moon, upon several nebulæ, clusters, and double stars, and they beg leave to report as the r sult of that examination, that the instrument possesses all the superiority over any reflectors hitherto submitted by Mr. Holcomb, which its increased length and aperture would lead us to expect, and that it has every attribute of excellence which the best optical skill could give to an instrument of these dimensions. The Committee cannot forbear again commenting upon the excellence and simplicity of Mr. Holcomb's method of mounting the instrument, which notwithstanding its size, is portable, with all its mounting, by a single person.

The object is easily followed by the rack work and the inconvenience, from the motion of carriages at short distances from it, was not found to be greater with a power of 1000, than with a power of 100, in the common mode of mounting achromatics, moveable by rack work on an upright stand.

The short time allowed the Committee prevented them from making observations on close double stars, for the purpose of determining the limit of its optical capacity. All of which is respectfully submitted.

By order of the committee.

WILLIAM HAMILTON, *Actuary*.

Oct. 13, 1836.

Agriculture, &c.

From the Farmers' Cabinet—Philadelphia.

[We bespeak for the following communication the careful and candid consideration of our readers, as the subject is one of great moment. The author, Mr. RONALDSON, is well known as one of our most respectable and enterprising citizens. He is the same gentleman who succeeded in directing the attention of our citizens to the culture, of the Beet Root for the fabrication of sugar; (see Cabinet No. 4. vol. 1.) and his object in this enterprise, like that just referred to, is to benefit the community without any reference to pecuniary gain.]

TO THE FARMERS OF THE UNITED STATES.

That care and skill have improved fruit trees, vegetables, and our domestic animals are facts known to all classes of husbandmen, and the advantages of rearing cattle from the best breeds is now well understood all over America. The advantages that accompany procuring the best grain for seed is as yet but partially understood and very little attended to.

Repeatedly sowing some kinds of grain on the same land, is in many cases followed by an evident decline in the quality; still this, it must be observed is not a uniform consequence; there are many and well authenticated instances where the change to a new soil and climate is accompanied with a deterioration, and in others as great an improvement has taken place.

As it is known that grains, &c., in some climates and soils degenerate to a minimum, sometimes in quality, in others in quantity, and frequently in both; a practice calculated to remedy these disadvantages is of great importance to the agriculture of the United States. On the present occasion it is our object to point out what may be done here, by showing what is done in other countries, and under circumstances far less favorable to the husbandmen, or to the operations of husbandry, than in America. In Scotland, for example, the climate is cold, wet and stormy; yet by care and industry crops are produced, remarkable both for quantity and quality.—There the greatest attention is paid to the changing of seed. The low countries procure their seed potatoes from the high districts at great expense of money and labor, The whole oat crop of some districts is bought for, and sowed for seed; this is the case with a portion of country called Blainsley, that lays south of Soutria Hill. In no country has the culture of clover been more beneficial, or attended with better success than in Scotland, yet the climate is so unfavorable to the ripening of clover seed, that nearly the whole has to be procured from England or Holland. The farmers of that country frequently change the wheat seed, and procure the best that is to be had, paying very little respect to price, and the greatest attention to quality.

It would appear that the principle by which the Scotch farmers are guided to the results they obtain, is to select their seed from those districts where it is grown in the greatest perfection, from the climate and soil being best adapted to the plant. Thus they choose seed oats and potatoes of their own growing, these being plants best adapted to mountainous, cool and moist regions; and clover and wheat seed from England and Holland, which are comparatively low, warm and dry, and better adapted to their production.

It is well known that in America, our oats are not good, they have little kernel or meal; and the quality of our Barley is not what it ought to be.

It is to the following circumstance the present address owes its existence.

In the year 1833, a well informed practical farmer visited Pennsylvania with the object of seeing as much of our practice of farming, soil and climate, as a short stay here would permit. On his return to Scotland, he procured and sent to his friends in Philadelphia some Angus Oats, Hopeton Oats, Barley, Wheat and Rye-grass; the cask containing the seeds miscarried and did not arrive here until the fall of 1835.

Some of each kind of these seeds have been sown here; the wheat come up very thin; it is presumed the seed suffered from the long voyage. On the 18th April, 1836 the Oats and Barley were sown on rather poor but fresh loam. It is true, the season has been cool, damp and favorable to these grains, still their success has surpassed any thing that could have been calculated on.—The Barley and both kinds of Oats are of superior growth in strength of stem, as well as thickness on the ground; they would lose nothing in a comparison with the crops of Oats or Barley of any country, and are likely to suffer loss from excessive growth, causing them to lodge. One kind of Oats commenced shooting into ear about the 1st of July, and the other about the tenth; the marks which were placed to distinguish the one from the other had got displaced, and this accident prevents knowing whether it is the Angus or Hopeton Oaats that first puts out the ear.

Now let me inquire into the economy of farmers adopting the practice of annually supplying themselves with new seed grain and found our calculations on a farm where about 20 bushels of Oats are sown each year; the farmer of such a piece of land could supply himself with an annual change of his Oat seed in the following manner. It is presumed that each bushel of the imported Oats he sows, will produce 10 bushels; then by annually buying two bushels, their produce would yield the 20 bushels required for sowing on his farm. Suppose the price of the imported Oats to be $1,50 cents a bushel, the two would cost $3—and the price of country oats was 50 cents, the two would cost $1.—The expense of changing the seed would be per annum $2. The estimate is not given as a matter of accuracy, but as a formula by which every one can make his own calculations.

In procuring a change of seed, there are other points necessary to be attended to besides the quality of the grain, and one of these is to guard against bringing with it the weeds incident to the country or fields where it has grown: for want of attention to this, there are farmers who have introduced into their fields, along with the clover they sowed, the narrow leafed plantain, which arrogates to itself a place which would otherwise be occupied by clover, to the detriment of his hay both in quality and quantity, and that more serious curse, Bensalem clover or white dailsy; all this is the result of their not taking sufficient care in the selection of their clover seed.

In the British Islands, their Oats and Barley fields at some seasons, are entirely yellow; nothing is to be seen save the bloom of the wild mustard, in some districts called Sheldrieks; and this is not the only one of this class of yellow flowering spring weed,—in Wheat they have what is here called Cockle, the seed of which is detrimental to superfine flower; all these should be guarded against by the European agent; and to prevent mischief, the seed after it arrives here should be sifted in a sieve that will separate the weeds from the pure grain, always collecting and burning the obnoxious seeds.

In proof of the sincerity, that the writer entertains a favorable opinion of this system, he will import for next season's sowing, one hundred bushels of selected Barley, one hundred of each variety of Oats, already spoken of, and, it being too late for receiving wheat for the ensuing sowing, measures will be taken for bringing to this country wheat for the following year.

Such persons as take an interest in renewing their seed grain, are invited to apply to the subscriber who will furnish them with any quantity, not less than a bushel. The cost will be governed by the price abroad and the expense of bringing the articles here The transaction will be attended with considerable trouble, and the limited extent of the operation will satisfy all who reflect, that there are other motives for undertaking the business than that of making money.

Letters post paid, will be duly attended to, addressed to

JAMES RONALDSON.

No. 200 south Ninth-street, Philadelphia.

P. S. Editors of newspapers who take an interest in the advancement af our agriculture are requested to insert the preceding in their papers.

From the Chicago (Illinois) American.

THE WESTERN "BARRENS."

Barrens are a species of country of a mixed character, uniting forest and prairie. They are covered with scattering oaks, rough and stunted in their appearance, interspersed with patches of hazel, brushwood, and tough grass. They appear to be the result of the contest which the fire is periodically continuing with the timber. The appearance of this description of country led the early settlers of the State to suppose that the scantiness of timber was owing to the poverty of the soil; and hence the title, thus ignorantly given, and calculated to convey erroneous notions to our eastern farmers became of universal application to this extensive tract of country. It is ascertained, however, that these *barrens* embrace as productive a soil as can be found in the State—healthy—more rolling than the prairies, and abounding with that important requisite to desirable farms, good springs. The fire visits these barrens in the fall, but owing to the insufficiency of the fuel, is not able to destroy, entirely, the timber. The farmer may settle, without hesitation or fear, in any part of this species of land, where he can find timber sufficient for his present purposes and wants, for the soil is supposed to be better adapted to all the interests of agriculture, and the vicissitudes of the season, than the deeper and richer mould of bottom and prairie land. Where the fire is prevented from the ravages, (as it easily can be by the occupant of the soil,) heavy timber springs up with a rapidity which would be incredible to the northern emigrant. High insulated *bluffs*, of a conical form, and exhibiting the appearance of connected ridges, rise up from the bottoms along the rivers which meander and fertilize them; they are from one to three hundred feet in height. *Knobs* of land, stony, and often rocky, at their summits, are found along the rivers, in some sections of the State, separated by deep ravines. The prairies are often intersected by ravines leading down to the streams. Deep sink holes, which serve to drain off the waters, are found in some parts, and prove that the substance is secondary limestone, abounding in subteraneous cavities. Very little that is denominated in the eastern States *stony* ground is found in this State. There are quarries of stone in the bluffs, in the banks of the streams, and in the ravines. In the vicinity of Juliet, and many other promising villages, an abundance of stone can be procured, admirably adapted to the purposes of building, uniting durability with great beauty and warmth. *Timber*, were it *equally* distributed in this State, would be adequate to the necessities of the settlers. Its apparent scarcity, where the prairie prevails, is not to be so great an obstacle to settlement as has been generally imagined. Substitutes have been found for many of the purposes to which timber is generally applied: and the rapidity with which prairie, under the hand of care and cultivation, becomes converted into forest of timber, affords a sure guaranty for the future.

The kinds of timber most abundant in the State are oaks of the various species, black and white walnut, ash of the several varieties, elm, sugar maple, honey, locust, hackberry, linden, hickory, cotton-wood, pecan, mulberry, buck eye, sycamore, cherry, box, elder, sassafras, and persimmon. In the southern and eastern parts of the State, yellow poplar and beech may be found. Near the Ohio are cypress trees, and in several counties clumps of yellow pine and cedar. On the Calumet, near the south end of Lake Michigan, is a forest of small pine. The underwood growth consists principally of redbud, pawpaw, sumach, plum, crab-apple, grape-vine, dog-wood, spice bush, green-brier, hazel, etc. The trees in this State are very luxuriant in their growth, and are frequently found of a stupendous size, particularly the cotton-wood and sycamore, on the alluvial soil of the rivers.

From the United States Gazette.

BEET SUGAR.

To J. R. Chandler, Esq.—Sir: Perceiving by the many applications made to me for information respecting beet sugar, that not only a very general interest prevails on the subject, but also some very erroneous views, I take leave, through your wide circulating paper, to publish a few of my ideas thereon, being the conclusion I have come to, after numerous experiments, as well as from information I have obtained from the most scientific French authorities.

1. An establishment will not clear its expense unless it be calculated to manufacture at least from two to five hundred pounds of sugar per day, so that the idea of individuals in this country manufacturing profitably for private consumption is preposterous; their sugar would stand them, including labor, a dollar per pound.

2. The greatest advantage will be derived from steam power, which will accomplish three objects at least, viz.: first, the rasping of the beets; secondly, the reducing of the liquor "in vacuo;" and thirdly, the boiling of the syrup without the risk of burning it, of which the beet syrup is in much greater danger than the cane syrup; the proof of the former being some degrees higher than that of the latter.

3. The juice of the beet decomposes in the summer in this country in less than two hours. I have known the visced fermentation commence in twenty minutes.—When this once occurs, sugar can never be obtained from it: in a large establishment in this country, it must be prevented by chemical agents.

4. Not only must the acid be neutralized, but the mucilage must be chemically coagulated, the cerate decomposed, and the malate of lime extracted, or the crystalizing will be rendered extremely difficult, if not totally impracticable in many cases, and good sugar will never be made.

5. I am persuaded the refining process can be profitably united to the manufacture of the raw sugar.

6. The profits are incredibly increased in proportion to the extensiveness of the establishment, but no one ought to engage in this business who has not *mind*, as well as a capital.

7. One half of the manufacturing expenses will be saved by a scientific arrangement of the apparatus, so as to dispense with, as much as possible, manual labor.

8. Understanding from various farmers within from ten to twenty miles of this city, that they are perfectly content with about twenty or twenty-five dollars per acre's produce, and as each acre ought to yield on an average 40,000 lbs. of beets, which will produce 2400 lbs. of sugar, I have made the following estimate. Supposing the apparatus to be capable of working only about 100 lbs. of sugar per day, it would take twenty-four days to manufacture 2400 lbs. of sugar.

EXPENSES.

One acre of beets (40,000 lbs.)	$25 00
Two men for 24 days,	48 00
Two boys for do.	22 00
Fire and rent, &c.	40 00
Total,	$135 00

RECEIPTS.

Quantity of sugar from the acre of beets, would be 2400 lbs. which at ten cents per lb. would be	$240 00
Beet cake and molasses, &c.	20 00
Total,	$260 00
Expenses,	135 00
Profits,	$125 00

By this general statement it will be perceived that there will be nearly cent. per cent. profit; but then the interest of the capital sunk in the purchase of machinery is not included. On the other hand, the two men could work twice or four times as much, and the apparatus for the increased quantity cost very little more.

If you think these remarks worth publishing, you are welcome to them, and I am, sir, your very obedient servant.

W. W. SLEIGH.

Hamilton Village, cor. of Cedar Lane.
September 30, 1836.

From the Maine Farmer.

ANTI-CATTLE CHOKER.—Our worthy friend Paine Wingate, has left in our office an instrument with the above title. It is what is *vulgarly* called a tarred rope, and we should call it a very useful and efficient instrument. There should be one in every neighborhood, for it is a fact that cattle are liable to get choked, the world over, and being choked ought to be relieved by the aid of man. But why is a tarred rope better for this purpose than a *cordwood stick?* For various reasons. It is sufficiently stiff to effect the business nine times in ten, and at the same time has that kind of elasticity which will accommodate itself to a position or passage not entirely straight.

In order to make one, take a piece of tarred rope, say one inch in diameter, and six feet long. Untwist it three or four inches at the end and leave a tuft of it loose in order to make a kind of ball or swablike end, then wind round it a piece of canvass or cloth in order to make the surface smooth, and over this roll or wind some spun yarn tightly and smoothly. In cold weather this rope should be warmed a little before using, and in warm weather it is well to wet it. When about to use it the tuft at the end should be tarred back, and this will make a soft but sufficiently solid bulb to fill the gullet when pushed down.

SEED HOD.—The above gentleman has also deposited for a short time, a vessel called a lift or seed hod, an implement well known in some places, but not seen in this vicinity very often. It is simple in its form and construction, and its use is to carry seed and other things when sowing. It is of an oval shape with sides bent in somewhat like the body of a fiddle. On one side is a hook and on the other an upright handle. When in use it has a band put over the shoulder and hooked into the hook; this brings it up snug to the left side of the body, and the left hand takes hold of the upright handle while the right hand is at liberty to scatter the seed. We hope some of our coopers will call and look at it, and "*get about*" making some of them for this market.

From the Cultivator.

CULTURE OF COTTON.

J. BUEL, DEAR SIR—Having recently become a subscriber to your very valuable publication, the "Cultivator," and deeming it highly incumbent upon each subscriber, to contribute his "quota" of agricultural information towards promoting the end of your publication, I send you the following as the most generally adopted mode of cultivating cotton in North Carolina. The land is "bedded," or broken up as soon after picking out as possible, (the earlier the better) with a plough drawn by two horses. The beds are from 3½ to 4 feet wide. After the earth has settled, and become somewhat indurated through the influence of rains and the sun, a double horse harrow is applied to the ridges, succeded immediately by a smaller one, which reduces the land to a perfect state of pulverization. Next follows the "marker," drawn by one horse, which makes a small trench on the middle of the ridge, in which the seed are strewn by hand. The seeds are rubbed, previous to planting, in ashes and water, which process embodies three distinct advantages. 1. It enables each seed to assume a separate position when sown. 2. It acts as a stimulant upon the plant—and 3d. It checks the ravages of that destructive insect, the "cut-worm." The seeds are covered very lightly, say from 1 to 1½ inches, by means of a small harrow of 6 or 8 teeth. Next in order is the process of "shaving," which consists in applying the weeding-hoe to each side of the cotton on the ridge; after which the bar of a single-horse plough is run at such a distance from the cotton as will not disturb its lateral roots, by which, all the grass that is taken from the vicinity of the plant is entirely covered in the middle of the alley or water-furrow. About 8 or 10 days subsequent to this, (the grass being completely dead) a triangular harrow is run upon the list formed by the two furrows thrown *from* the cotton, and two furrows thrown *to* the cotton, by means of a small plough. I forgot to state above, that immediately after "shaving and barring," the cotton is chopped through by the weeding-hoe, at intervals of 8 or 10 inches, and the most promising and luxuriant stalks selected, leaving from one to two in a hill. Next follows the "dirting process," as it is termed, which by some is done with the hand, by others with the hoe. The former mode is too laborious, and far from being the most *effectual* and *expeditious*.—When the cotton has attained a considerable height, the bar is run very *shallow*, and the plough is run *deep*, when the mould-board is turned to the cotton, to prevent "*firing*." The cultivation then is perfected by alternately "barring" and turning the mould-board to the cotton, immediately followed by the hoes, for the purpose of more effectually dirting the cotton, and uncovering those branches which the mould-board may have covered. Some of my neighbors "top" their cotton; they think it causes the plant to expand more, and form more pods. I should like to see in your next number a description of the "Cultivator," which you recommend to your readers, as entirely superceding the necessity of the plough and hoe in the cultivation of Indian corn, together with a detail of the best method of cultivating that article.

With unfeigned respect,

I am yours,

AGRICOLA.

NORTH-CAROLINA, 1st Nov. 1836.

From the Northampton Courier.

PEA-NUT CACOONS FROM ITALY.

We have seen some cacoons of a superior quality, raised in Northampton the present year, being the product of Italian eggs, 240 of which weighed one pound—one peck of which were reeled at Northampton Silk factory, produced seven ounces of silk, of superior fibre and most brilliant lustre, being at the rate of 1¾ pounds of silk to a bushel. The cacoons were long, firm, and in the shape of a Pea-nut, having a depression or stricture mid-way of the cacoon. They were small, firm and heavy, the thread of unusual length, so much so that the reeler almost despaired of finding an end.

We have the impression that the worms were fed on the Canton mulberry. We understand the demand for, and sales of mulberry trees and cuttings this fall is unprecedented. We approve of the removal of the trees to the place of destination, before

winter, that they may be ready for setting next spring, and avoid exposure to the spring frosts and drying winds. Trees and cuttings should be set immediately after being removed from the place of deposite.

The present prospect is, that the silk growing business will be prosecuted with more energy the next, than in any preceding year; an impulse has been given, that cannot be easily checked or paralysed. It is hoped that the few individuals who have thoroughly investigated and tested the mulberry culture, will not relax their exertions to acquire and communicate practical and useful information on the subject of silk culture, but that they will persevere until a mulberry patch shall be planted, and found as common about every mansion in the country village and cabin of the forest, as is the currant bush in our gardens.

It has been proved by actual experiment that worms may be fed on the foliage of the Chinese mulberry the same year the plants or cuttings are set out, with evident benefit to the plant, producing more foliage, and may be plucked the same season, always leaving the leading shoots untouched until the last collection of the foliage, and then take off the leading shoots to facilitate and promote the formation of wood.

From the Farmers' Register.

COMPARATIVE VALUE OF APPLES, TO FEED STOCK, AND FOR SALE, AND THEIR PRODUCTS, CIDER AND BRANDY.

NOVEMBER 4, 1836.

During the two last summers and falls, my duties called me into the apple regions of the north. The following facts were obtained, in reference to the subject of apple cider and brandy.

1. Cider drinkers are peculiarly subject to rheumatism, to inflamed eyelids, to headache, bleeding at the nose, to sores and ulcers, difficult and tedious to cure, to affections of the stomach and bowels, and to premature trembling of the hand and head.

2. Cider drunkards are the most brutish and cruel of the unhappy tribe of inebriates.

3. An old orchard and a distillery, are almost invariably indices of widows, orphans, poverty and drunkenness.

4. There is a great loss of money in making either cider or brandy. Good eating apples are worth on an average 25 cents a bushel. Eight bushels of apples make a barrel of cider, and twelve barrels of cider make one barrel of brandy. Brandy at 50 cents per gallon would give about 15 cents per bushel for the apples. The loss is ten cents per bushel. This, on an orchard of one hundred trees, in ten years, would be over one thousand dollars! No allowance is made for capital and labor connected with distilling. Take these into consideration, and the loss is much greater.

5. It costs no more to raise good apples suitable for market, than to raise apples only suitable for distilling. Very often apples are worth one dollar per bushel, and then the loss is immense, by turning them into brandy.—I am told that in Mobile, apples sell now fo ten dollars a barrel.

6. Engrafting and budding will change the character of an orchard, and more than compensate for the time and amount lost in producing the change, in ten years.

7. Apples make most excellent food for horses. Several physicians of extensive practice, in Connecticut and Massachusetts feed their horses on apples and hay. I have never seen fatter horses—more sleek and spirited. The hair is much more lively, and requires less grooming than that of horses fed on grain. Mr. Norton of Farmington, Connecticut, has about the finest pair of hosres I have seen. They are fed mainly on apples and hay. They travel very fast and seem to have both wind and bottom. It is proper, however, to remark, that not as much grain is given to horses at the north as is customary at the south. One thing is worth noticing—horses fed on apples do not eat as much hay as when they are fed on grain. Very sour raw apples injure the teeth of horses; but when boiled they do not.—The rule of feeding is to commence with a small quantity and gradually increase to a bushel a day, for one horse.

8. Apples are most excellent food for beeves. The fattest beef I have seen, was made so on sweet apples.

9. Nothing will fatten mutton quicker than apples. It is necessary, or best, to cut up the apples when fed to sheep.

10. Hogs care nothing for corn if they can get apples: if sweet, the apples may be given without boiling: if sour, they must be boiled. Mixed with corn meal the flesh is firmer.

11. Apples increase the quantity and quality of milk. At first there was a prejudice against giving apples to milch cows; because it was thought they diminished or dried up the milk. It is true, that a *gorge* of apples, or any other green food, will cause a fever, and dry up the milk; but given in proper quantities, the effect is quite different.

12. Cattle and hogs are purchased and fattened on apples, and sold at a fine profit, when to fatten them on corn would ensure a loss.

13. Sweet apples and good eating apples are to be preferred as food for horses, sheep, and cows: also for hogs; though some recommend a mixture of sour and sweet for hogs.

If these remarks shall induce any one to test their correctness, by making a fair experiment, the object of my writing them will be fully answered.

THOMAS P. HUNT.

IMPROVEMENT OF COFFEE.—Many things have been proposed as substitutes for Coffee. Rye, and other grain, beans, peas, chicory, beets dried, &c. have in turn been proposed and their qualities valued. For some years past there has been sold in Paris, under the pompous name of *Coffee flowers imported from America*, a dark powder, a pinch of which really communicates to coffee a very agreeable aroma and allows of a little diminution of the quantity. I have examined this powder, and find it to be only sugar caromelized, or rather, almost completely chared. A small quantity of caromel produces precisely the same effect.

Chesnuts deprived of the envelope, cut into fragments of the size of coffee grains, dried and mixed with real coffee, roasted and ground together, are the best substitutes I have found. I have used it for thirty years. Some mix them in equal proportions.—[Bodin De La Pichonnerie.]

SUPPOSED NEW PLANET.—On the 15th of February, M. Arago read to the Academy of Sciences an extract of a letter from M. Cacciatore, Astronomer at Palermo, to Capt. Smyth. The Sicilian Astronomer announces in this letter, that he saw in the month of May, 1835, near the 17th star, of the 12th hour of the Catalogue of Piazzi, (right ascension 181° 30′, and southern declination 4° 45′,) another star of the 7th or 8th magnitude. Having taken the distance of the two stars, he found that in three days the distance had increased.—The motion of the star was about ten seconds of right ascension on the eastern side, and a minute or a little less towards the north. In consequence of the state of the weather, he could not succeed in tracing it. From the slowness of its motion, he conceives it must be situated beyond Herschel.—[Bib. Univ. Jan. 1836—Rec. Gen. Sc. June, 1836.]

CIRCULAR.

PHILADELPHIA, November, 1836.

SIR—I take the liberty of informing you, that, within a few months past, I have perfected several very valuable improvements in the Locomotive Steam Engine, which have given better results than have ever been obtained by the best Locomotives in Europe or America, and respectfully call your attention to the following extracts, viz.:

From the Railroad Journal, New-York, July 16, 1836.

"LOCOMOTIVE ENGINES ON INCLINED PLANES.—The Locomotive Steam Engine, 'GEORGE WASHINGTON,' made for the State of Pennsylvania, by William Norris, of Philadelphia, was placed on the Columbia and Philadelphia Railroad, on Saturday afternoon, the 9th instant. On the following morning, her powers were tested, in ascending the Inclined Plane near Philadelphia. This plane is 2800 feet in length, with an ascent in that distance of 196 feet, or at the rate of 369 feet to the mile, or 7 feet rise in 100 feet, or 1 foot in 14. The weight of the Engine is 14,930 lbs. only. The load attached weighed 19,200 lbs. including the weight of 24 persons who were on the Tender and Burthen Car. The Engine started immediately at the base, without a running start, and dragged up said load of 19,200 lbs. the above distance of 2800 feet, in the space of two minutes and one second, or at the rate of 15½ miles per hour; pressure on the boiler a fraction under 60 lbs. to the square inch. The Engine then descended the plane with the same load at various speed, frequently stopping to test the security, the valves being reversed, or set for going ahead; and when it was desired to stop altogether, the steam was let on very slowly, which brought her to a dead stand for a second or two,

when she would immediately start up the grade. In this way, stopping and starting at pleasure, the time occupied in descending the 2800 feet, was from 12 to 15 minutes, thus testing the perfect security of her performance on the plane. She again ascended the plane with the same load and took her place on the road, the same morning, ready for use."

From the Pennsylvania Inquirer, July 21.

"IMPORTANT IMPROVEMENT.—THE GEORGE WASHINGTON LOCOMOTIVE.—We invite attention to the following. It notices an improvement of a most important character. A friend, who enjoyed the pleasure of an excursion in a car drawn by this new locomotive, speaks of her beauty and power in the most enthusiastic terms. We trust that some correspondent, acquainted with the subject, who has had an opportunity of examining the GEORGE WASHINGTON, will furnish a detailed account of this new and important improvement.

"FROM THE UNITED STATES GAZETTE.—'Mr. Chandler—The undesigned was yesterday one of a party of about fifty gentlemen, who met at the invitation of Mr. William Norris, to be witnesses to the success of an experiment, which, as the consequences will be of almost incalculable benefit to the public in general, I will endeavor to give you an account of.

"'We assembled at 4 o'clock, A. M., and proceeded to the foot of the inclined plane on the Columbia Railroad, near the Schuylkill, where we found Mr. Norris's new Locomotive Engine, the 'GEORGE WASHINGTON,' in waiting for us, to test her powers in taking us up the plane without assistance from the stationary power.

"'We started, ascending most majestically the whole distance of 935 yards in 2 minutes and 23 seconds, being at the rate of a mile in 4½ minutes, thereby showing to the world that, thanks to Mr. Norris, the enormous expense of stationary engines on Railroads was no longer necessary.

"'We were unable to ascertain the exact weight of two of the passenger cars, but estimating three tons each, would make our whole weight fourteen tons, and that calculation is believed to be below the mark; the rise in the plane is 7 feet in every 100 feet, or 1 foot in 14$\frac{2}{7}$ feet; and the greatest power that has ever been before attained, was, in England, to ascend without any extra weight, 1 foot in 60 feet, and in America, 1 foot in 42 feet. Very little reflection will convince every one of the great importance of Mr. Norris's recent discovery or improvement.

"'The company, amongst whom were several gentlemen of distinguiseed talents, Messrs. Campbell and Roberts, engineers, Mr. Ortlip, superintendent, Mr. Smith, commissioner, Messrs. Minor and Schaeffer, from New-York, Mr. Schwartz, from Paris, &c. &c., breakfasted at the Paoli, and proceeded to Lancaster to dine and celebrate the event.

"'After dinner, it being understood that his Excellency, Governor Ritner, was in the town of Lancaster, and his engagements not allowing of coming all the way to Philadelphia, he accepted an invitation from Mr. Norris, to take a short excursion on the road, for the purpose of seeing the powers of the engine; and judging by his manner and expressions, his gratification must have been more than ordinary.

"'We returned to the city about 8 o'clock in the evening, convinced of the success of our host, Mr. Norris, and having, in the language of one of our party, lived six days in one.'"

From the National Gazette, July 21.

"On Tuesday, the 19th instant, a Locomotive Engine, manufactured by Mr. William Norris, of this city, ascended the Inclined Plane on the Columbia Railroad, drawing with great ease her Tender, and two Passenger Cars, with 53 passengers. Any thing approaching this result has never been attained hitherto, either in England or this country.

"The length of the plane is 2800 feet, the grade 369 feet to the mile, or an ascent of 196 feet in the length of the plane.—The experiment was tried at a very early hour in the morning, while the rails were wet with dew, and of course not in the most favorable condition. The time occupied in passing from the level at the base, to that at the top of the plane, was 2 minutes and 24 seconds. The experiment was witnessed by many scientific gentlemen, among whom the opinion was general, that the improvement of Mr. Norris promises a most important reduction in the expense hitherto attending the transportation on inclined planes. The weight of the Engine with water, 14,930 lbs.; load dragged on the plane, including tender and fuel, cars and passengers, 31,270 lbs. Pressure under 80 lbs. to square inch. It is remarkable that the Engine was blowing off, on her arrival at the top, having acquired speed and power during the ascent."

From the Railroad Journal, New-York, July 30

"EXCURSION TO PHILADELPHIA, AND REMARKABLE PERFORMANCE OF THE LOCOMOTIVE 'GEORGE WASHINGTON.'—In pursuance of our request, Mr. Norris made arrangements with the commissioners of the Columbia Railroad, for the use of his locomotive. Tuesday, July the 19th, was the day appointed for the trial. We left here on Monday afternoon, at 4 o'clock, accompanied by Mr. George N. Miner, of this city, Mr. Theodore Schwartz, of Paris, and Messrs. Elliot and Betts, of Alabama. Mr. Schwartz, who was to sail for Europe the next day, gladly made the trip, with a view to carry home his own testimony as an eye witness. Our journey over the Camden and Amboy, and Trenton and Philadelphia Railroads was highly interesting, and the conversation of that evening will long be remembered with pleasure. We arrived at Philadelphia about midnight and after sundry mistakes and mischances succeeded in obtaining some repose. On Tuesday morning, two cars, drawn by horses, set out with a party of upwards of forty. We arrived at the foot of the inclined plane before 6 o'clock, while the rails were yet quite wet with dew. On our arrival, it was found that, owing to accident or design, while the fire was burning, the water had been blown out of the boiler so as to endanger the tubes. The result was a leakage of some consequence during the day. The Engine started at the foot of the plane and on the plane. After proceeding a few feet, the wheels were found to slip, and the Engine returned. It was said that the rails were found to have been *oiled* at this place; a small quantity of sand was strown over the spot, and the Engine again proceeded. She regularly and steadily gained speed as she advanced to the very top, passing over the plane in 2 minutes and 24 seconds. The enthusiasm of feeling manifested cannot be described; so complete a triumph had never been obtained; the doubts that had been entertained by some, and the fears of others, were dispelled in an instant; the eager look that settled upon every one's face, gave way to that of confident success, while all present expressed their gratification in loud and repeated cheers.

"The length of the plane is 2800 feet; the grade 369 feet to the mile, or 1 foot rise in 14.3 feet, which is a much steeper grade than the planes on the Mohawk and Hudson Railroad, those being 1 foot in 18 feet, making an ascent of 196 feet in 2800 feet; weight of Engine with water, 14,930 lbs; load drawn up the plane, including weight of Tender with water and coal, two Passenger Cars and 53 passengers, 31,270 lbs.; pressure in the boiler, less than 80 lbs. to the square inch; time of running 2 minutes and 24 seconds. It is to be remembered that the rails were wet with dew. As to the oil, it was afterwards mentioned that bets were made with the workmen to a considerable amount, and those having been lost by the successful performance of the Engine on a former day, were now quadrupled, and to save themselves it is not unlikely that this means was provided to accelerate the descent rather than the ascent of the Engine. At the conclusion we shall give the dimensions of this Engine.

"The party again embarked, after examining the workshops, and proceeded to Paoli to breakfast, and thence to Lancaster, the Engine conveying at the same time a number of freight cars.

"The unfortunate location of this road is very evident; frequent and short curves are introduced so uniformly, that it would be supposed that such a location was to be preferred to a direct one. We arrived safely at Lancaster, and partook of an excellent dinner. A number of toasts were given, and conversation turned generally to the subject of internal improvement.—Mr. Roberts, engineer of the Harrisburg road, and Mr. H. R. Campbell, engineer of the Norristown, and of the West Philadelphia Railroad, were present; a number of the company were citizens of Philadelphia. After dinner, the company were presented to Governor Ritner, who was then in town. He afterwards accompanied the party some few miles from Lancaster and back again, when he left us, much gratified with his rapid journey. We returned in a large eight wheel car, a form that we much admired. The whole weight attached to the Engine (tender, &c. included,) must have been over 14 tons, if

not 15 tons. The time of running (exclusive of stoppage,) from Lancaster to the head of the Schuylkill inclined plane, was 3 hours and 11 minutes, being a distance of nearly 67 miles. This, it is to be remembered, was over a road having curvatures of less than 600 feet radius, up ascents of sometimes 45 feet per mile. On level and straight portions of the road, a velocity of 47 miles was attained. As the trip had already been protracted, this engine was obliged to leave at the head of the plane, on her return to Lancaster the same evening, and we descended by the rope.

"The following are the dimensions of the 'George Washington' Engine, of Mr. William Norris: Diameter of cylinders $10\frac{1}{4}$ inches; length of stroke $17\frac{5}{8}$ inches; number of tubes 78; outside diameter 2 inches; length 7 feet; diameter of driving wheels 4 feet; diameter of truck 30 inches. The Engine is six wheeled, having two driving wheels. Whole weight of Engine 14,930 lbs., actual weight on driving wheels 8700 lbs.

"It must be rembembered that there is no contrivance, as in some engines, for increasing the adhesion, by throwing the weight of the tender upon the engines, the axle being in front of the fire box, preventing any such arrangement. This engine, we are now informed, is making the regular trips, though a full load has not yet been obtained, on account of the scarcity of cars. The greatest load, as yet, drawn by it over the road, was 119 tons, gross weight, in 22 cars. The engineer confidently expects to draw 150 tons, at 12 or 15 miles per hour. She now usually works with 70 lbs. pressure of steam.

"The following is a list of the names of the gentlemen who were of the party:

"We, the subscribers, were present and witnessed the experiment and complete success of the 'George Washington,' in ascending the inclined plane, with a train of cars, containing 54 persons, besides engineers, firemen, &c., up the Columbia Railroad, at Philadelphia, on the 19th July. 1836.

Israel Morris,	Israel Roberts,
William Morrison,	S. Griffits Fisher,
A. M. Eastwick,	Joseph Harrison, Jun.
Franklin Peale,	R. M. Patterson,
T. E. Gubert,	Theodore Schwartz,
F. Blackburne,	E. Durand,
George R. Oat,	Townsend Smith,
Isaac P. Morris,	Frederick Vogel,
George Robbins,	Rufus Tyler,
A. W. Thompson,	Robert B. Davidson,
Frederick Gaul,	Alex'r. Krumbhaar,
William S. Otis,	D. K. Minor,
Alexander M'Clurg,	T. R. Peale,
P. B. Goddard, M.D.,	Octavius A. Norris,
J. Sidney Jones,	Joseph Oat,
Mahlon Ortlip,	James Poultney,
J. C. Cresson,	John E. Garrett,
George N. Miner,	George C. Schaeffer,
M. M. Reeve, M.D.,	H. R. Campbell,
Smith Jenkins,	Daniel Smith,
Thomas Moore,	

Walter Sims, Nashville, Tenn."

From the National Gazette, October 19.

"Inclined Planes.—The new Locomotive Steam Engine, 'Washington County Farmer,' built for the Commonwealth of Pennsylvania, by Mr. Norris, of this city, was placed on the Columbia Railroad, on Tuesday afternoon.

"The power of the Engine was then tested in ascending the Inclined Plane, which was performed to the complete satisfaction of numerous scientific gentlemen, invited expressly for the occasion.

"The plane is 2800 feet long, ascent in that distance 196 feet, equal to 369 feet to the mile, or 1 foot rise in $14\frac{3}{10}$ feet. Weight of Engine 18,170 lbs. with water included. Load drawn up, 30,116 lbs. including Tender with fuel and water, two large Passenger Cars and 39 passengers. Time of running, 3 minutes and 15 seconds, pressure in the boiler under 70 lbs.

"In descending the plane, the engineer repeatedly came to a dead stand from a great speed, and for some minutes played up and down the grade, thus proving most satisfactorily, the immense power of the Engine, and the perfect safety in its performance. The Engine is a master-piece of machinery and of beautiful exterior.

"The result here obtained has never been equalled by the best Engines in this country or Europe, excepting only similar performances of the 'George Washington,' an Engine by the same maker.

"The advantage of this great improvement in Locomotive Engines, is self evident; Railroads can be constructed at much less cost than heretofore, now that engines can be procured (of the usual weight) to perform on grades of 70 feet or even 100 feet rise in the mile."

From the Pennsylvania Inquirer, October 20.

"Inclined Planes—Mr. Norris's Engine.—We were much gratified on Tuesday, in witnessing the new Locomotive Steam Engine, built by Mr. Norris, of this city, for the commonwealth of Pennsylvania. It ascended the Inclined Plane in admirable style, and performed, to the entire satisfaction of a numerous party of scientific and other gentlemen who were present.

"In order that our readers may fully understand the nature of the ascent, we annex the following statistics of the Inclined Plane: length, 2800 feet; ascent, 196 feet.

"The above ascent is equal to 369 feet in a mile, and is a rise of 1 foot in $14\frac{3}{10}$ feet.

"The Engine, which is called the 'Washington County Farmer,' weighs 18,170 lbs. The load drawn up, including fuel and water, two large Passenger Cars, with 29 passengers, weighed 30,116 pounds The pressure in the boiler was under 70 lbs., and the ascent occupied 3 minutes and 15 seconds.

"In descending the plane, the engineer caused the Engine to stop suddenly several times, though previously going at great speed; and he twice moved the Engine up and down the Inclined Plane at pleasure; thus showing at once its great power and safety."

The "George Washington" has been since July 19th, performing daily over the Columbia Railroad, length 82 miles, with trains of from 18 to 25 cars, frequently making two trips per day, and in some instances three trips in 21 hours. The largest number of Cars, in one train, drawn by this Engine over the road, has been 35; 18 loaded, 3 half loaded, and 14 empty, making a load of 128 tons, which was performed in the usual running time of 12 miles per hour. The greatest load drawn by this Engine, has been 137 tons, in 27 cars.

The "Washington County Farmer" is now in successful operation; the first load drawn by her over the road, consisted of 28 loaded cars, weighing $141\frac{3}{4}$ tons.—The ascents in this road are very heavy; the least being 28 feet rise per mile, the majority 32 feet and the greatest 47 feet. This Engine, with the load of $141\frac{3}{4}$ tons, passed over the steep ascent of 47 feet per mile, which is upwards of three-fourths of a mile long, at the unprecedented rate of 22 *miles* per hour.

I have just completed extensive buildings and workshops, and am prepared to execute orders for Locomotive Engines, with despatch, all of which shall have my late improvements, and are warranted to be made of the best materials and superior workmanship.

William Norris, *Philadelphia.*

AN ENGINEER, regularly bred to the Profession in England, as well as to that of a Topographical Surveyor and Draughtsman, is desirous of obtaining employment in the United States. He has lately, for several years, been a salaried officer of one of the Principal Land Companies in the British Provinces, from the agents of which he can produce unexceptionable references.

On the subject of Railways he would feel particularly at home, having had much experience in their survey and formation while in England, and he confidently hopes that he would give satisfaction in all the other branches of the Profession.

Apply to the Office of this paper, 132 Nassau-st, or to Dr. Bartlett, at the office of the Albion, Cedar-street.

TO PLOUGHMEN.

THE Subscriber has upwards of three hundred acres of meadow land, in the sod, near the city of New York, that he wishes to have PLOUGHED, as early in the course of the next year as practicable. He wishes to CONTRACT for the whole, or any part. It must be ploughed four inches deep, the furrow must be turned completely over, so that the whole will lie flat—to plough a great part of this land advantageously and speedily, a double team of light cattle is preferable to one pair of heavy oxen. Provender for men and cattle can be procured on the premises. Apply by letter, directed to Anthony Dey, 63 Cedar street, corner Nassau-street, New-York, by mail or otherwise, stating terms etc

rr4t—12m—48 A. DEY.

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation. J25tf

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N. Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention.

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 47—tf

HARVEY'S PATENT RAILROAD SPIKES.

THE Subscribers are manufacturing and are now prepared to make contracts for the supply of the above article. Samples may be seen and obtained at Messrs. BOORMAN, JOHNSON, AYRES & Co No. 119 Greenwich Street, New-York, or at the Makers in Poughkeepsie, who refer to the subjoined certificates in relation to the article.

HARVEY & KNIGHT.

POUGHKEEPSIE, October 25th, 1836.

The undersigned having attentively examined HARVEY'S PATENT FLANCHED and GROOVED SPIKES is of the opinion, that they are decidedly preferable for Railroads to any other Spikes with which he is acquainted; and shall unhesitatingly recommend their adoption by the different Railroad Companies whose works he has in charge.

BENJ. WRIGHT,
Chief Engineer N. Y. & E. R. R.

NEW-YORK, April 4th, 1836.

Harvey's Flanched and Grooved Spikes are evidently superior for Railroads to those in common use, and I shall recommend their adoption on the roads under my charge if their increased cost over the latter is not greater than some twenty per cent.

JNO. M. FESSENDON, Engineer.

BOSTON, April 26th, 1836. No. 44—7t.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes (1J23am) H. BURDEN

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Durfee, Coleman & Co., for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

8th month, 8th, 1836. Hudson, Columbia County, State of New-York.

E. S. TOWNSEND, GEORGE COLEMAN,
ROBT. C. FOLGER, SYDNEY S. DURFEE
33—tf.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whittemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq.,	(Civil Engineer,) Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt John Bottom,	Tonawanda, Penn
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New York, and several other bridges are now in progress

The undersigned has removed to Rochester, Monroe county, New-York, where he will promptly attend to orders in this line of business to any practicabl eextent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H Long

Rochester, May 22d, 1836. 19y-tf.

An English Engineer, who has had the advantage of some experience, and is in possession of good testimonials, is desirous of being employed on a Railroad or under an Engineer of character in the United State, as Assistant.

Address this office—post paid.

50—3t

An Engineer is desirous of obtaining a situation, on some work, either Railroad or Canal; he would have no objections to go on to any part of the United States.

Satisfactory references given as to character and capacity. Address W. H. W. at this office—post-paid. 504t

A SPLENDID OPPORTUNITY TO MAKE A FORTUNE.

THE Subscriber having obtained Letters Patent, from the Government of France, granting him the exclusive privilege of manufacturing Horse Shoes, by his newly invented machines, now offers the same for sale on terms which cannot fail to make an independent fortune to any enterprising gentlemen wishing to embark in the same.

The machines are in constant operation at the Troy Iron and Nail Factory, and all that is necessary to satisfy the most incredulous, that it is the most VALUABLE PATENT, ever obtained, either in this or any other country, is to witness the operation which is open for inspection to all during working hours. All letters addressed to the subscriber (post paid) will receive due attention.

Troy Iron Works, HENRY BURDEN.

N. B. Horse Shoes of all sizes will be kept constantly for sale by the principal Iron and Hard-ware Merchants, in the United States, at a small advance above the price of Horse Shoe Iron in Bar. All persons selling the same, are AUTHORISED TO WARRANT EVERY SHOE, made from the BEST REFINED IRON, and any failing to render THE MOST PERFECT SATISFACTION, both as regards workmanship and quality of Iron, will be received back, and the price of the same refunded. H. BURDEN. 47—tf

RAILWAY IRON, LOCOMOTIVES, &c

THE subscribers offer the following articles for sale.

Railway Iron, flat bars, with countersunk holes and mitred joints,

						lbs.	
350 tons	2½ by	⅝,	15 ft in length,	weighing		$4\frac{68}{100}$	per ft.
280 "	2 "	⅝,	"	"	"	$3\frac{50}{100}$	"
70 "	1½ "	⅝,	"	"	"	2½	"
80 "	1¼ "	⅜,	"	"	"	$1\frac{25}{100}$	"
90 "	1 "	½,	"	"	"	⅞	"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2¾, 3, 3¼, 3½, 3¾, and 3⅞ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand flax.

Also Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

Mr. Solomon W. Roberts, a highly respectable American Engineer, resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron &c. ordered through us

A. & G. RALSTON.

28—tf Philadelphia, No. 4, South Front st.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size. Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

H. R. DUNHAM & CO.

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